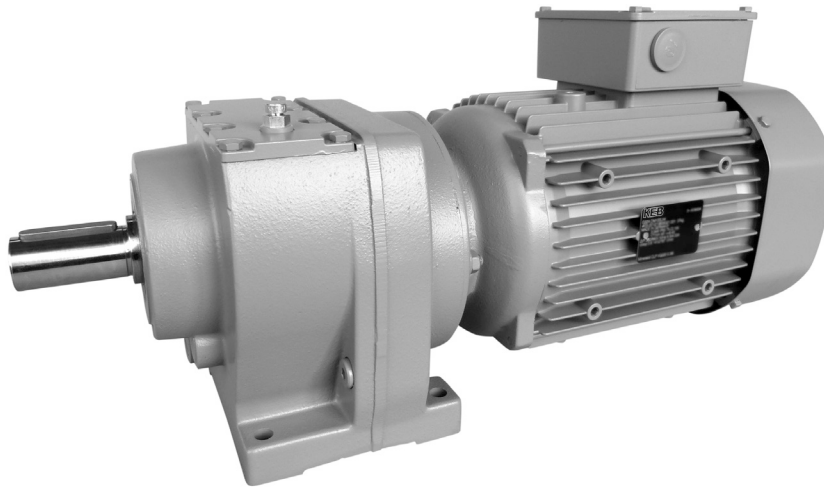


Operating and maintenance instructions Gear unit



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Important informations

Live parts, rotating parts and hot surfaces of electrical machines can cause serious injury or property damages.

Installation, connection, start-up and maintenance has to be performed by qualified personnel.

The safety instructions, the installation and maintenance instructions, the project documents and the relevant national, local and system specific safety requirements must be observed.

- We reserve the right to make changes of all informations provided from this program.
- Any damage found to have been caused during transport should be notified to the freight forwarder without delay.
- Damaged products must not be taken into operation.
- The observance of the installation and maintenance instructions is condition for safe operation and to fulfill warranty claims.
- The products may only be stored in closed, dry rooms, protected from mechanical damage and vibration, permissible ambient temperature for storage: 0...+60°C
In case of long-term storage, consultation with the manufacturer is necessary.
- The lifting lugs provided have only be designed for the weight of the product, additional loads must not be attached.

These instructions are not meant to cover all details concerning any possible design and applications. In case of doubt, contact the manufacturer!

Manufacturer:

KEB Antriebstechnik GmbH

Wildbacher Straße 5, D-08289 Schneeberg

Postfach 100152, D-08284 Schneeberg

Telefon (03772)67-0

Fax (03772)67-280

The identification of spare parts requires the nameplate data of the product with the manufacturers serial number.

Mechanical installation

- Before mounting, remove the corrosion protection of the output shaft and grease the shaft surface
- Gearbox installation free of shock and tension
- Pay attention to alignment when using a coupling
- Oil vent-, control- and drain plug have to be accessible.

When the gearbox is delivered with closed plug instead of vent plug: Change plug against supplied vent plug or pressure valve.

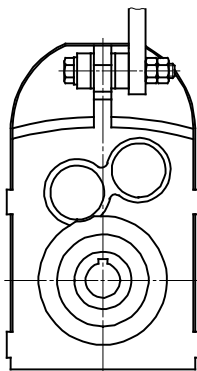
- Check lubrication level according mounting position and name plate data
- Installation of gearbox in wet ambient or outdoors requires anticorrosive execution.

Touch up painting damages after installation.

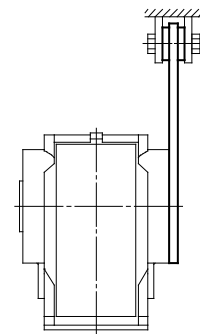
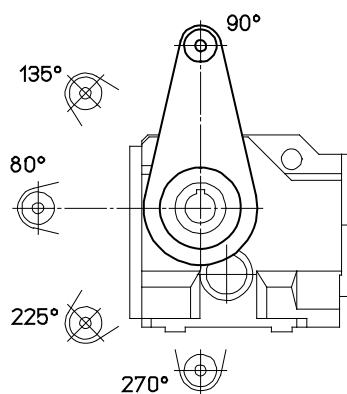
Mounting of torque arms

Do not brace the torque arm during assembling.

Shaft Mounted Helical Gear unit F



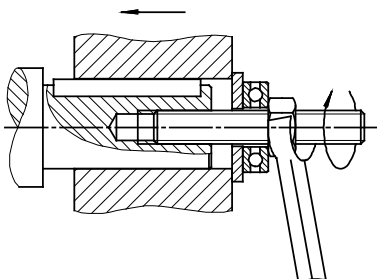
Helical worm gear unit S
Helical bevel gear unit K



Torque arm support double-sided.

Output shaft with key

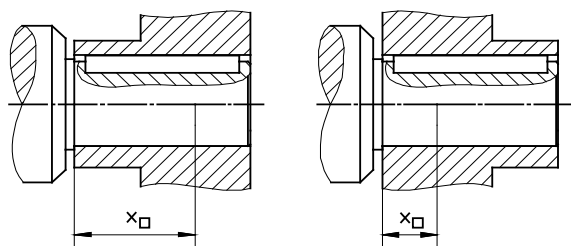
Mounting of couplings or driving elements by assembly tool



Example for assembly tool

- Use center hole of output shaft
Heat the transmission elements or use of lubricant simplify the assembly
- Avoid shocks during mounting of transmission elements.
- Transmission elements has to be balanced.
- Fix the key at start without coupling.

