

Innovative Power Transmission



Planetary Gears Type PLS and PWS

RENK Planetary Marine Gears for Fast Vessels

Planetary Marine Gears for Main Propulsion Systems

Capacity range from 1,500 to 10,000 kW and reduction ratios from 1.5 to 7.1



Mine sweeper, type SM 343 of the German Navy with PLS 25 in non-magnetic design



Coastguard vessel

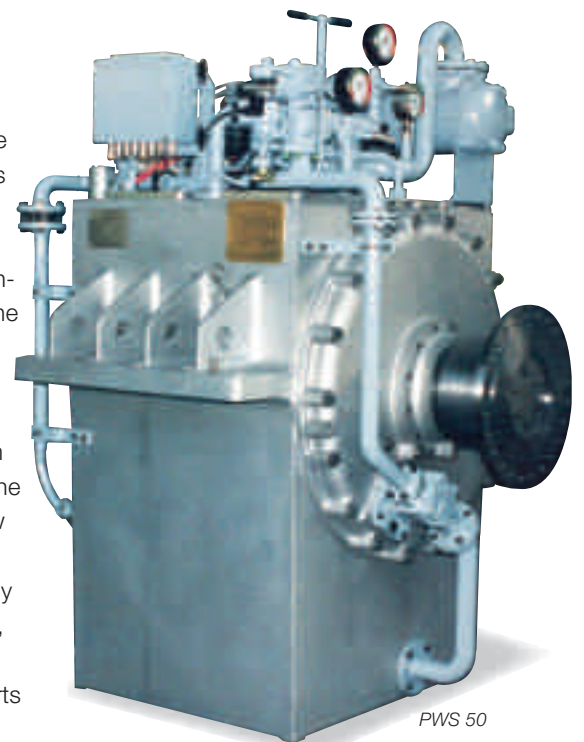


Coastguard vessel

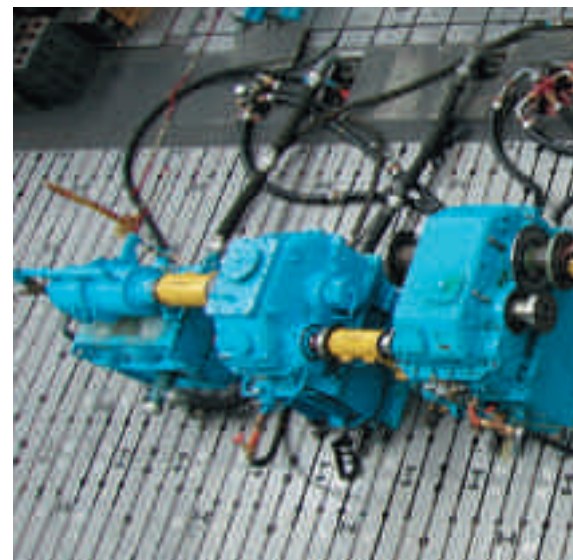
The marine planetary gear units of RENK series PLS and PWS have been specially designed for use in fast vessels, such as corvettes, patrol boats and luxury yachts. With a capacity range from 1,500 to 10,000 kW and reduction ratios from 1.5 to 7.1, this gear series covers all known requirements. Optionally, if required, Power Take Off's (PTO) and Power Take In's (PTI), trolling valve as well as higher gear reductions can be delivered. The RENK planetary gears for fast vessels are also available as disconnectable reduction gear units and as reversing gear units for fixed pitch propellers. Input and output shafts are co-axial. The main gear housing is cast aluminium.

PWS and PLS gear units are compact and torsionally rigid. The bottom section of the housing incorporates the oil collecting tank (dry sump), to allow favourable installation conditions in the ship. Normally the gears are rigidly connected with the ship's foundation, however, for special extreme noise reduced requirements, elastic supports are optionally available.

Within the planet gear system all external toothed gears are case hardened, and all internal toothed gears are nitrided or tempered to high hardness. The teeth are ground to highest accuracy. To absorb propeller thrust, the axial bearing is incorporated within the gear unit. Long-life antifriction bearings are used throughout the gear system. At particular request slide bearings can be optionally provided.



