5 Project Planning for Gear Units

5.1 Efficiency of SEW gear units

General information

The efficiency of gear units is mainly determined by the gearing and bearing friction. Keep in mind that the starting efficiency of a gear unit is always less than its efficiency at operating speed. This factor is especially pronounced in the case of helical-worm and Spiroplan® right-angle gearmotors.

R, F, K gear units

The efficiency of helical, parallel-shaft and helical-bevel gear units varies with the number of gear stages, between 94 % (3-stage) and 98 % (1-stage).

S and W gear units

The gearing in helical-worm and Spiroplan® gear units produces a high proportion of sliding friction. As a result, these gear units have higher gearing losses than R, F or K gear units and thus be less efficient.

The efficiency depends on the following factors:

- Gear ratio of the helical-worm or Spiroplan® stage
- Input speed
- Gear unit temperature

Helical-worm gear units from SEW-EURODRIVE are helical gear/worm combinations that are significantly more efficient than plain worm gear units. The efficiency may reach $\eta < 0.5$ if the helical-worm or Spiroplan® stage has a very high ratio step.

Self-locking

Retrodriving torques on helical-worm or Spiroplan® gear units produce an efficiency of $\eta' = 2 - 1/\eta$, which is significantly less favorable than the forward efficiency η. The helical-worm or Spiroplan® gear unit is self-locking if the forward efficiency $\eta \leq 0.5$. Some Spiroplan® gear units are also dynamically self-locking. Contact SEW-EURODRIVE if you wish to make technical use of the braking effect of self-locking characteristics.

STOP

Do not use the self-locking effect of helical-worm and Spiroplan® gear units as sole safety function for hoists.

Run-in phase

The tooth flanks of new helical-worm and Spiroplan® gear units are not yet completely smooth. That fact makes for a greater friction angle and less efficiency than during later operation. This effect intensifies with increasing gear unit ratio. Subtract the following values from the listed efficiency during the run-in phase:

	Worm	
	i range	**η reduction**
1-start	approx. 50 ... 280	approx. 12%
2-start	approx. 20 ... 75	approx. 6%
3-start	approx. 20 ... 90	approx. 3%
5-start	approx. 6 ... 25	approx. 3%
6-start	approx. 7 ... 25	approx. 2%

Spiroplan® W10 to W30		Spiroplan® W37 and W47	
i range	**η reduction**	**i range**	**η reduction**
approx. 35 ... 75	approx. 15%	-	-
approx. 20 ... 35	approx. 10%	-	-
approx. 10 ... 20	approx. 8%	approx. 30 ... 70	approx. 8%
About 8	approx. 5%	approx. 10 ... 30	approx. 5%
About 6	approx. 3%	approx. 3 ... 10	approx. 3%

The run-in phase usually lasts 48 hours. Helical-worm and Spiroplan® gear units achieve their listed rated efficiency values when:

- the gear unit has been completely run-in,
- the gear unit has reached nominal operating temperature,
- the recommended lubricant has been filled in and
- the gear unit is operating in the rated load range.

Churning losses

In certain gear unit mounting positions (→ Sec. "Mounting positions and important order information"), the first gearing stage is completely immersed in the lubricant. When the circumferential velocity of the input stage is high, considerable churning losses occur in larger gear units that must be taken into account. Contact SEW-EURODRIVE if you wish to use gear units of this type.

If possible, use mounting position M1 for R, K and S gear units to keep the churning losses low.

5.2 Oil expansion tank

The oil expansion tank allows the lubricant/air space of the gear unit to expand. This means no lubricant can escape the breather valve at high operating temperatures.

SEW-EURODRIVE recommends to use oil expansion tanks for gear units and gearmotors in M4 mounting position and for input speeds > 2000 min^{-1}.

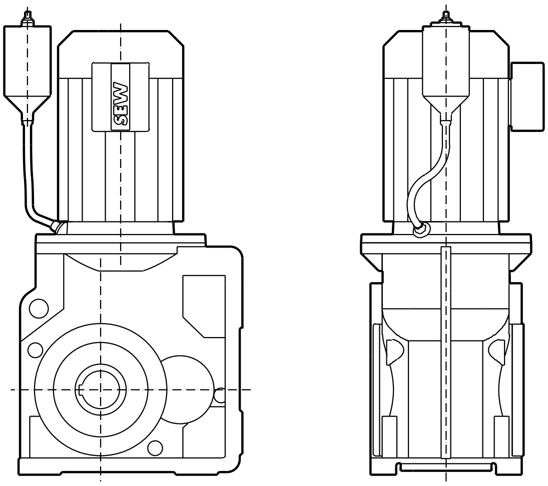

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Figure 2: Oil expansion tank

The oil compensator is provided as assembly kit. It is intended for mounting onto the gearmotor. However, if installation space is limited or if the expansion tank is intended for gear units without motor, it can be mounted to nearby machine parts.

