auma®
Solutions for a world in motion

HYMAX

Hypoid escalator gear units

HIGH EFFICIENCY ESCALATOR GEAR UNITS
HYPOID-HELICAL GEAR UNITS FTHST.1

AUMA DRIVES

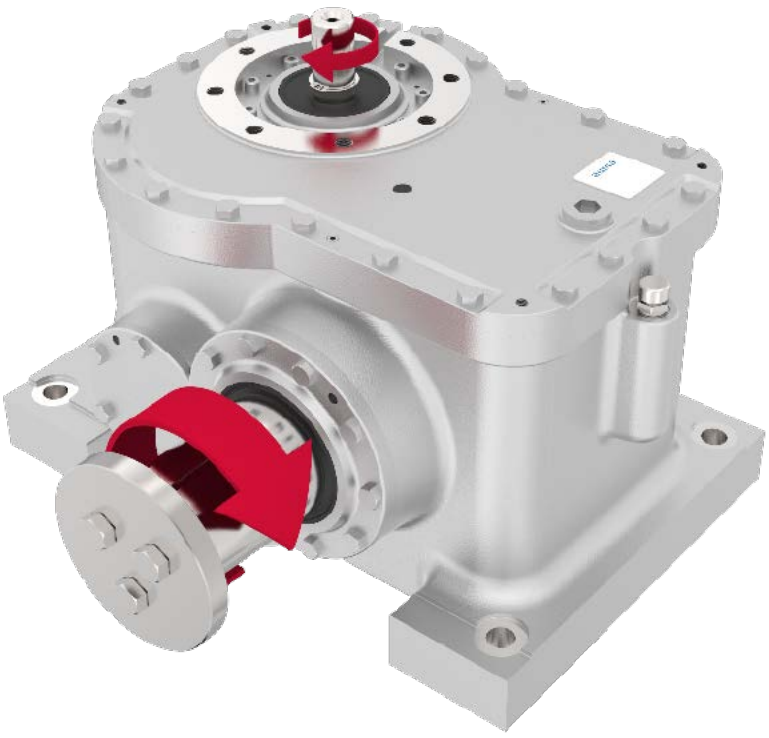
Our name means highest precision, engineering art and customised solutions in manufacturing gear units and drive systems. Safety-relevant applications such as the transport of people have always been a core automation competence for our gear units. We have complemented the elevator drive range by AUMA Drives escalator gear units for more than a decade. More than 47,000 AUMA Drives escalator gear units are reliably automating escalators in airpoirts, underground stations and department stores worldwide. With our single-stage and multi-stage gearbox series – and going beyond with the so-called twin drives – we cover motor power between 5 kW and 90 kW. The major assets of escalator gear units are their capability to withstand high loads and their functional safety, long running times, reliability and efficiency. We offer 100 % traceability for all components within the power drive.

ESCALATOR GEAR UNITS

ESCALATOR GEAR UNITS WITHOUT COMPROMISE

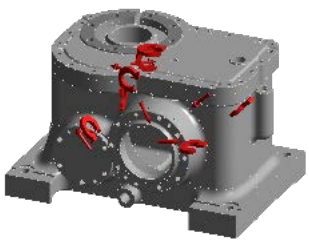
No matter whether you go to airports, underground stations or department stores – It is impossible to imagine everyday life without escalators. The core of all systems is the drive technology, imperatively meeting highest demands: a matter of course for AUMA Drives. We guarantee high resilience and functional safety, long service performance, reliability and economic viability.

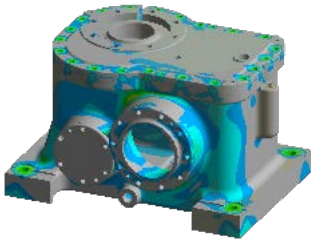
From the single part to the complete gearbox, all production steps are subject to continuous quality control – from incoming goods to final inspection at the acoustic measurement room. Our products fulfil all requirements of relevant standards according to the customer's product specifications.



DESIGN AND CHARACTERISTICS

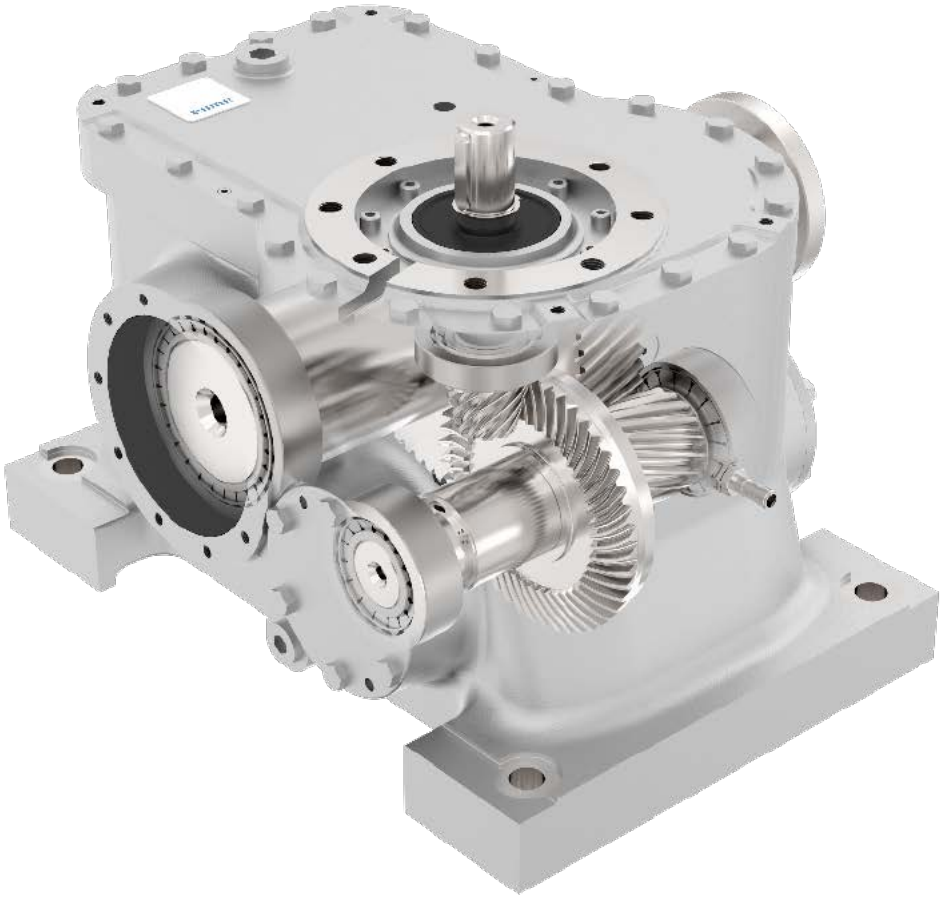
Various outstanding features have established our HYMAX gear units as first class escalator gear units.
The latest state of research has been implemented in the drive design, which is consistently geared to maximum efficiency. Without compromise, the experience gained from more than 20 years of developing escalator gear units has been transferred into a design that sets new standards. FEM optimised housings warrant for maximum stiffness and consequently reduced vibration within the powertrain.