PWS 50



To optimise the reactions of the engine during clutch engagement, the actuating pressure on the multi-disc clutches is continuously and progressively increased to its final operating value. When the clutch is open, the discs are automatically held apart to achieve the lowest possible drag torque, which assists engine start-up and idle. Control of the multi-disc clutch is electro-hydraulic. The entire gear monitoring system follows the rules for unmanned machinery operation as demanded by the classification societies.

By installing an intermediate gear stage within the RENK design, any speed reduction commonly used in fast vessels can be delivered. The PLS gear unit consists of a single-stage planet wheel set with multi-disc clutch for connecting and disconnecting the drive unit during operation. By varying the design of the planet wheel set and corresponding arrangement of the multi-disc clutch the input shaft and the output shaft either have the same direction or opposite direction of rotation.

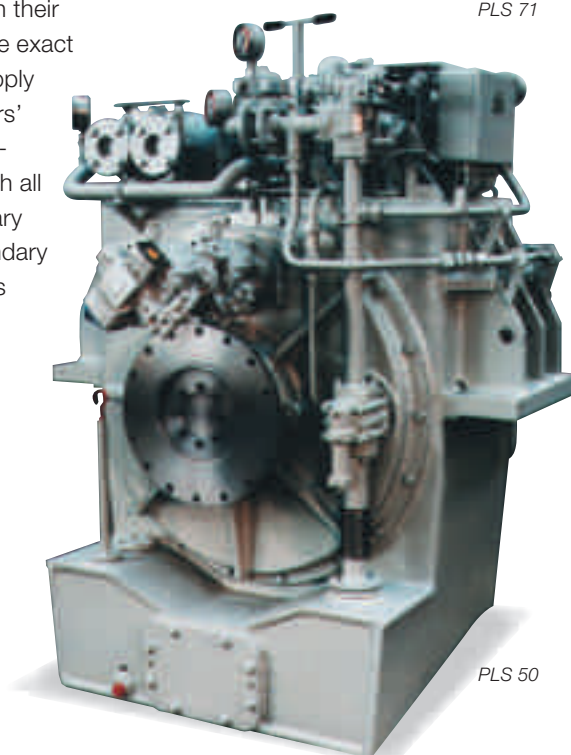
The PWS gear unit for fixed pitch propellers consists of two in-line planetary sets which can each be connected or disconnected via two separate multi-disc clutches. Depending on which

planet set has been selected, the same direction of rotation or opposite direction of rotation is obtained on the output shafts. This enables the vessel to carry out the manoeuvres “Ahead”, “Astern” and “Stop” and repeated as often as desired during a voyage or docking manoeuvre. The controlled oil pressure applied to the multi-disc clutches ensures cushioned gear changes. The PWS gear can be operated under full load in both forward and reverse gear. In the case of vessels with several shaft lines, port and starboard gear units may be supplied completely identical and interchangeable.

The gear units are complete with their own oil system and controls. The exact specification of the scope of supply will be agreed with the customers’ representative based on the vessels particular requirements. With all PLS and PWS type gears, primary high pressure pumps and secondary trailing pumps are provided, plus additional electric pumps upon specific request.