(e.g. to much tension of chain or belt, misalignment of coupling)



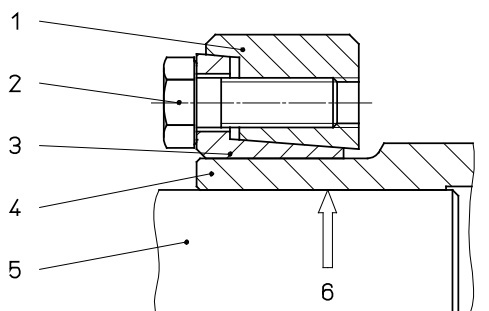
unfavorable position

favorable position

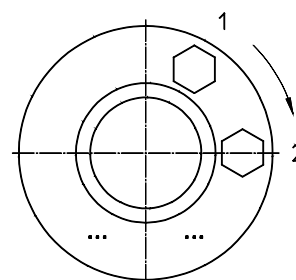
Hollow shaft with keyway

- Consider constructional informations in geared motor cataloge
- Use assembling tool for mounting
- Protect the connection against corrosion by proper lubricants

Hollow shaft with shrink disc



- 1 outer ring
- 2 tension screw
- 3 inner ring
- 4 hub
- 5 Shaft
- 6 free of grease



assembling

- shrink discs are ready for installation
Do not dismantle the unit before bracing the first time.
- Degrease the hub bore and shaft.
- Install the shrink disc on shaft
- the outside surface of shrink disk hub can be protected by grease.
Tighten the tension screws after installation of shaft only
- Fit the shaft or install the hub on shaft. Tighten of tension screws even allocated, untill aligning of lateral front face of inner and outer ring
- Observe the tightening torque of tension scews from shrink disk!

tension screw	M6	M8	M10	M12	M14
Tightening torque Ma [Nm]	12	30	59	100	160

- Do not disassemble dismantled shrink disc before installation once again.
clean and grease shrink disc after contermination only
Use solid material lubricant with friction coefficient of $\mu=0.04$ (e.g. Molykote Spray)

Startup

- Before startup, check correct mounting position and lubrication level of the gearbox
- Startup of worm gearboxes:
 With new helical-worm gear units the tooth flanks are not completely smoothed down. The efficiency is lower than after the running in process.
 For a two start worm the decrease is about 6%. The running-in process is essentially concluded after 24 hours.

Attachment of motors on input adapter

use supplied coupling only. Installation of coupling part flush to motor shaft end. Fixation of coupling part by grubscrew

Do not exceed the permitted forces F_{max} in the table by weight or other forces to avoid overload, deformations and inadmissible heating.

- M IEC	- M NEMA	- M S	X [mm]	F_{max} [N]
63/71	56	70	80	450
80/90	140	90/110	120	800
100/112	180	140	140	1600
132	210	190	180	2000
160/180	250/280		230	4000

X: distance of emphasis from main machine to adapter flange

F_{max} : permissible force at emphasis of main machine

increase of distance X causes linear reduction of F_{max}

for decrease of distance X the value of F_{max} remains constant

Inspection and maintenance

- Oil level control in gearbox after each 1000 working hours, minimum after 6 month
 Recommended change of lubricant depending on operation conditions.
 Mineraloil: Oil bath temperature $\leq 60^{\circ}\text{C}$, after 10.000 hours of operation
 Oil bath temperature $\leq 80^{\circ}\text{C}$, after 5.000 hours of operation
 after 2 years at latest
 Synthetic oil: Oil bath temperature $\leq 80^{\circ}\text{C}$, after 10.000 hours of operation
 Oil bath temperature $\leq 100^{\circ}\text{C}$, after 5.000 hours of operation
 after 5 years at latest
- Check bearings at oil level control
 Change when noise or temperature are increased
 Feed roller bearings on output shaft (excluding mounting position M4) with grease with consistency class 2.
- Check seal at sight depending on operation conditions after 1000 hours, minimum after 6 month for leaks
 seal leaking gearboxes, if necessary add missing oil volume
 Recommended change of seals: after 5 years at latest
- Check screw connections for tightness
- Repair corrosion damages

Motor adapter -M IEC, -M NEMA

- Control the coupling between motor and gearbox for the first time after 3000 hours, latest after 6 months.
Visual inspection, backlash, wear measurement with feeler gauge between hub and the spider
- Reference data:

- M IEC	- M NEMA	s
63/71	56	2mm
80/90/100/112/132	140/180/210	3mm
160/180	250/280	4mm

- if the values are exceeded, switch spider
with low wear, the inspection interval can be increased to 6000 hours/18 months

Check oil level / Change of lubrication

Warm up of gearbox simplify drain of oil

Fill only lubricant of type and volume shown on name plate

Consider selection table for type of lubrication

Make wearing check of worm-wheel at same time.