Component	Code
Geared elements and shafts	Unlimited nominal fatigue life EN 115: 2017 - Chapter 5.4.1.3.2.
Housing	Guideline FKM (6th edition)
Hypoid gear sets	ISO 10300 (2014)
Helical gear sets	ISO 6336 (2006)
Shafts	DIN 743 (2012)
Feather keys	DIN 6892 (2012 method B)
Bearings	ISO/TS 16281 (2008)
Joins	Form-locked only EN 115:2017 - Chapter 5.4.1.3.1.

ESCALATOR GEAR UNIT FTHST.1



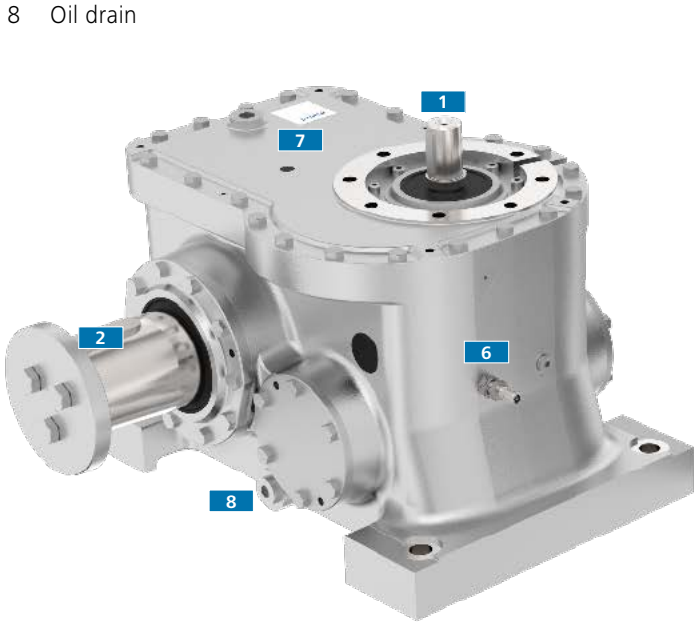
NOISE EMISSION, EFFICIENCY AND LIFETIME

In our in-house acoustic measurement room complying with DIN standards, the acoustic pressure level of our escalator gear units is measured and recorded as part of final inspection. Machining of gear sets on state-of-the-art equipment as well as unique measuring technology, partially in special development projects in close cooperation with our partners, ensure optimum gear quality. When using synthetic polyglycol lubricants the FTHST.1 series achieve an efficiency rating of more than 96% thanks to our gearing optimisation technology. Paired with the implementation of top grade materials, selected standard parts and high precision housing machining, maximum service life and highest reliability are achieved. The evidence of these results were confirmed by internal verifications and tests on customers' test benches.

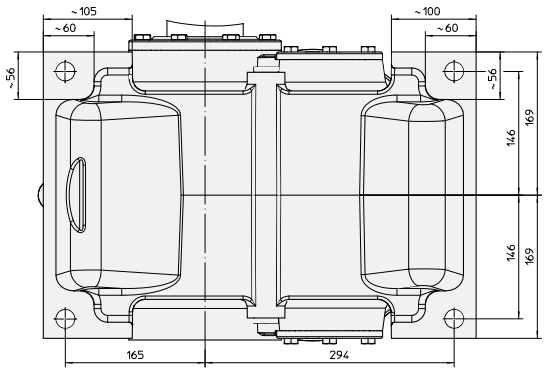
OPTIONS AND MOUNTING PARTS

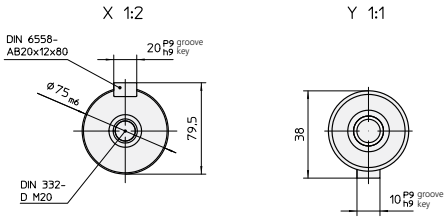
If specifically desired, AUMA Drives escalator gear units can be provided with integrated sensor technology for monitoring oil level, oil sump temperature and system vibration. When implemented in extremely low temperature environments, we offer an optional oil heater to ensure optimum lubrication as early as during the start-up phase.

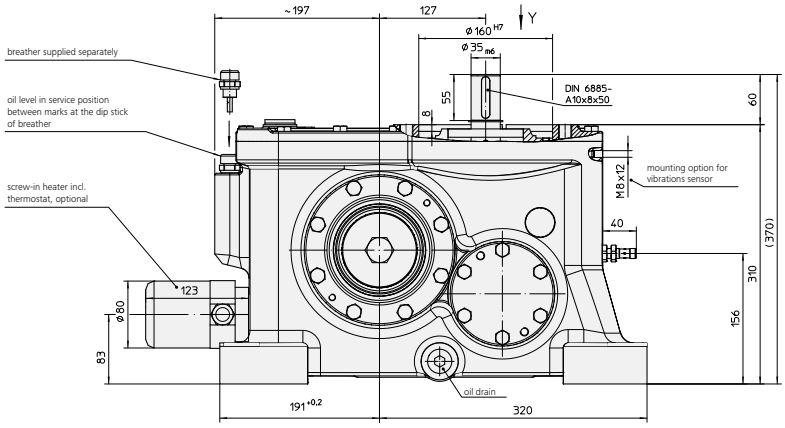
1 Input shaft
2 Output shaft
3 Air breather
4 Motorflange (Option)
5 Chain wheel (Option)
6 Combi-Sensor Oil level / Oil temperature (Option)
7 Type plate
8 Oil drain

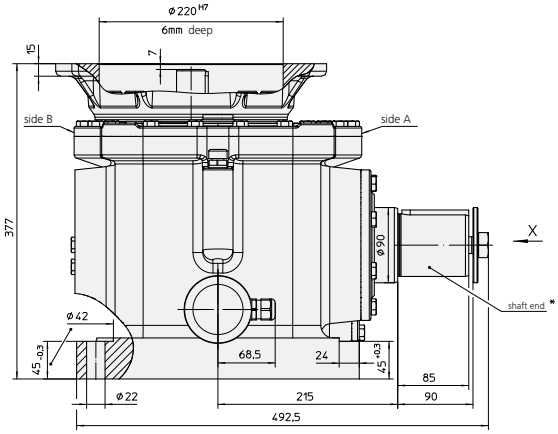


DIMENSION SHEET - TYPE FTHST 156.1









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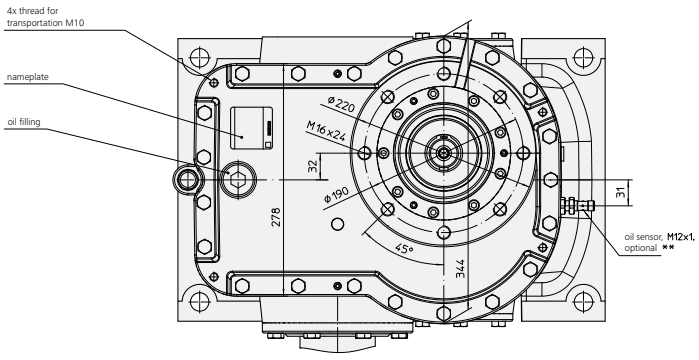