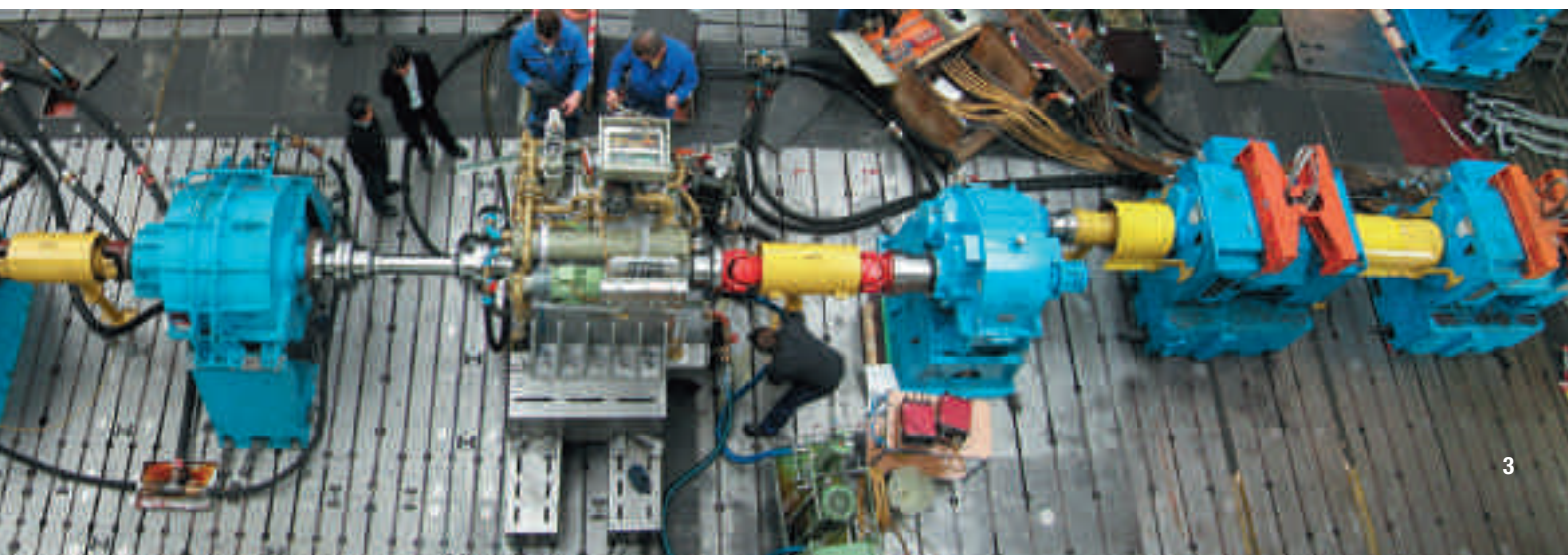


PLS 71



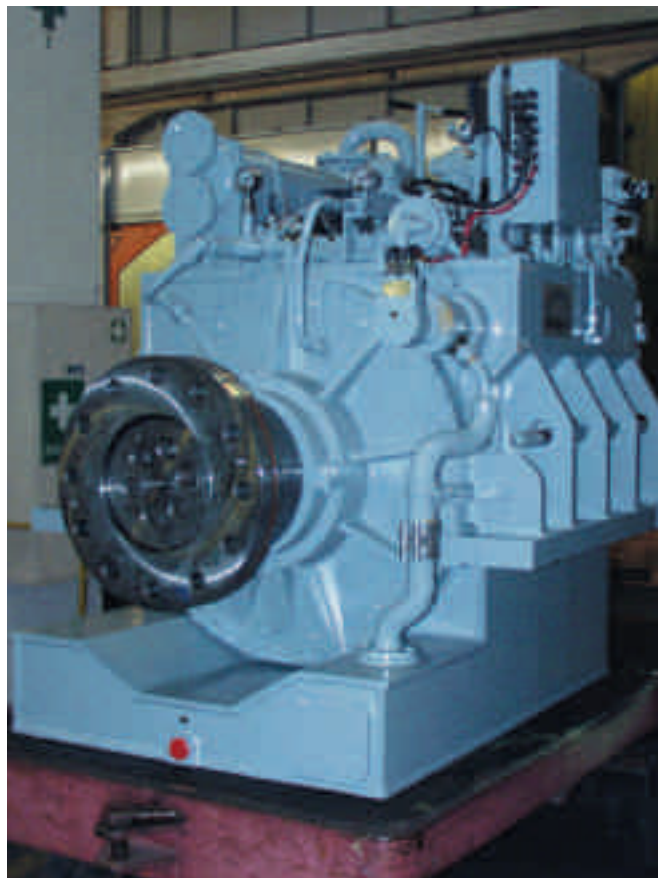
PLS 50

Test rig for gear units of series PWS



Main Features and Special Advantages

- Compactness – allowing favourable design of the engine room.
- Insensitivity of the transmission elements to deformations of the ship's foundation – ensuring high reliability even under extreme operating conditions.
- The coaxial gearbox design allows a very simple foundation concept.
- Cushioned speed changing processes – engine power performance adapted engagement torques.
- Low weight/power ratio – increasing the vessel's payload.
- Highly efficient due to the planet gear design and the automatic separation of the discs of the open multi-disc brake, even when installed at inclined shaft angles.
- Auxiliary drive (PTI) is optional using an auxiliary engine (electric motor or other power source) – therefore suitable for special operations (low-speed operations with ultra-quiet acoustical requirements).