For further information, please contact your SEW-EURODRIVE sales representative.

5.3 Multi-stage gearmotors

General information

You can achieve extremely low output speeds by using multi-stage gear units or multi-stage gearmotors. This means an additional second gear unit, usually a helical gear unit, is installed in front of the gear unit or between gear unit and motor.

The resulting total reduction ratio may make gear unit protection necessary.

Limiting the motor power

You have to reduce the maximum output motor power according to the maximum permitted output torque on the gear unit ($M_{a\ max}$). For this purpose you first have to determine the maximum permitted motor torque ($M_{N\ zul}$).

You can calculate the maximum permitted motor torque as follows:

$$M_{N\ zul} = \frac{M_{a\ max}}{i_{ges} \cdot \eta_{ges}}$$

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Use this maximum permitted motor torque $M_{N\ zul}$ and the load diagram of the motor to determine the associated value for the motor current.

Take suitable measures to prevent the continuous current consumption of the motor from exceeding the previously determined value for the motor torque $M_{N\ zul}$. A suitable measure is, for example, to set the trip current of the motor protection switch to this maximum current value. A motor protection switch offers the option to compensate for a brief overload, for example during the startup phase of the motor. A suitable measure for inverter drives is to limit the output current of the inverter according to the determined motor current.

Checking brake torques

If you use a multi-stage brakemotor, you have to limit the braking torque (M_B) according to the maximum permitted motor torque $M_{N\ zul}$. The maximum permitted braking torque is 200 % $M_{N\ zul}$.

$M_{B\ max} \leq 200\ \%\ M_{N\ zul}$

If you have questions on the starting frequency of multi-stage brake motors, please consult SEW-EURODRIVE.

Avoiding blockage

Blockage on the output side of the multi-stage gear unit or multi-stage gearmotor is not permitted. The reason is that indeterminable torques and uncontrolled overhung and axial loads may occur. The gear units may suffer irreparable damage as a result.

STOP

Consult SEW-EURODRIVE if blockages of the multi-stage gear unit or multi-stage gearmotor cannot be avoided due to the application.

5.4 Service factor

Determining the service factor

The effect of the driven machine on the gear unit is taken into account to a sufficient level of accuracy using the service factor f_B. The service factor is determined according to the daily operating time and the starting frequency Z. Three load classifications are taken into account depending on the mass acceleration factor. You can read off the service factor applicable to your application in Figure 3. The service factor determined from this diagram must be smaller than or equal to the service factor according to the selection tables.

$$M_a \cdot f_b \leq M_{a\,max}$$

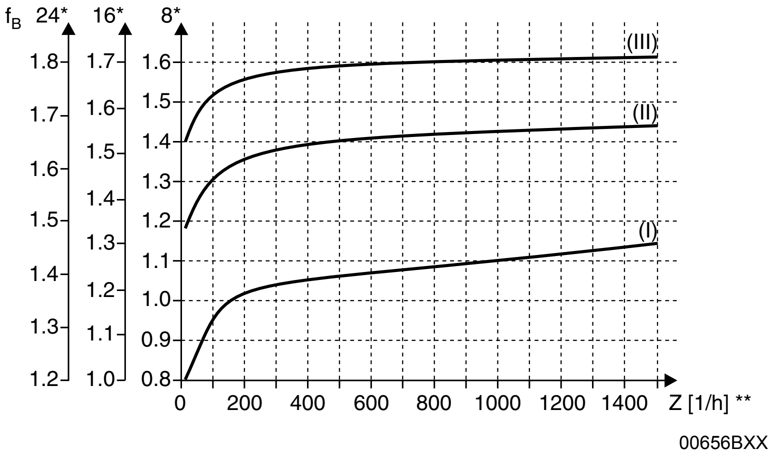

Figure 3: Service factor f_B

* Daily operating time in hours/day
** Starting frequency Z: The cycles include all starting and braking procedures as well as changeovers from low to high speed and vice versa.