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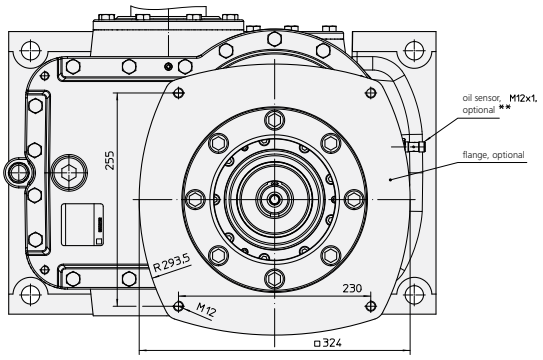

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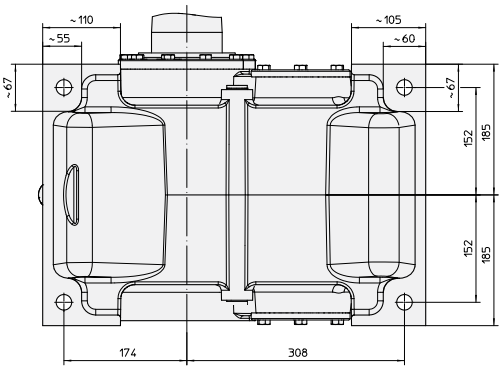

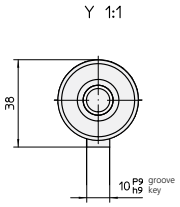

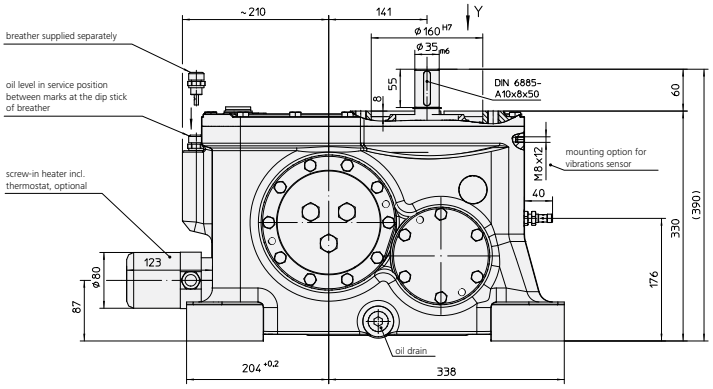

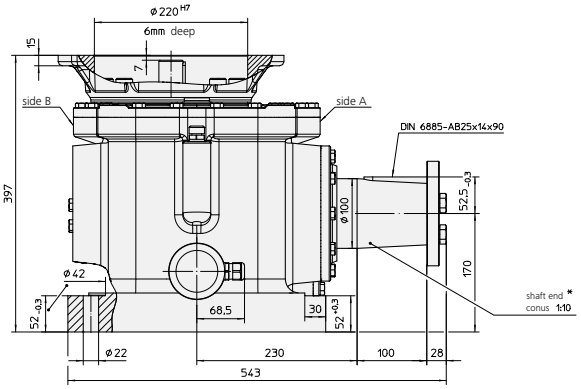

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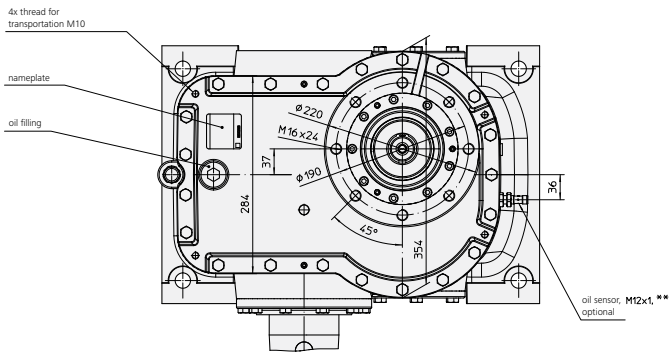

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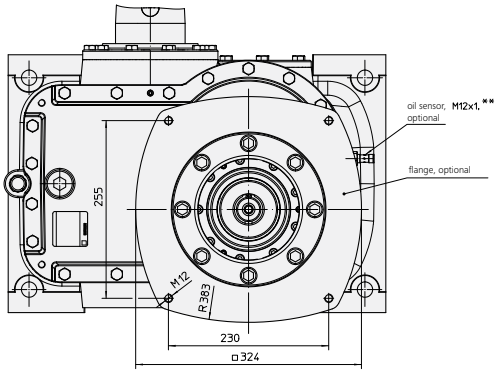

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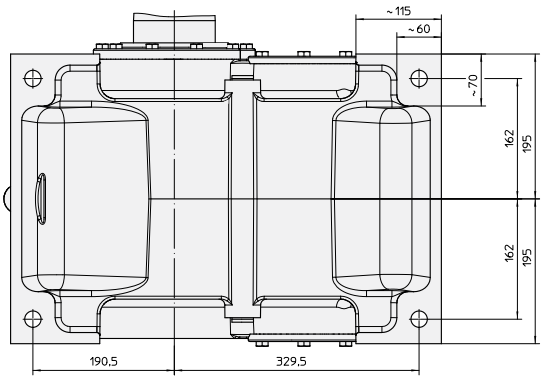