Enclosures: Lubrication (per gearbox size): Lubrication quantity, Position of oil plugs, Informations of oil level control

Description of icons:



Filler plug



Vent plug



Non-ventilated



Level plug
Lubrication level until level plug



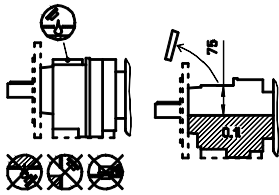
Level plug
Control by dip stick



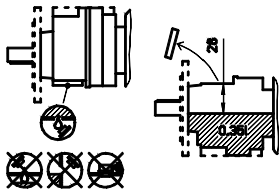
Drain plug

G0

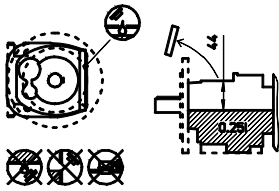
M1 (B3, B5)



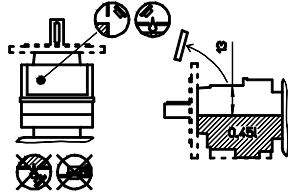
M3 (B8, B5/180)



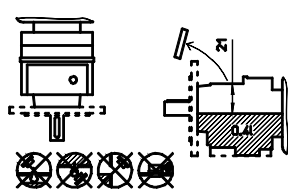
M5 (B6, B5/90)



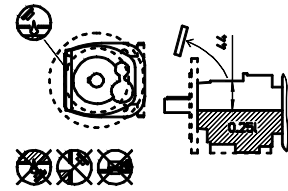
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M4 (V5, V1)



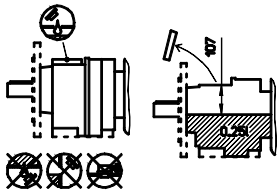
M6 (B7, B5/270)



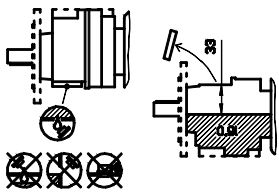
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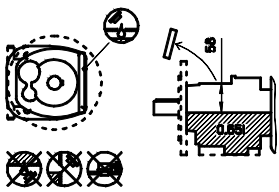
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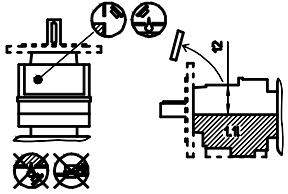
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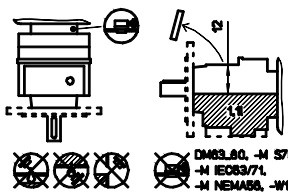
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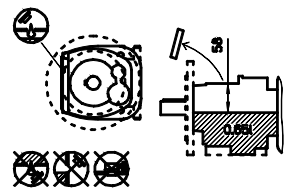
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M4 (V5, V1)



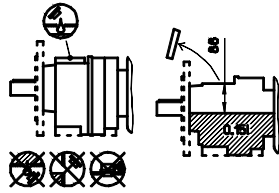
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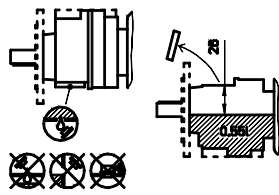
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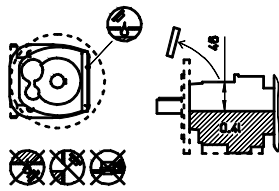
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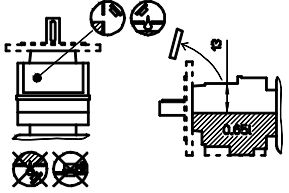
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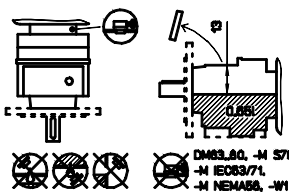
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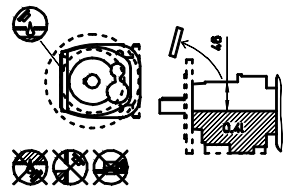
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M4 (V5, V1)



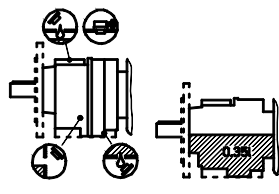
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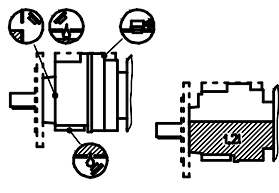
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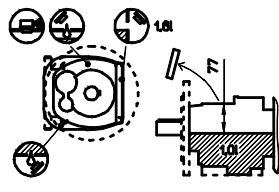
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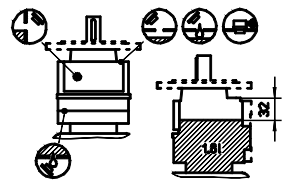
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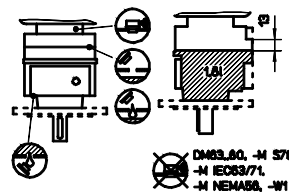
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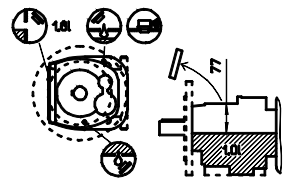
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M4 (V5, V1)



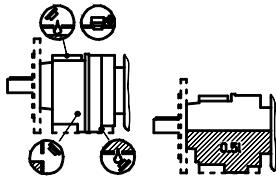
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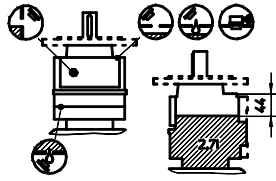
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G4