Load classification

There are three load classifications:

(I) Uniform, permitted mass acceleration factor ≤ 0.2
(II) Non-uniform, permitted mass acceleration factor ≤ 3
(III) Non-uniform, permitted mass acceleration factor ≤ 10

Mass acceleration factor

The mass acceleration factor is calculated as follows:

$$\textbf{Mass acceleration factor} = \frac{\textbf{All external mass moments of inertia}}{\textbf{Mass moment of inertia on the motor end}}$$

"All external mass moments of inertia" are the mass moments of inertia of the driven machine and the gear unit, scaled down to the motor speed. The calculation for scaling down to motor speed is performed using the following formula:

$$J_X = J \bullet \left(\frac{n}{n_M}\right)^2$$

J_X = Mass moment of inertia scaled down to the motor shaft
J = Mass moment of inertia with reference to the output speed of the gear unit
n = Output speed of the gear unit
n_M = Motor speed

"Mass moment of inertia at the motor end" is the mass moment of inertia of the motor and, if installed, the brake and the flywheel fan (Z fan).

Service factors f_B 1.8 may occur with large mass acceleration factors (> 10), high levels of backlash in the transmission elements or large overhung loads. Contact SEW-EURODRIVE in such cases.

Service factor: SEW f_B

The method for determining the maximum permitted continuous torque $M_{o\ max}$ and using this value to derive the service factor $f_B = M_{o\ max} / M_o$ is not defined in a standard and varies greatly from manufacturer to manufacturer. Even at a SEW service factor of $f_B = 1$, the gear units afford an extremely high level of safety and reliability in the fatigue strength range (exception: Wearing of the worm wheel of the helical-worm gear unit). The service factor may differ from specifications of other gear unit manufacturers. If you are in doubt, contact SEW-EURODRIVE for more detailed information on your specific drive.

Example

Mass acceleration factor 2.5 (load classification II), 14 hours/day operating time (read off at 16 h/d) and 300 cycles/hour Figure 3 result in a service factor f_B = 1.51. According to the selection tables, the selected gearmotor must have an SEW f_B value of 1.51 or greater.

Helical-worm gear unit

For helical-worm gear units, two additional service factors will have to be taken into consideration besides service factor f_B derived from Figure 3. These are:

- f_{B1} = Service factor from ambient temperature
- f_{B2} = Service factor from cyclic duration factor

The additional service factors f_{B1} and f_{B2} can be determined by referring to the diagrams in Figure 4 . For f_{B1}, the load classification is taken into account in the same way as for f_B.

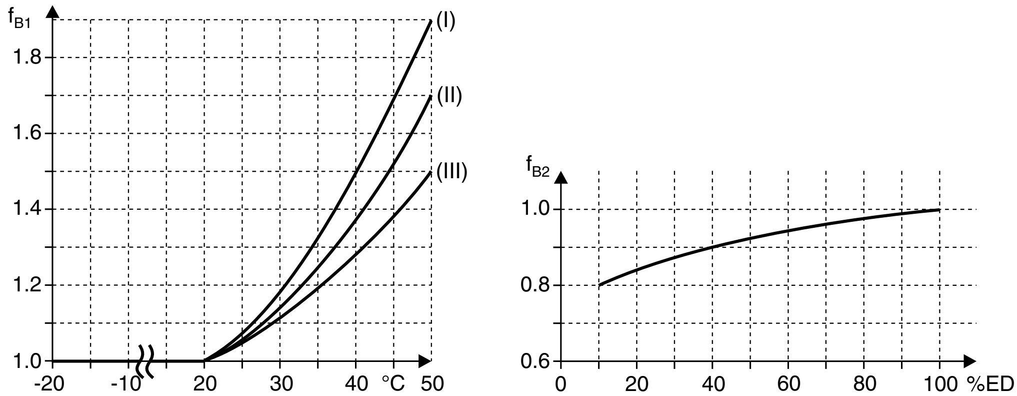

Figure 4: Additional service factors f_{B1} and f_{B2}

$$\text{cdf (\%)} = \frac{\text{Time under load in min/h}}{60} \cdot 100$$

Contact SEW-EURODRIVE in case of temperatures below -20 °C (→ f_{B1}).

The total service factor for helical-worm gear units is calculated as follows:

$$f_{Bges} = f_B \cdot f_{B1} \cdot f_{B2}$$

Example

The gearmotor with the service factor f_B = 1.51 in the previous example is to be a helical-worm gearmotor.