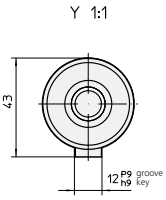

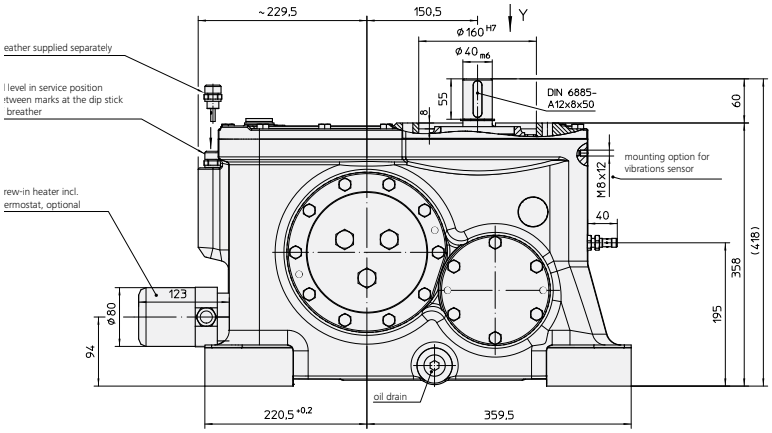

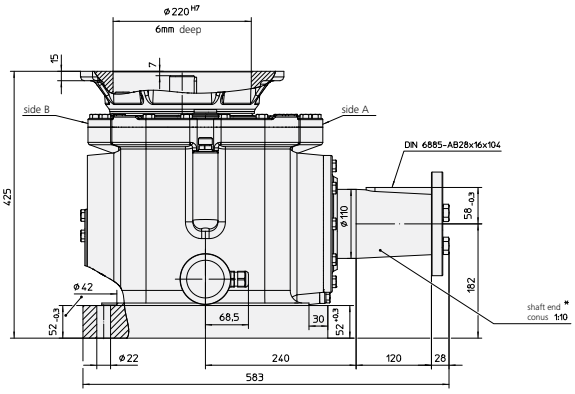

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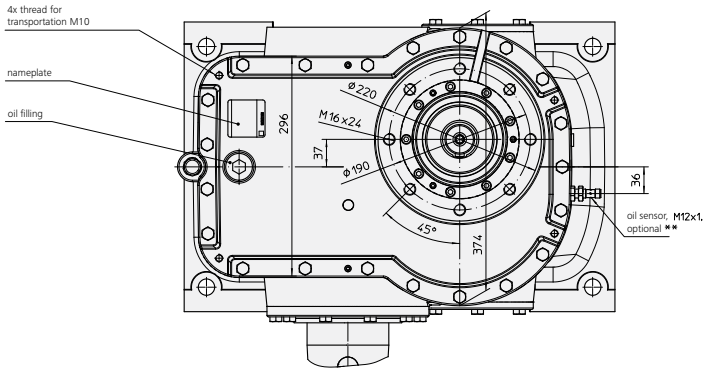

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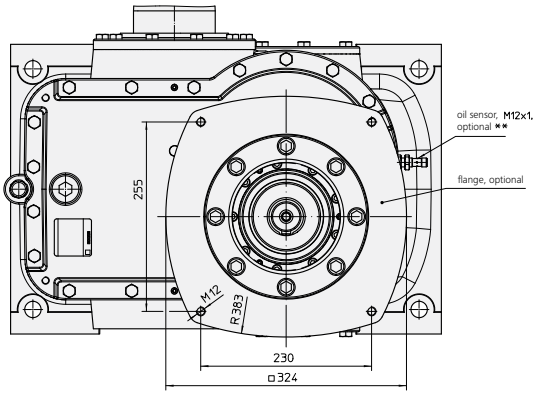



Courtesy of Gleason Corporation

GEAR UNIT SELECTION

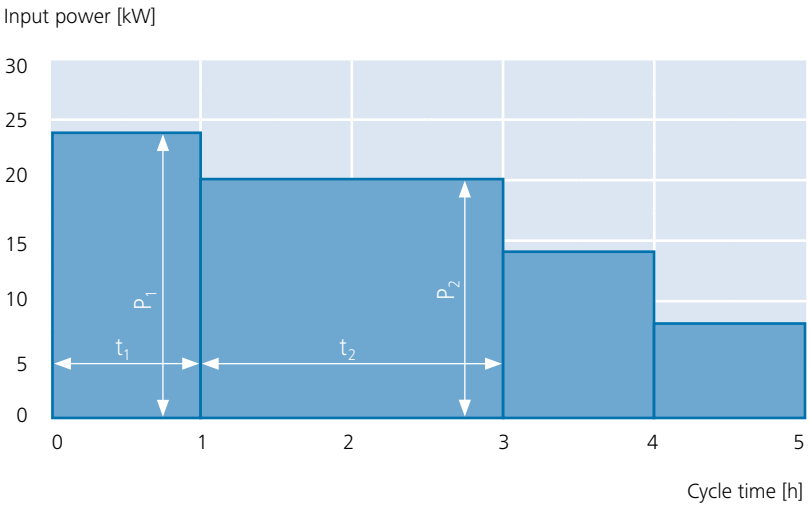
FTHST 156.1

FTHST 168.1

FTSHST 182.1

Our comprehensive product portfolio and the large number of possible transmission ratios offer many selection criteria for finding the optimum gear unit for your application and hence a cost-efficient drive solution. Rated motor power and speed and the desired speed at the pinion are decisive for the gear unit type, size and transmission ratio. Determination of computed lifetime of the selected motor-gear unit combination is based on the load spectrum of the escalator to be automated. The load spectrum is the variable for the varying loads due to fluctuating number of people to be transported during the day. By means of the computed equivalent power P_{eq} lifetime and permissible radial force are determined on the basis of graphs. The course of action is demonstrated by means of the following example:

1. LOAD SPECTRUM (EXAMPLE)



2. CYCLE TIME

$$t_{tot} = t_1 + t_2 + t_3 + \cdots t_i$$

3. EQUIVALENT POWER P_{EQ}

$$P_{eq} = \sqrt[3]{P_1^3 \times \frac{t_1}{t_{tot}} + P_2^3 \times \frac{t_2}{t_{tot}} + P_3^3 \times \frac{t_3}{t_{tot}} + \ldots + P_i^3 \times \frac{t_i}{t_{tot}}}$$