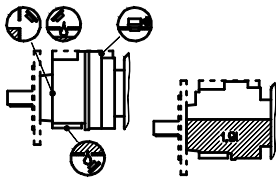
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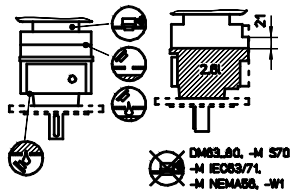
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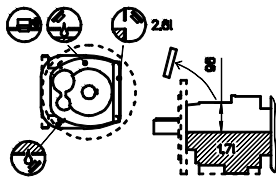
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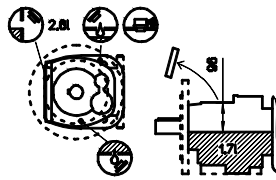
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M5 (B6, B5/90)



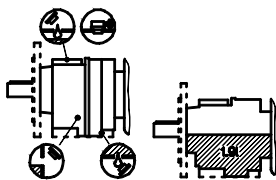
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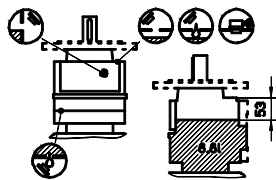
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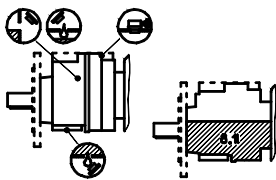
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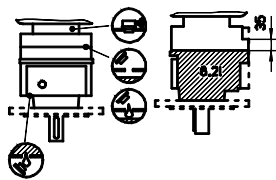
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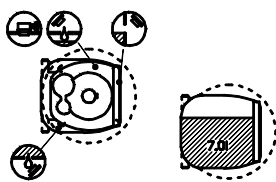
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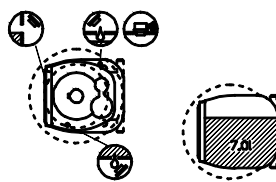
M4 (V5, V1)



M5 (B6, B5/90)



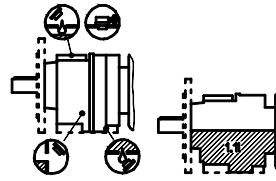
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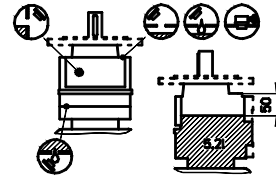
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G5

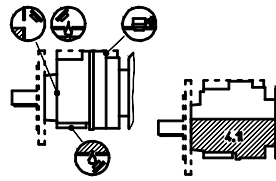
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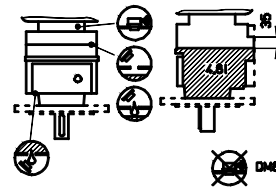
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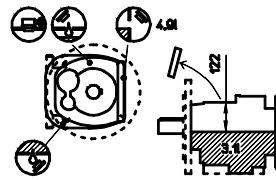
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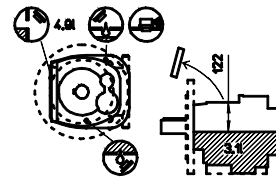
M4 (V5, V1)



M5 (B6, B5/90)



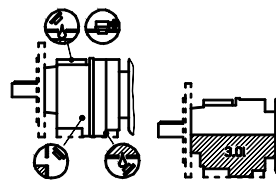
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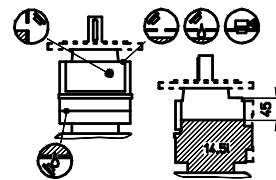
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G7

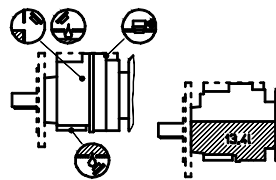
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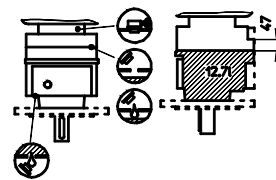
M2 (V6, V3)



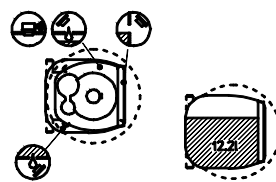
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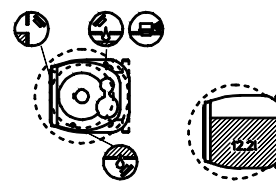
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M5 (B6, B5/90)



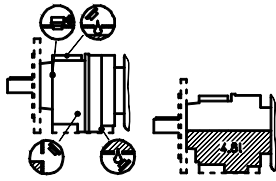
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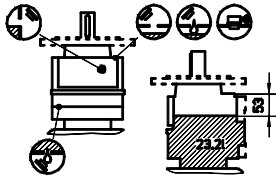
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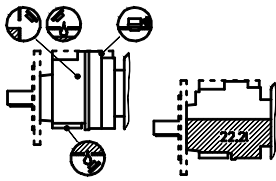
M1 (B3, B5)