Ambient temperature ϑ = 40 °C → f_{B1} = 1.38 (read off at load classification II)

Time under load = 40 min/h → cdf = 66.67% → f_{B2} = 0.95

The total service factor is f_{Btot} = 1.51 • 1.38 • 0.95 = 1.98

According to the selection tables, the selected helical-worm gearmotor must have an SEW f_B service factor of 1.98 or greater.

5.5 Overhung and axial loads

Determining the overhung load

An important factor for determining the resulting overhung load is the type of transmission element mounted to the shaft end. The following transmission element factors f_Z have to be considered for various transmission elements.

Transmission element	Transmission element factor f_Z	Comments
Gears	1.15	< 17 teeth
Chain sprockets	1.40	< 13 teeth
Chain sprockets	1.25	< 20 teeth
Narrow V-belt pulleys	1.75	Influence of the pre-tensioning force
Flat-belt pulleys	2.50	Influence of the pre-tensioning force
Toothed belt pulleys	1.50	Influence of the pre-tensioning force

The overhung load exerted on the motor or gear shaft is calculated as follows:

$$F_R = \frac{M_d \cdot 2000}{d_0} \cdot f_Z$$

F_R = Overhung load in N

M_d = Torque in Nm

d_0 = Mean diameter of the installed transmission element in mm

f_Z = Transmission element factor

Permitted overhung load

The basis for determining the permitted overhung loads is the computation of the rated bearing service life L_{10h} of the anti-friction bearings (according to ISO 281).

For special operating conditions, the permitted overhung loads can be determined with regard to the modified service life L_{na} on request.

The permitted overhung loads F_{Ra} for the output shafts of foot-mounted gear units with a solid shaft are listed in the selection tables for gearmotors. Contact SEW-EURODRIVE in case of other versions.

The values refer to force applied to the center of the shaft end (in right-angle gear units as viewed onto drive end). The values for the force application angle α and direction of rotation are based on the most unfavorable conditions.

- Only 50% of the F_{Ra} value specified in the selection tables is permitted in mounting position M1 with wall attachment on the front face for K and S gear units.
- Helical-bevel gearmotors K167 and K187 in mounting positions M1 to M4: A maximum of 50% of the overhung load F_{Ra} specified in the selection tables in the case of gear unit mounting other than as shown in the mounting position sheets.
- Foot and flange-mounted helical gearmotors (R..F): A maximum of 50% of the overhung load F_{Ra} specified in the selection tables for torque transmission via flange mounting are permitted.

Higher permitted overhung loads

Exactly considering the force application angle α and the direction of rotation makes it possible to achieve a higher overhung load. Higher output shaft loads are permitted if heavy duty bearings are installed, especially with R, F and K gear units. Contact SEW-EURODRIVE in such cases.

Definition of the force application

The force application is defined according to the following figure:

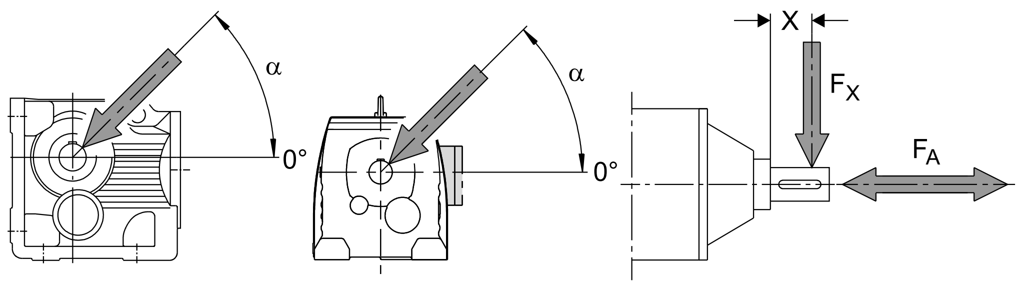

Figure 5: Definition of the force application

F_X = Permitted overhung load at point x [N]
F_A = Permitted axial load [N]

Permitted axial load

If there is no overhung load, then an axial force F_A (tension or compression) amounting to 50% of the overhung load given in the selection tables is permitted. This condition applies to the following gearmotors:

- Helical gearmotors except for R..137... to R..167...
- Parallel-shaft and helical-bevel gearmotors with solid shaft except for F97...
- Helical-worm gearmotors with solid shaft

Contact SEW-EURODRIVE for all other types of gear units and in the event of significantly greater axial forces or combinations of overhung load and axial force.

On the input side: Overhung load conversion for off-center force application

Important: only applies to gear units with input shaft assembly:

Please contact SEW-EURODRIVE for off-center force application on the drive end.