EXAMPLE

Load event 1 = 24 kW across 1/5 of time

Load event 2 = 20 kW across 2/5 of time

Load event 3 = 14 kW across 1/5 of time

Load event 4 = 8 kW across 1/5 of time

$t_{tot} = 5\,h$

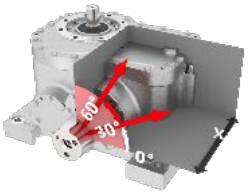
$P_{eq} = 18.8\,kW$

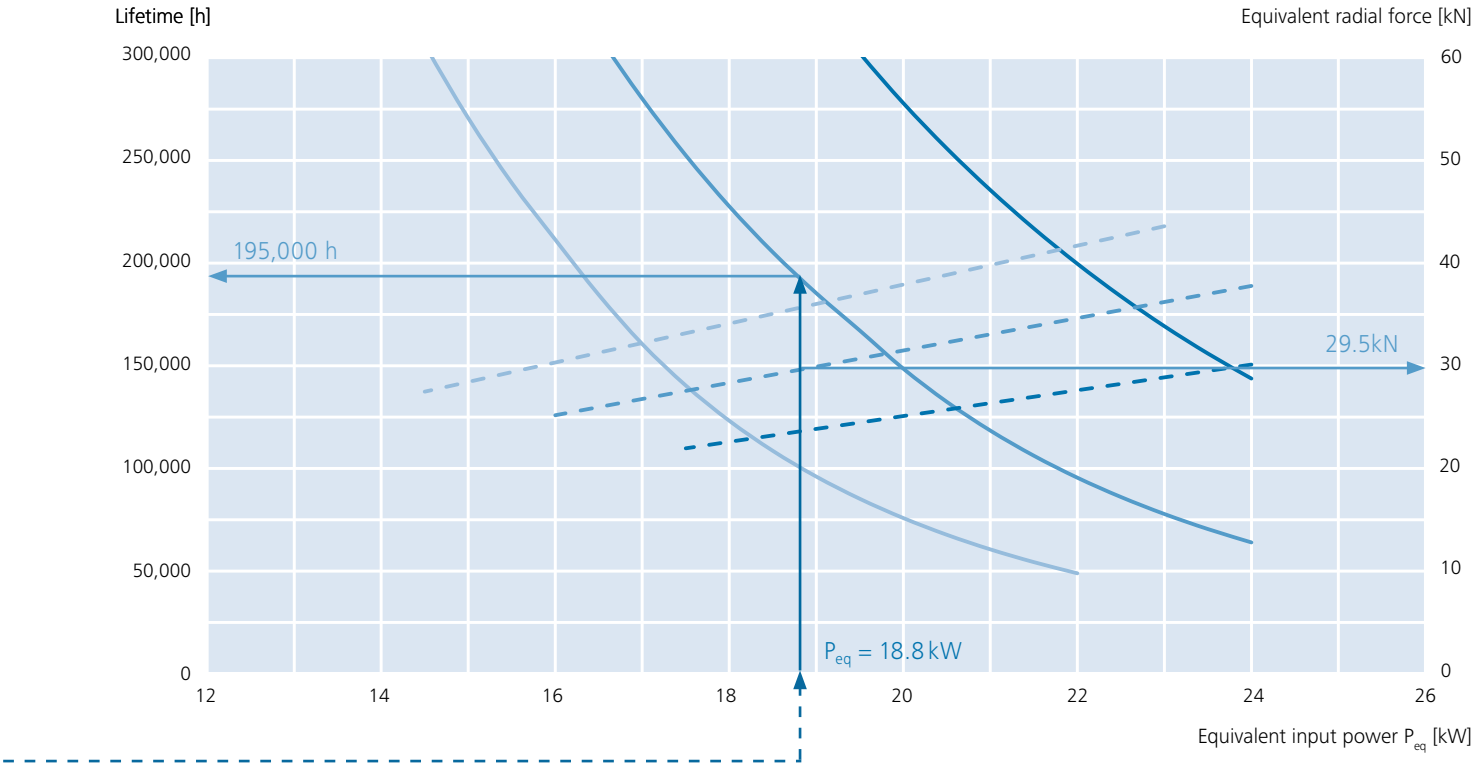
4. GRAPHIC DETERMINATION OF RESULTING LIFETIME AND PERMISSIBLE RADIAL FORCE AT OUTPUT SHAFT

TRANSMISSION RATIO 20.8

Gear unit selected as example: FTHST 168.1 with transmission ratio i = 20.8 and motor speed of 1,180 rpm

Lubrication	Polyglycol	
Ambient temperature	40 °C	
Efficiency	≥ 96 %	
Max. output torque	6.8 kNm (acc. to EN 115 » factor of safety ≥ 5)	α = 30…60°
Max. radial force	66 kN (acc. to EN 115 » factor of safety ≥ 5)	x = 280 mm





Lifetime	Radial force	Input speed [rpm]	Max. rated motor power [kW]	Max. rated radial force [kN]
		980	23.0	43
		1180	24.0	38
		1480	24.0	30

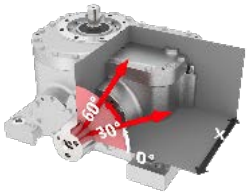
5. RESULT

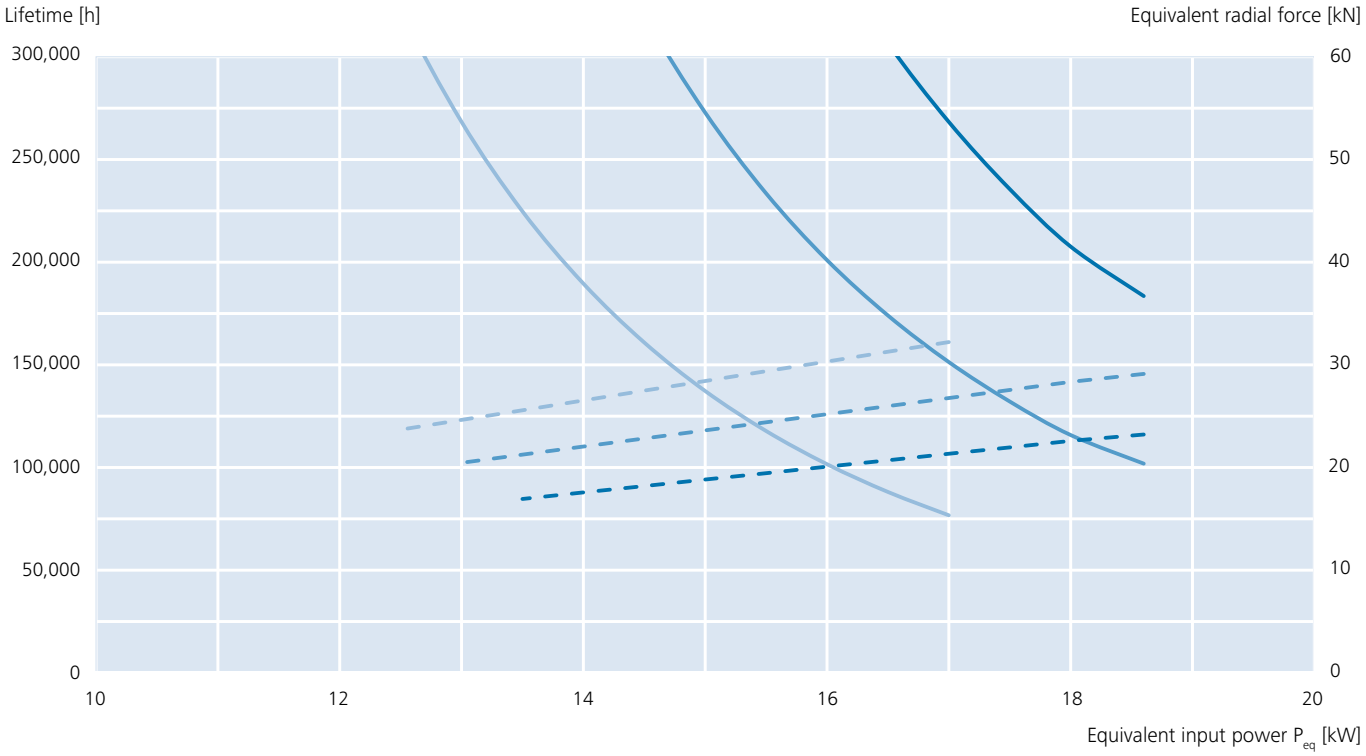
The selected gear unit FTHST168.1 with reduction ratio i = 20.8 achieves a computed lifetime of 195,000 hours. The permissible radial load on the output shaft at α =30…60° is 29.5 kN.