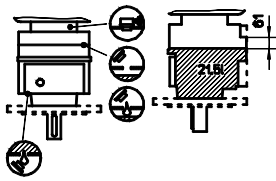
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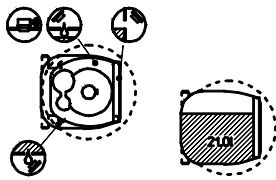
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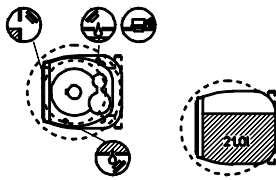
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M5 (B6, B5/90)



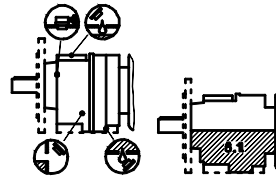
M6 (B7, B5/270)



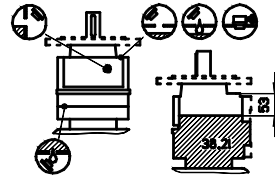
GZ006U00068

G9

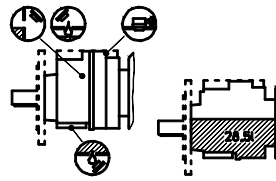
M1 (B3, B5)



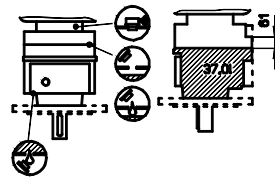
M2 (V6, V3)



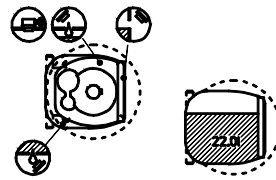
M3 (B8, B5/180)



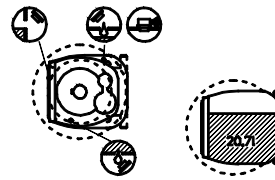
M4 (V5, V1)



M5 (B6, B5/90)



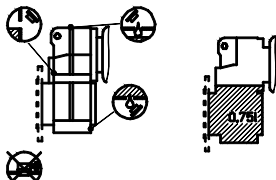
M6 (B7, B5/270)



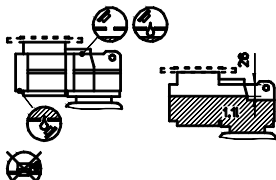
GZ006U00069

F2

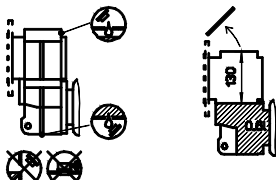
M1 (H1)



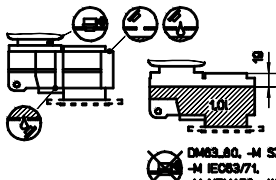
M2 (H6)



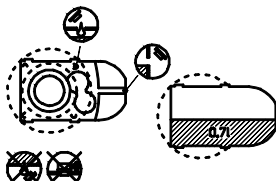
M3 (H2)



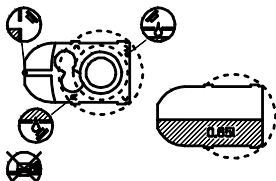
M4 (H5)



M5 (H4)



M6 (H3)

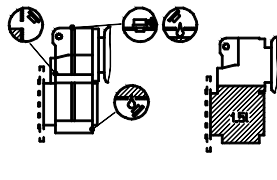


~~DM63..60, -H 570~~
~~-H IEC63/71~~
~~-H NEMA56, -W1~~

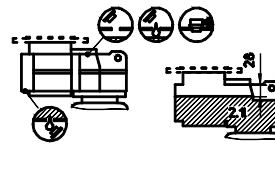
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F3

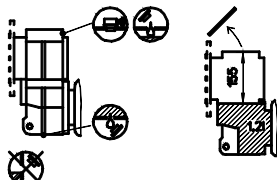
M1 (H1)



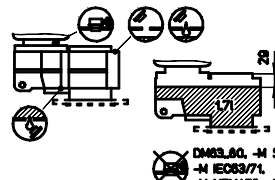
M2 (H6)



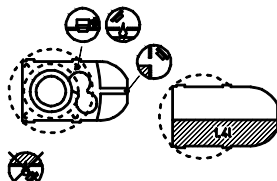
M3 (H2)



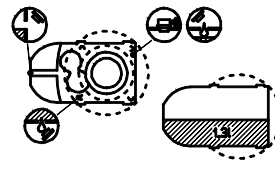
M4 (H5)



M5 (H4)



M6 (H3)

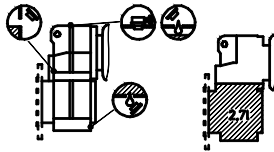


~~DM63..60, -H 570~~
~~-H IEC63/71~~
~~-H NEMA56, -W1~~

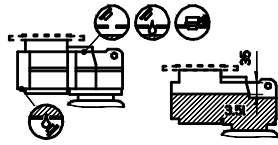
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F4

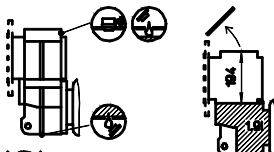
M1 (H1)



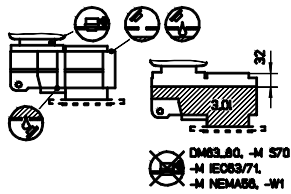
M2 (H6)



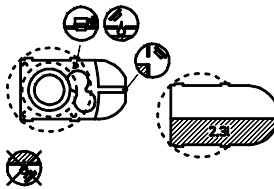
M3 (H2)