- Port and starboard gear units have the same connections with PLS, in the case of the type PWS they are also identical – allowing simple installation in multi-shaft vessels and offering interchangeability.
- If required, a low-speed gear can be provided, allowing special operating conditions (extra low speed, marine fouling of the hull).
- Excellent anti shock properties due to compact design.
- For special requirements, the gearboxes can be delivered in antimagnetic version or optionally in water submersible design.
- pressure proof to a depth of 5 metres.



PWS 50



Gearbox PLS 35,5 (rotor set)

Versatile Arrangements



PWS 50 for a coastguard vessel.



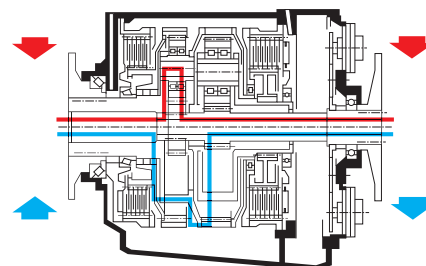
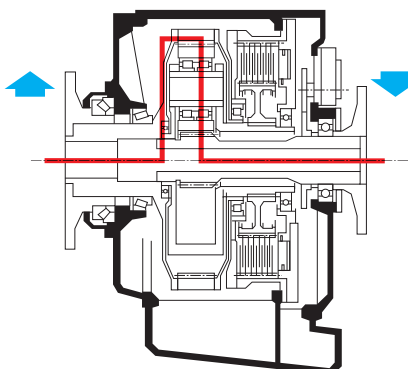
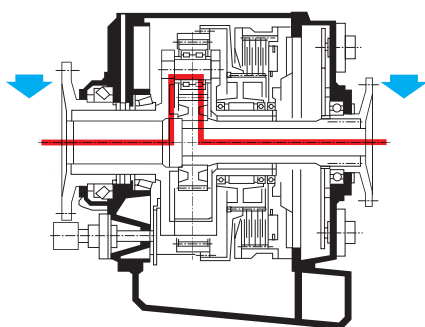
PLS 71 for a fast patrol boat.

Designs and direction of rotation

Marine planetary gear unit Type PLS..p, input and output shaft with same direction of rotation