PERFORMANCE - TYPE FTHST 156.1

TRANSMISSION RATIO 20.8

Lubrication	Polyglycol	
Ambient temperature	40 °C	
Efficiency	≥ 96 %	
Max. output torque	5.1 kNm (acc. to EN 115 » factor of safety ≥ 5)	α = 30…60°
Max. radial force	50 kN (acc. to EN 115 » factor of safety ≥ 5)	x = 258 mm



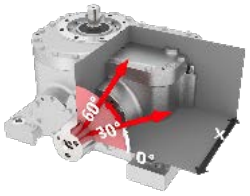


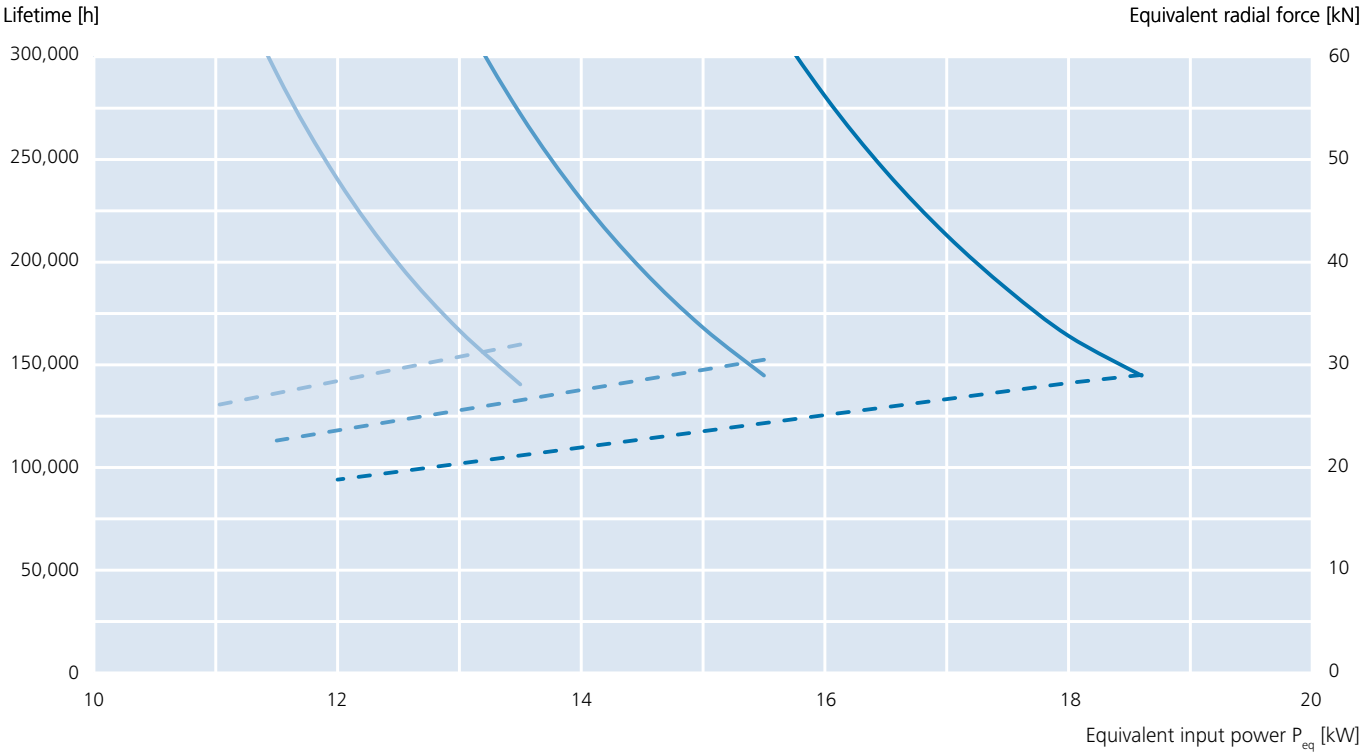
Lifetime	Radial force	Input speed [rpm]	Max. rated motor power [kW]	Max. rated radial force [kN]
		980	17.0	32
		1180	18.6	30
		1480	18.6	29

PERFORMANCE - TYPE FTHST 156.1

TRANSMISSION RATIO 25.9

Lubrication	Polyglycol	
Ambient temperature	40 °C	
Efficiency	≥ 96 %	
Max. output torque	4.8 kNm (acc. to EN 115 » factor of safety ≥ 5)	α = 30…60°
Max. radial force	47 kN (acc. to EN 115 » factor of safety ≥ 5)	x = 258 mm



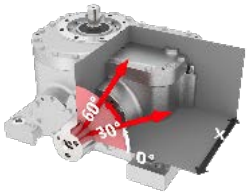


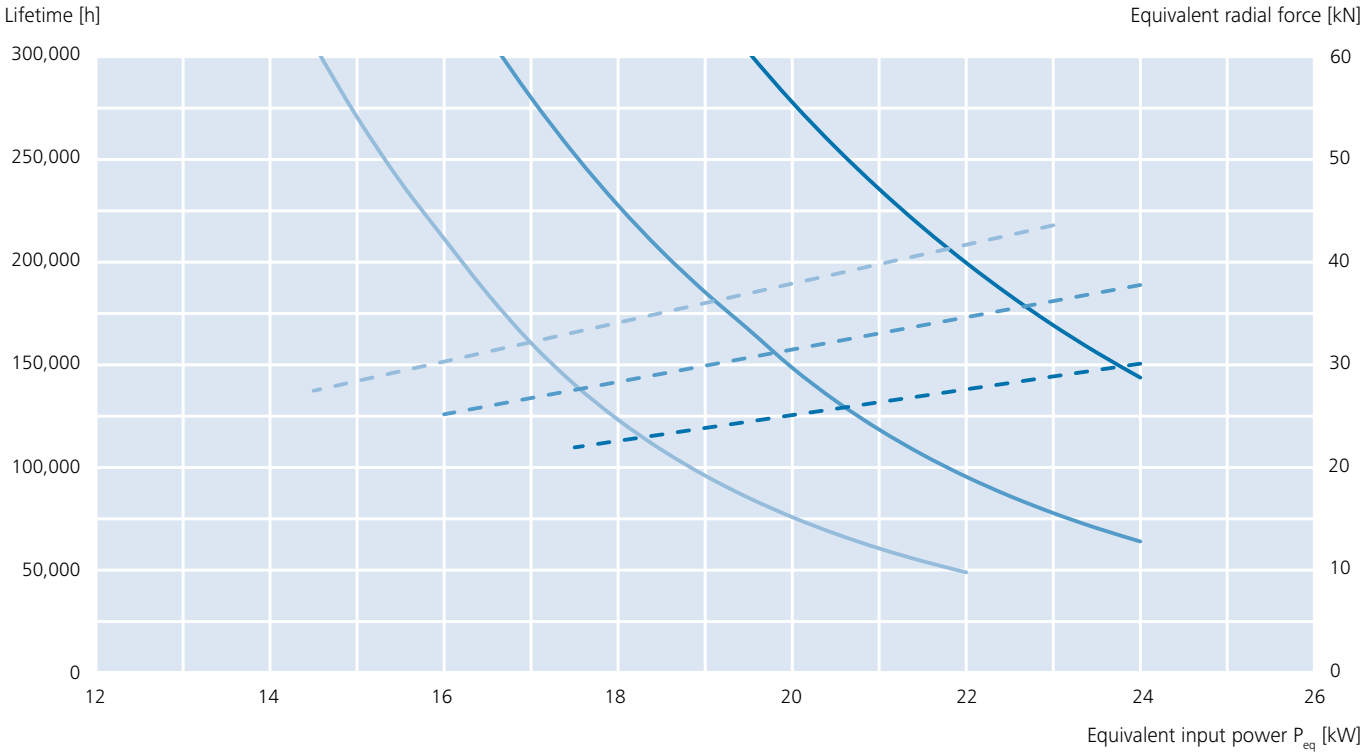
Lifetime	Radial force	Input speed [rpm]	Max. rated motor power [kW]	Max. rated radial force [kN]
		980	13.5	32
		1180	15.5	29
		1480	18.6	24