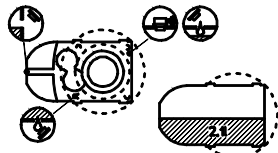
M4 (H5)



M5 (H4)



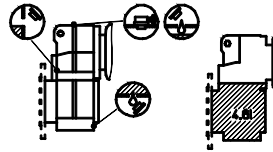
M6 (H3)



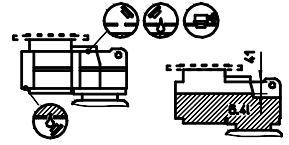
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F5

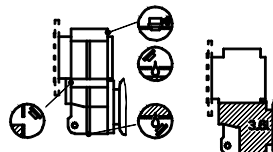
M1 (H1)



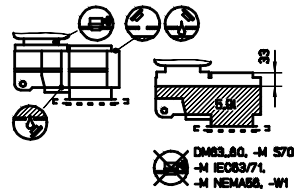
M2 (H6)



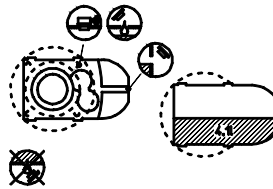
M3 (H2)



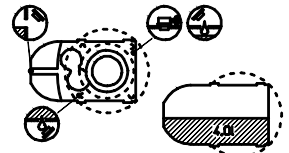
M4 (H5)



M5 (H4)



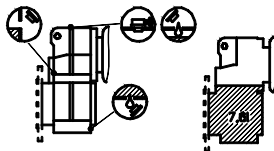
M6 (H3)



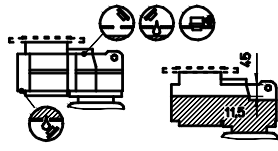
GZ00GU000F5

F6

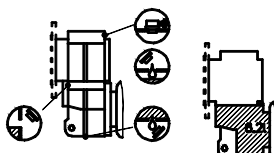
M1 (H1)



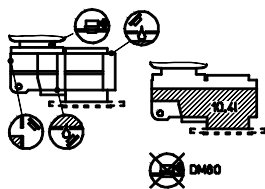
M2 (H6)



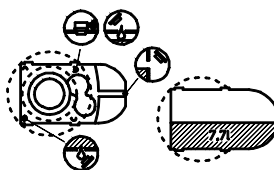
M3 (H2)



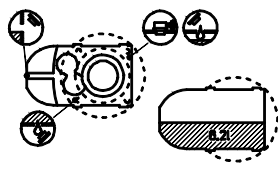
M4 (H5)



M5 (H4)



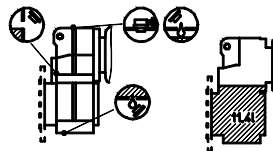
M6 (H3)



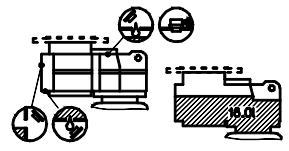
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F7

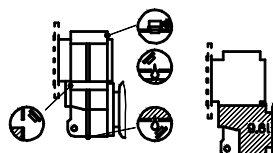
M1 (H1)



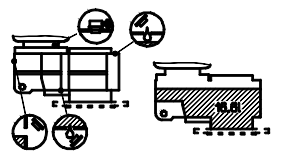
M2 (H6)



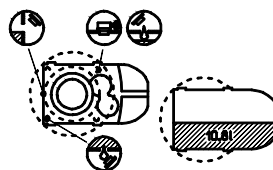
M3 (H2)



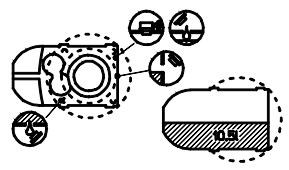
M4 (H5)



M5 (H4)



M6 (H3)

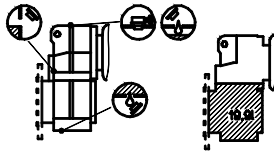


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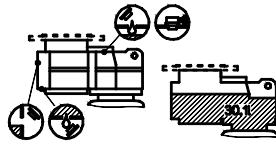
F8

S0

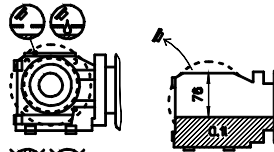
M1 (H1)



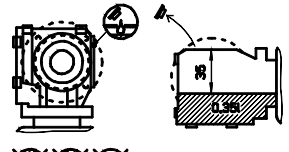
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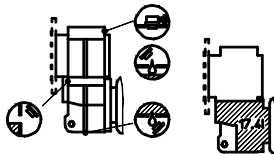
M1 (H1)



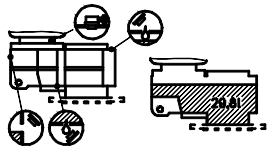
M2 (H4)



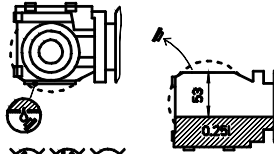
M3 (H2)



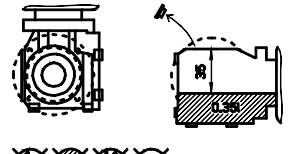
M4 (H5)