On the output side: Overhung load conversion for off-center force application

The permitted overhung loads must be calculated according the selection tables using the following formulae in the event that force is not applied at the center of the shaft end. The smaller of the two values F_{xL} (according to bearing life) and F_{xW} (according to shaft strength) is the permitted value for the overhung load at point x. Note that the calculations apply to $M_{a\,max}$.

F_{xL} according to bearing service life

$$F_{xL} = F_{Ramax} \cdot \frac{a}{b + x} \text{ [N]}$$

F_{xW} from the Shaft strength:

$$F_{xW} = \frac{c}{f + x} \text{ [N]}$$

F_{Ra}	=	Permitted overhung load (x = l/2) for foot-mounted gear units according to the selection tables in [N]
x	=	Distance from the shaft shoulder to the force application point in [mm]
a, b, f	=	Gear unit constant for overhung load conversion [mm]
c	=	Gear unit constant for overhung load conversion [Nmm]

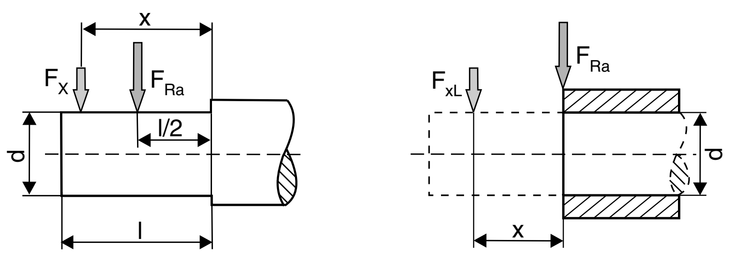

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Figure 6: Overhung load F_x for off-center force application

Gear unit constants for overhung load conversion

Gear unit type	a [mm]	b [mm]	c [Nmm]	f [mm]	d [mm]	l [mm]
RX57	43.5	23.5	$1.51 \bullet 10^5$	34.2	20	40
RX67	52.5	27.5	$2.42 \bullet 10^5$	39.7	25	50
RX77	60.5	30.5	$1.95 \bullet 10^5$	0	30	60
RX87	73.5	33.5	$7.69 \bullet 10^5$	48.9	40	80
RX97	86.5	36.5	$1.43 \bullet 10^6$	53.9	50	100
RX107	102.5	42.5	$2.47 \bullet 10^6$	62.3	60	120
R07	72.0	52.0	$4.67 \bullet 10^4$	11	20	40
R17	88.5	68.5	$6.527 \bullet 10^4$	17	20	40
R27	106.5	81.5	$1.56 \bullet 10^5$	11.8	25	50
R37	118	93	$1.24 \bullet 10^5$	0	25	50
R47	137	107	$2.44 \bullet 10^5$	15	30	60
R57	147.5	112.5	$3.77 \bullet 10^5$	18	35	70
R67	168.5	133.5	$2.65 \bullet 10^5$	0	35	70
R77	173.7	133.7	$3.97 \bullet 10^5$	0	40	80
R87	216.7	166.7	$8.47 \bullet 10^5$	0	50	100
R97	255.5	195.5	$1.06 \bullet 10^6$	0	60	120
R107	285.5	215.5	$2.06 \bullet 10^6$	0	70	140
R137	343.5	258.5	$4.58 \bullet 10^6$	0	90	170
R147	402	297	$8.65 \bullet 10^6$	33	110	210
R167	450	345	$1.26 \bullet 10^7$	0	120	210
F27	109.5	84.5	$1.13 \bullet 10^5$	0	25	50
F37	123.5	98.5	$1.07 \bullet 10^5$	0	25	50
F47	153.5	123.5	$1.40 \bullet 10^5$	0	30	60
F57	170.7	135.7	$2.70 \bullet 10^5$	0	35	70
F67	181.3	141.3	$4.12 \bullet 10^5$	0	40	80
F77	215.8	165.8	$7.87 \bullet 10^5$	0	50	100
F87	263	203	$1.06 \bullet 10^6$	0	60	120
F97	350	280	$2.09 \bullet 10^6$	0	70	140
F107	373.5	288.5	$4.23 \bullet 10^6$	0	90	170
F127	442.5	337.5	$9.45 \bullet 10^6$	0	110	210
F157	512	407	$1.05 \bullet 10^7$	0	120	210
K37	123.5	98.5	$1.30 \bullet 10^5$	0	25	50
K47	153.5	123.5	$1.40 \bullet 10^5$	0	30	60
K57	169.7	134.7	$2.70 \bullet 10^5$	0	35	70
K67	181.3	141.3	$4.12 \bullet 10^5$	0	40	80
K77	215.8	165.8	$7.69 \bullet 10^5$	0	50	100
K87	252	192	$1.64 \bullet 10^6$	0	60	120
K97	319	249	$2.8 \bullet 10^6$	0	70	140
K107	373.5	288.5	$5.53 \bullet 10^6$	0	90	170
K127	443.5	338.5	$8.31 \bullet 10^6$	0	110	210
K157	509	404	$1.18 \bullet 10^7$	0	120	210
K167	621.5	496.5	$1.88 \bullet 10^7$	0	160	250
K187	720.5	560.5	$3.04 \bullet 10^7$	0	190	320
W10	84.8	64.8	$3.6 \bullet 10^4$	0	16	40
W20	98.5	78.5	$4.4 \bullet 10^4$	0	20	40
W30	109.5	89.5	$6.0 \bullet 10^4$	0	20	40
W37	121.1	101.1	$6.95 \bullet 10^4$	0	20	40
W47	145.5	115.5	$4.26 \bullet 10^5$	35.6	30	60
S37	118.5	98.5	$6.0 \bullet 10^4$	0	20	40
S47	130	105	$1.33 \bullet 10^5$	0	25	50
S57	150	120	$2.14 \bullet 10^5$	0	30	60
S67	184	149	$3.04 \bullet 10^5$	0	35	70
S77	224	179	$5.26 \bullet 10^5$	0	45	90
S87	281.5	221.5	$1.68 \bullet 10^6$	0	60	120
S97	326.3	256.3	$2.54 \bullet 10^6$	0	70	140