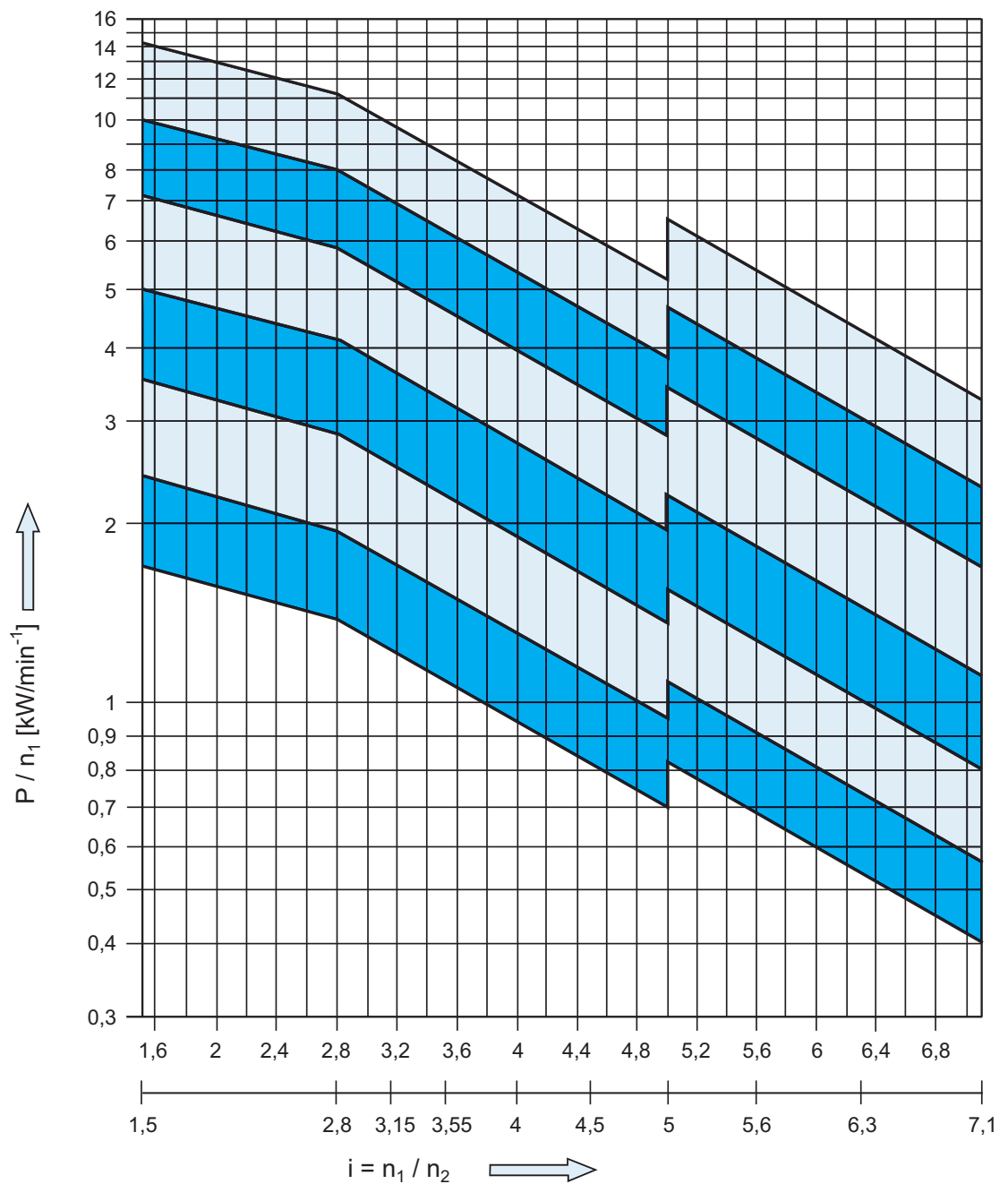
Marine planetary gear unit Type PLS..z, input and output shaft with opposite direction of rotation

Marine planetary reversing gear unit type PWS (special design with deep tank)