PERFORMANCE - TYPE FTHST 168.1

TRANSMISSION RATIO 20.8

Lubrication	Polyglycol	
Ambient temperature	40 °C	
Efficiency	≥ 96 %	
Max. output torque	6.8 kNm (acc. to EN 115 » factor of safety ≥ 5)	α = 30…60°
Max. radial force	66 kN (acc. to EN 115 » factor of safety ≥ 5)	x = 280 mm



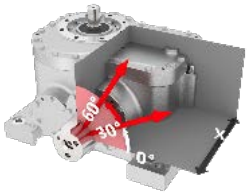


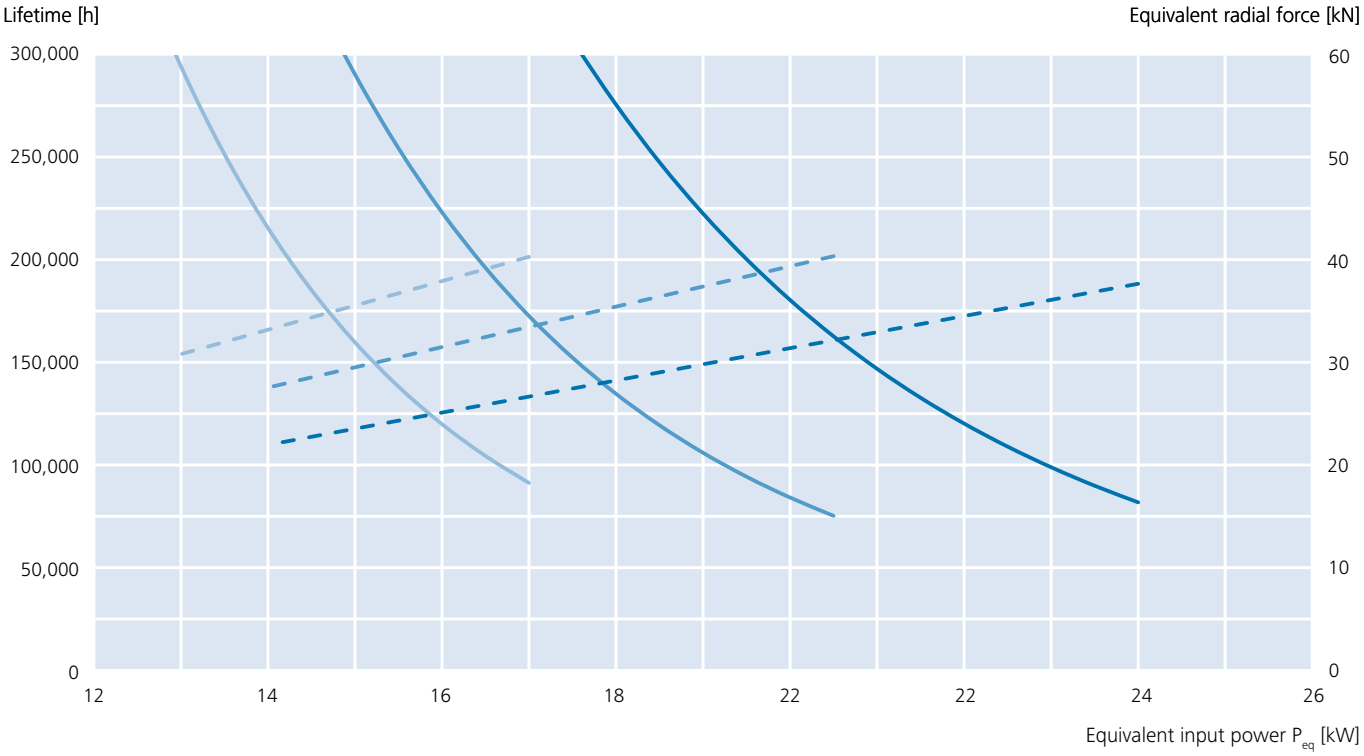
Lifetime	Radial force	Input speed [rpm]	Max. rated motor power [kW]	Max. rated radial force [kN]
		980	23.0	43
		1180	24.0	38
		1480	24.0	30

PERFORMANCE - TYPE FTHST 168.1

TRANSMISSION RATIO 25.9

Lubrication	Polyglycol	
Ambient temperature	40 °C	
Efficiency	≥ 96 %	
Max. output torque	6.4 kNm (acc. to EN 115 » factor of safety ≥ 5)	α = 30…60°
Max. radial force	62 kN (acc. to EN 115 » factor of safety ≥ 5)	x = 280 mm