Values for types not listed are available on request.

5.6 RM gear units

Project planning You must take account of the higher overhung loads and axial forces when planning projects with RM helical gearmotors with extended bearing housing. Observe the following project planning procedure:

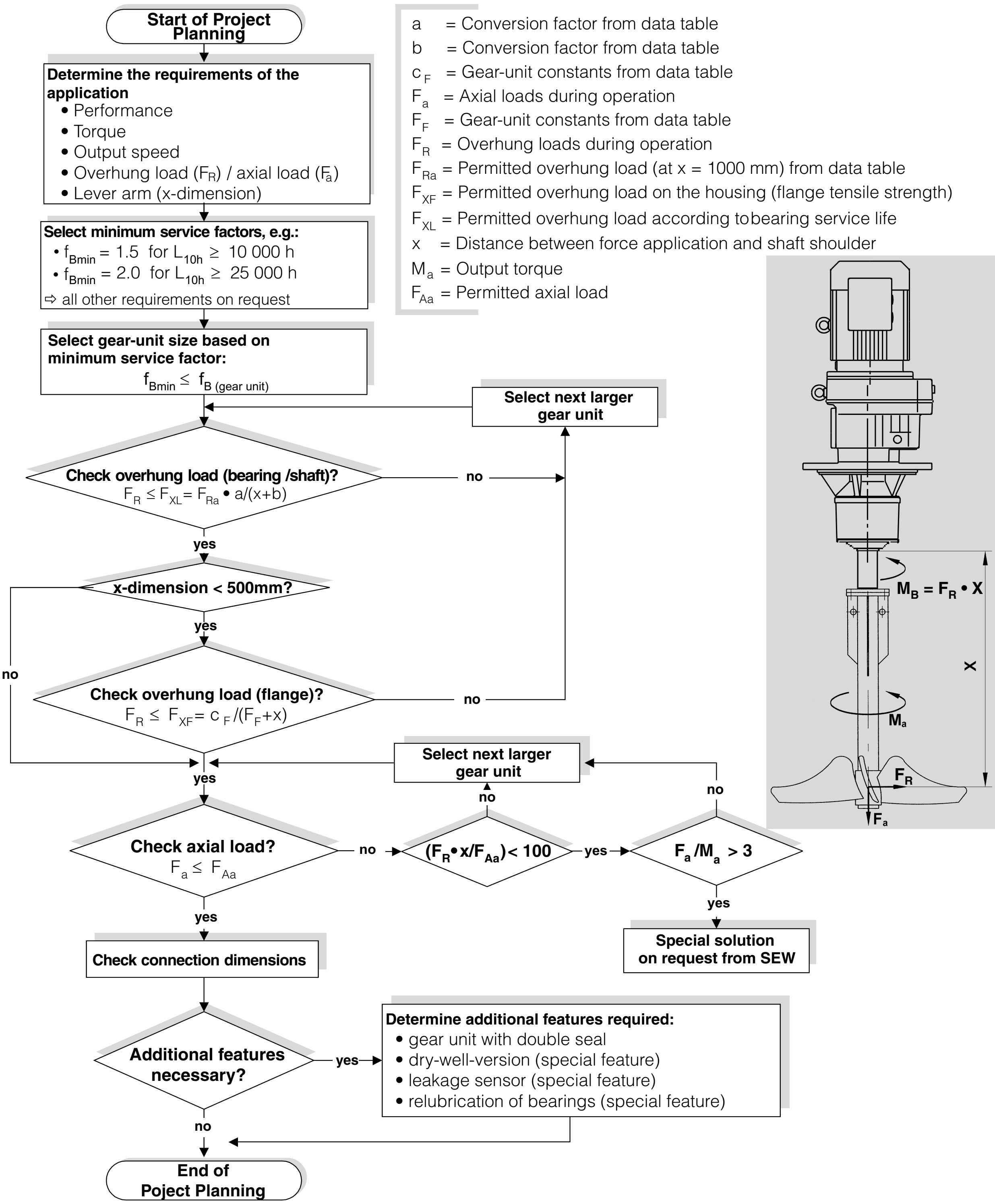

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Figure 7: Project planning for RM gear units

Permitted overhung loads and axial forces

The permitted overhung loads F_{Ra} and axial forces F_{Aa} are specified for various service factors f_B and nominal bearing service life L_{10h}.

f_{Bmin} = 1.5; L_{10h} = 10 000 h

			n_a [1/min]							
			< 16	16-25	26-40	41-60	61-100	101-160	161-250	251-400
RM57	F_{Ra}	[N]	400	400	400	400	400	405	410	415
	F_{Aa}	[N]	18800	15000	11500	9700	7100	5650	4450	3800
RM67	F_{Ra}	[N]	575	575	575	580	575	585	590	600
	F_{Aa}	[N]	19000	18900	15300	11900	9210	7470	5870	5050
RM77	F_{Ra}	[N]	1200	1200	1200	1200	1200	1210	1210	1220
	F_{Aa}	[N]	22000	22000	19400	15100	11400	9220	7200	6710
RM87	F_{Ra}	[N]	1970	1970	1970	1970	1980	1990	2000	2010
	F_{Aa}	[N]	30000	30000	23600	18000	14300	11000	8940	8030
RM97	F_{Ra}	[N]	2980	2980	2980	2990	3010	3050	3060	3080
	F_{Aa}	[N]	40000	36100	27300	20300	15900	12600	9640	7810
RM107	F_{Ra}	[N]	4230	4230	4230	4230	4230	4230	3580	3830
	F_{Aa}	[N]	48000	41000	30300	23000	18000	13100	9550	9030
RM137	F_{Ra}	[N]	8710	8710	8710	8710	7220	5060	3980	6750