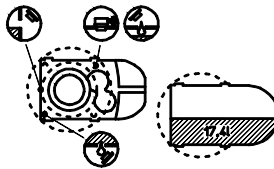
M3 (H2)



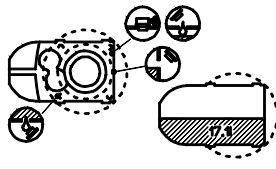
M4 (H3)



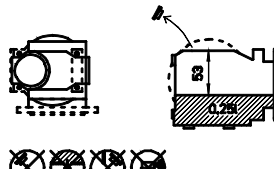
M5 (H4)



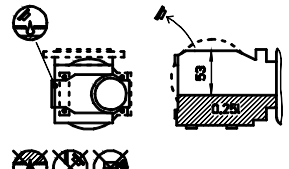
M6 (H3)



M5 (H5)



M6 (H6)



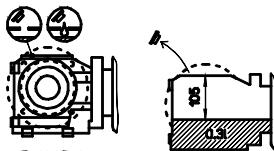
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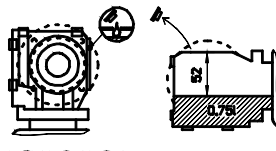
S1

S2

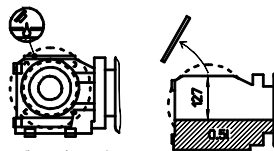
M1 (H1)



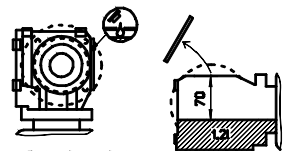
M2 (H4)



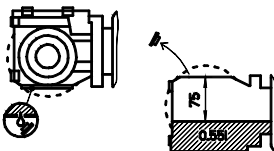
M1 (H1)



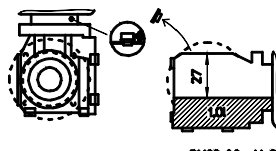
M2 (H4)



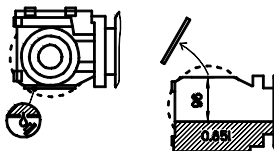
M3 (H2)



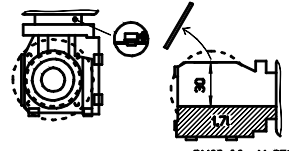
M4 (H3)



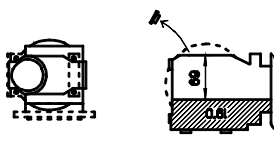
M3 (H2)



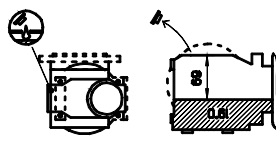
M4 (H3)



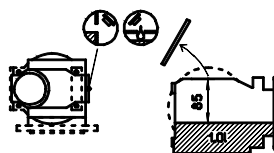
M5 (H5)



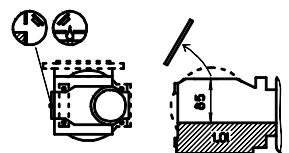
M6 (H6)



M5 (H5)



M6 (H6)



DM63..60, -M 570
-M IE063/71
-M NEM466, -W1

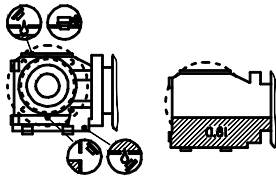
DM63..60, -M 570
-M IE063/71
-M NEM466, -W1

GZ00GU000S1

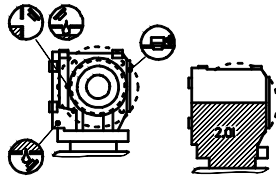
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S3

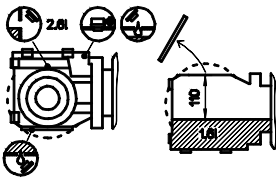
M1 (H1)



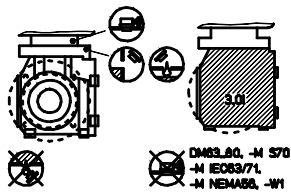
M2 (H4)



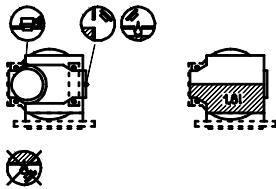
M3 (H2)



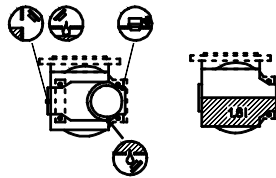
M4 (H3)



M5 (H5)



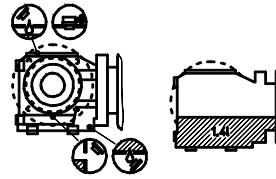
M6 (H6)



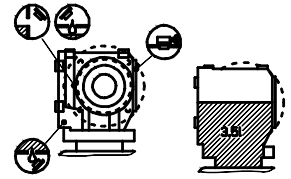
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S4

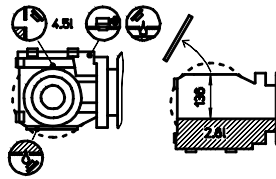
M1 (H1)



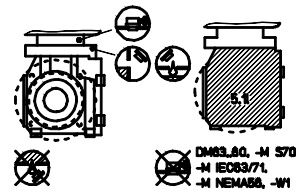
M2 (H4)