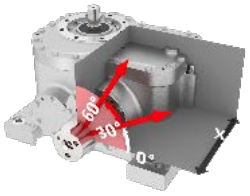


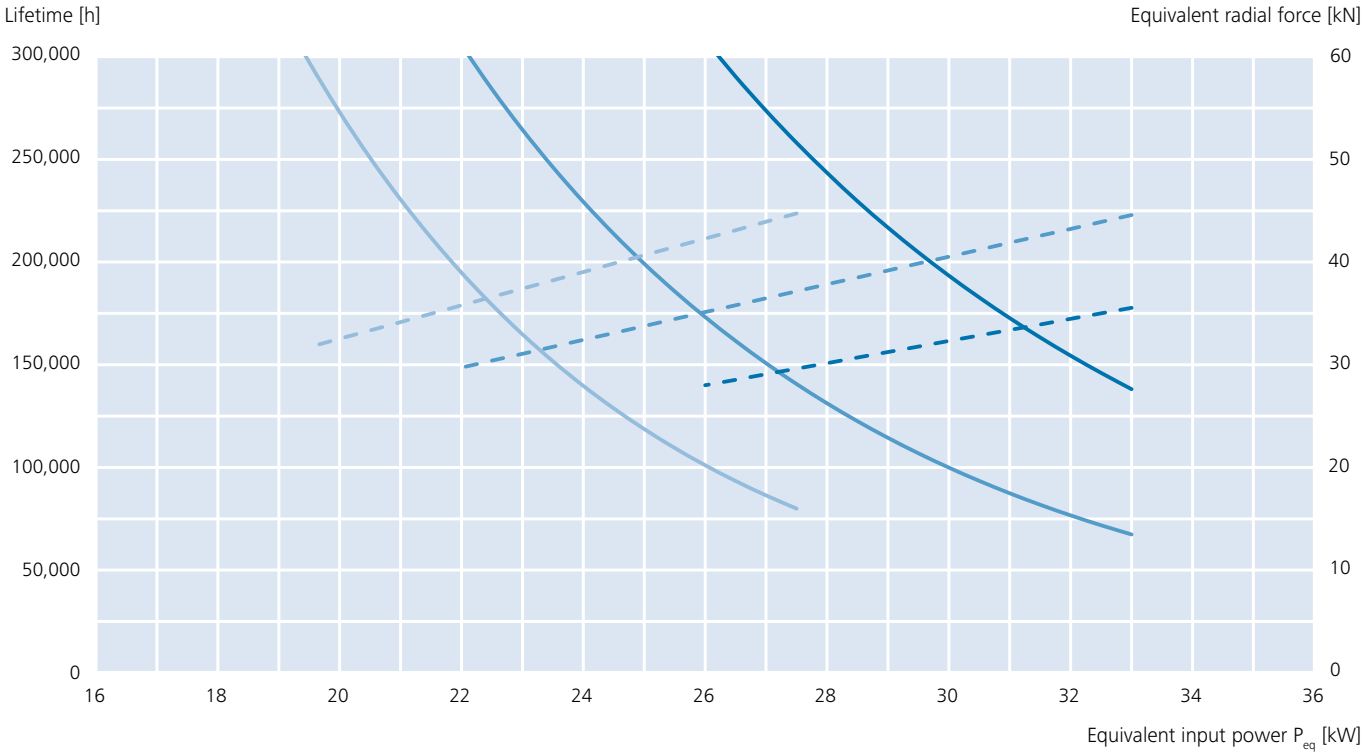
Lifetime	Radial force	Input speed [rpm]	Max. rated motor power [kW]	Max. rated radial force [kN]
———	- - - - - -	980	17.0	40
———	- - - - - -	1180	20.5	40
———	- - - - - -	1480	24.0	37

PERFORMANCE - TYPE FTHST 182.1

TRANSMISSION RATIO 20.8

Lubrication	Polyglycol	
Ambient temperature	40 °C	
Efficiency	≥ 96 %	
Max. output torque	8.4 kNm (acc. to EN 115 » factor of safety ≥ 5)	α = 30…60°
Max. radial force	70 kN (acc. to EN 115 » factor of safety ≥ 5)	x = 300 mm



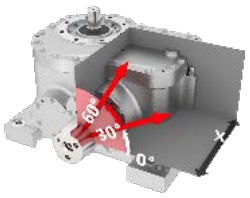


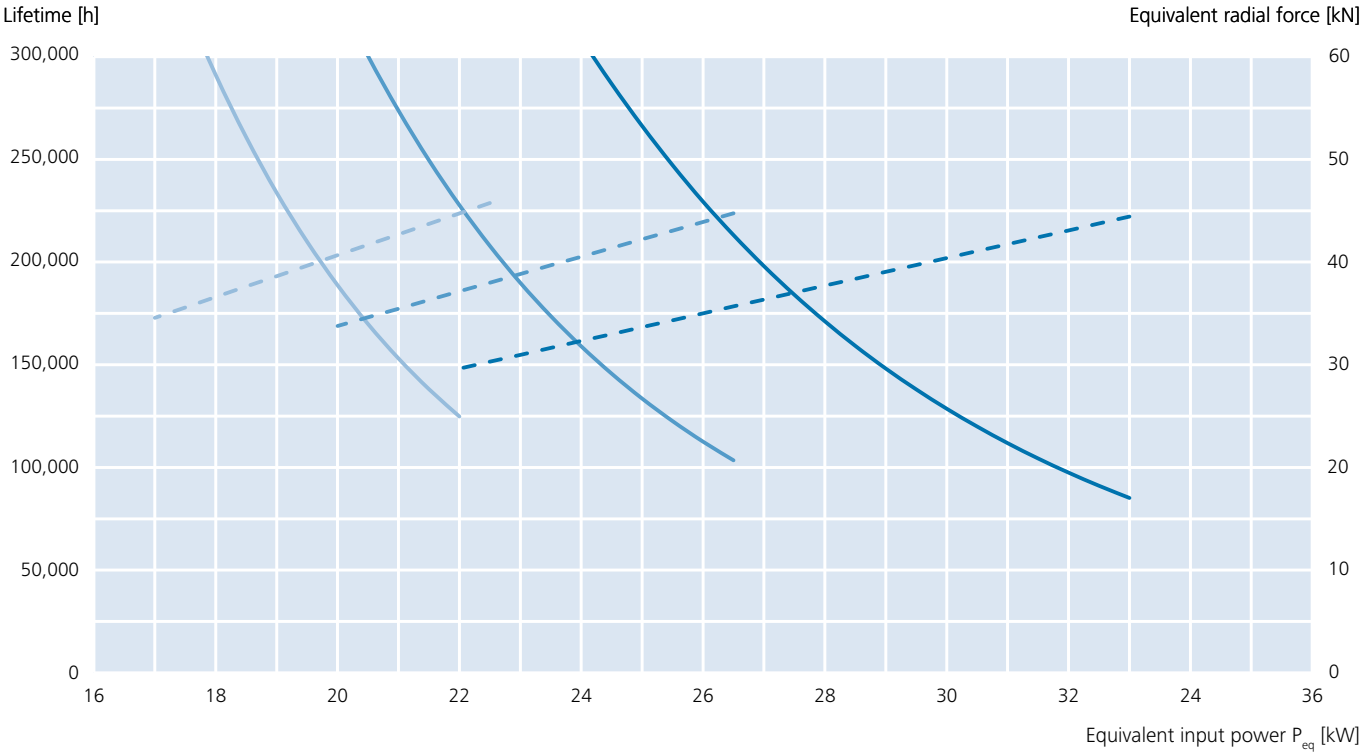
Lifetime	Radial force	Input speed [rpm]	Max. rated motor power [kW]	Max. rated radial force [kN]
		980	27.5	45
		1180	33.0	45
		1480	33.0	36

PERFORMANCE - TYPE FTHST 182.1

TRANSMISSION RATIO 25.9

Lubrication	Polyglycol	
Ambient temperature	40 °C	
Efficiency	≥ 96 %	
Max. output torque	7.8 kNm (acc. to EN 115 » factor of safety ≥ 5)	α = 30…60°
Max. radial force	65 kN (acc. to EN 115 » factor of safety ≥ 5)	x = 300 mm





Lifetime	Radial force	Input speed [rpm]	Max. rated motor power [kW]	Max. rated radial force [kN]
———	- - - - - -	980	22.0	45
———	- - - - - -	1180	26.5	45
———	- - - - - -	1480	33.0	44

auma®
Solutions for a world in motion

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