	F_{Aa}	[N]	70000	70000	70000	57600	46900	44000	35600	32400
RM147	F_{Ra}	[N]	11100	11100	11100	11100	11100	10600	8640	10800
	F_{Aa}	[N]	70000	70000	69700	58400	45600	38000	32800	30800
RM167	F_{Ra}	[N]	14600	14600	14600	14600	14600	14700	-	-
	F_{Aa}	[N]	70000	70000	70000	60300	45300	36900	-	-

f_{Bmin} = 2,0; L_{10h} = 25 000 h

			n_a [1/min]							
			< 16	16-25	26-40	41-60	61-100	101-160	161-250	251-400
RM57	F_{Ra}	[N]	410	410	410	410	410	415	415	420
	F_{Aa}	[N]	12100	9600	7350	6050	4300	3350	2600	2200
RM67	F_{Ra}	[N]	590	590	590	595	590	595	600	605
	F_{Aa}	[N]	15800	12000	9580	7330	5580	4460	3460	2930
RM77	F_{Ra}	[N]	1210	1210	1210	1210	1210	1220	1220	1220
	F_{Aa}	[N]	20000	15400	11900	9070	6670	5280	4010	3700
RM87	F_{Ra}	[N]	2000	2000	2000	2000	2000	1720	1690	1710
	F_{Aa}	[N]	24600	19200	14300	10600	8190	6100	5490	4860
RM97	F_{Ra}	[N]	3040	3040	3040	3050	3070	3080	2540	2430
	F_{Aa}	[N]	28400	22000	16200	11600	8850	6840	5830	4760
RM107	F_{Ra}	[N]	4330	4330	4330	4330	4330	3350	2810	2990
	F_{Aa}	[N]	32300	24800	17800	13000	9780	8170	5950	5620
RM137	F_{Ra}	[N]	8850	8850	8850	8830	5660	4020	3200	5240
	F_{Aa}	[N]	70000	59900	48000	37900	33800	31700	25600	23300
RM147	F_{Ra}	[N]	11400	11400	11400	11400	11400	8320	6850	8440
	F_{Aa}	[N]	70000	60600	45900	39900	33500	27900	24100	22600
RM167	F_{Ra}	[N]	15100	15100	15100	15100	15100	13100	-	-
	F_{Aa}	[N]	70000	63500	51600	37800	26800	23600	-	-