Gear unit size

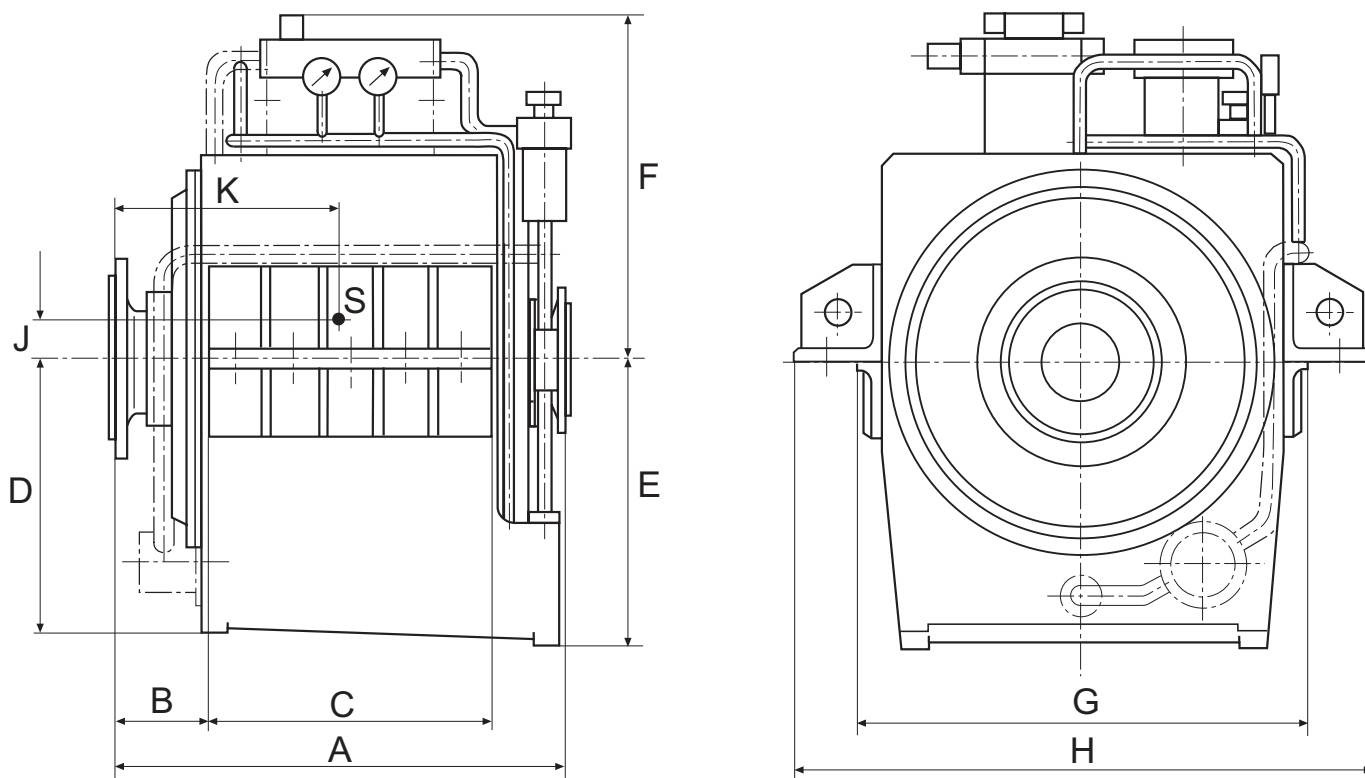
Performance diagram



In the performance diagram the reference value P/n applies to the drive and relates to the excess engine performance according to ISO 3046/1 (P = engine power, n = rpm).

In the case of engines with a guaranteed maximum output limitation the limiting curves may be exceeded by 6%.

Remark: According to classification rules, P/n to be multiplied by factor 1.1...1.3.



Gear unit dimensions

Type	Dimensions [mm]											Weight, dry [kg]		Thrust	Oil content	
	A i<2,8 i<5	A i>2,8 i>5	B	C	D	E	F	G	H	J	K	i<2,8 i<5	i>2,8 i>5			
PLS																
18	900	800	200	480	530	560	710	850	1,120	80	400	1,600	1,450	130	90	
25	1,000	900	225	530	600	630	800	950	1,250	90	450	2,100	1,800	160	110	
35,5	1,120	1,000	250	600	670	710	900	1,060	1,400	100	500	2,800	2,450	200	130	
50	1,250	1,120	280	670	750	800	1,000	1,180	1,600	115	560	3,600	3,200	250	150	
71	1,400	1,250	315	750	850	900	1,120	1,320	1,800	125	630	4,550	4,150	320	185	
100	1,600	1,400	355	850	950	1,000	1,250	1,500	2,000	140	710	5,780	5,150	400	230	

Type	Dimensions [mm]											Weight, dry [kg]		Thrust	Oil content
	A i<2,8 i<5	A i>2,8 i>5	B	C	D	E	F	G	H	J	K	i<2,8 i<5	i>2,8 i>5		
PWS															
18	1,060	950	200	600	530	560	710	850	1,120	80	480	1,900	1,750	130	120
25	1,180	1,060	225	670	600	630	800	950	1,250	90	530	2,600	2,350	160	145
35,5	1,320	1,180	250	750	670	710	900	1,060	1,400	100	600	3,600	3,350	200	170
50	1,500	1,320	280	850	750	800	1,000	1,180	1,600	112	670	5,050	4,700	250	200
71	1,700	1,500	315	950	850	900	1,120	1,320	1,800	125	750	6,900	6,350	320	235
100	1,900	1,700	355	1,060	950	1,000	1,250	1,500	2,000	140	850	9,700	8,750	400	280

Changes due to technical progress reserved.

Dimensions for low-speed design on request.

Design I > 2.8 on request.



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