Conversion factors and gear unit constants

The following conversion factors and gear unit constants apply to calculating the permitted overhung load F_{xL} at point x ≠ 1000 mm for RM gearmotors:

Gear unit type	a	b	c_F (f_B = 1.5)	c_F (f_B = 2.0)	F_F
RM57	1047	47	1220600	1260400	277
RM67	1047	47	2047600	2100000	297.5
RM77	1050	50	2512800	2574700	340.5
RM87	1056.5	56.5	4917800	5029000	414
RM97	1061	61	10911600	11124100	481
RM107	1069	69	15367000	15652000	554.5
RM137	1088	88	25291700	25993600	650
RM147	1091	91	30038700	31173900	756
RM167	1089.5	89.5	42096100	43654300	869

Additional weight RM gear units

Type	Additional weight compared to RF with reference to the smallest RF flange Δm [kg]
RM57	12.0
RM67	15.8
RM77	25.0
RM87	29.7
RM97	51.3
RM107	88.0
RM137	111.1
RM147	167.4
RM167	195.4

5.7 Condition monitoring: Oil aging and vibration sensor

DUO10A diagnostics unit (Oil aging sensor)

The diagnostics unit consists of a temperature sensor and the actual evaluation unit. The temperature sensor is screwed into a screw plug bore of the gear unit via an adapter system and connected to the evaluation unit.

The service life curves of the oil grades common in SEW gear units are stored in the electronics of the evaluation unit. SEW-EURODRIVE can also customize any oil grade in the diagnostic unit. Standard parameterization is performed directly on the evaluation unit. During operation, the evaluation unit continuously calculates the remaining service life in days based on the oil temperature, i.e. the time until the next oil change. The remaining service life is displayed directly on the evaluation unit. The expiration of the service life can also be transferred to a higher-level system via a binary signal and be evaluated or visualized there. Other switch outputs signal when a prewarning stage has been reached, a preset temperature limit is exceeded or readiness for operation. The voltage supply is DC 24 V.

The system operator no longer has to replace the oil within predefined intervals, but can adapt the replacement interval individually to the actual load. The benefits are reduced maintenance and service costs and increased system availability.

DUV10A diagnostics unit (vibration sensor)

The DUV10A diagnostics unit measures the structure-borne noise and uses this value to calculate the frequency spectrum. The structure-born noise sensor and evaluation electronics are fully integrated in the diagnostic unit. Data, such as vibration acceleration, damage frequencies, etc., can be recorded, processed and evaluated decentralized without any expert knowledge. The damage progress of the diagnosis objects is indicated by the LEDs directly on the diagnostics unit. External visualization of the binary signals to the controller is also possible. A depth diagnosis can be displayed via the software.

The diagnostics unit is attached to the gearmotor or motor using a fastening element. The position where the diagnostic unit is installed depends on the objects to be diagnosed (gear unit/motor type, mounting position). The tightening torque for the screw connection is 7 Nm.

The diagnostics unit can be used to monitor up to 5 different objects or 20 individual frequencies. The diagnostic unit can be used with both constant and variable speeds. To ensure correct diagnosis when using variable speeds, a 0...20 mA current loop or a pulse signal must be supplied. The voltage supply is DC 24 V.

The parameters of the unit are set using the supplied software. When all data have been parameterized, a pulse test is carried out to check the signal level from the diagnostics object to the diagnostics unit. Next, all data is transferred to the sensor and a teach-in run can be performed. The teach-in is a self-learning process performed by the sensor under operating conditions. After successful teach-in, the unit is ready and enters monitoring mode. As the unit requires a certain measuring time at constant speed depending on the setting and number of objects to be monitored, you should consult SEW-EURODRIVE for applications where this time is < 16 seconds.