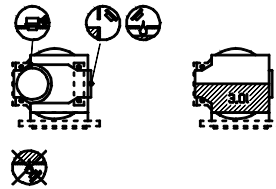
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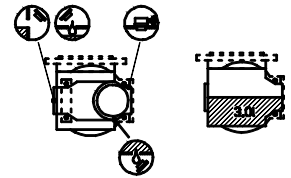
M4 (H3)



M5 (H5)



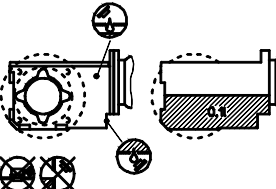
M6 (H6)



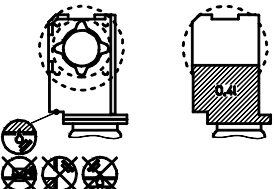
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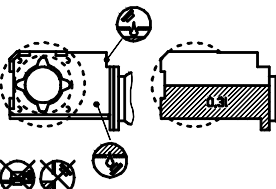
M1 (H1)



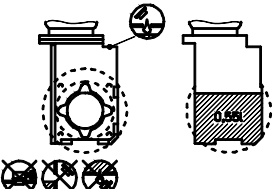
M2 (H4)



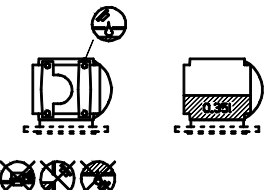
M3 (H2)



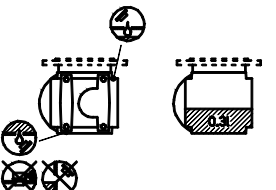
M4 (H3)



M5 (H5)



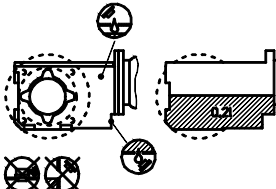
M6 (H6)



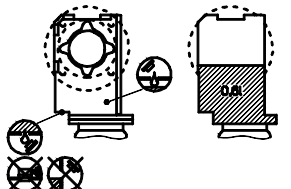
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K1

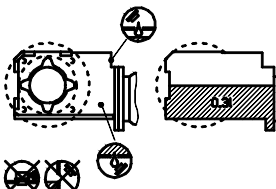
M1 (H1)



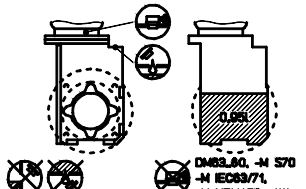
M2 (H4)



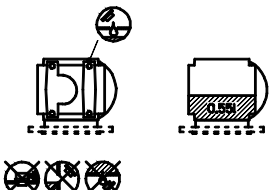
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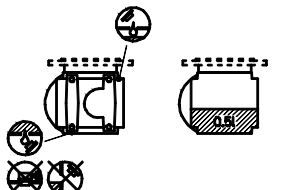
M4 (H3)



M5 (H5)



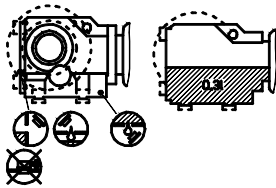
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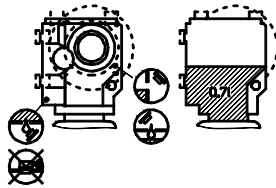
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K2

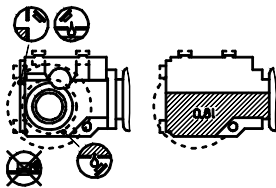
M1 (H1)



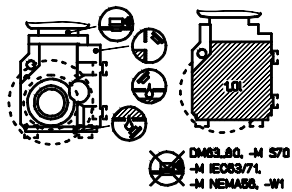
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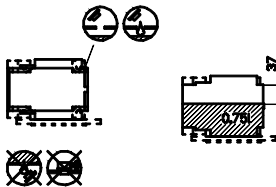
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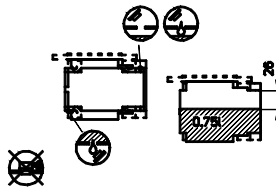
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M5 (H5)



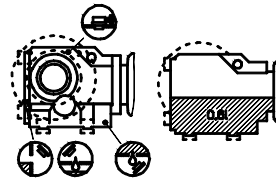
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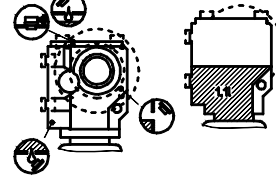
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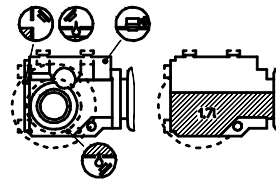
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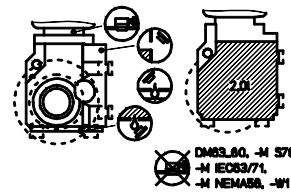
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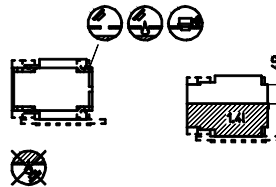
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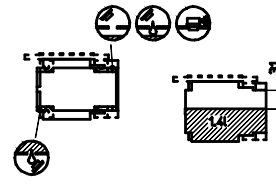
M4 (H3)



M5 (H5)



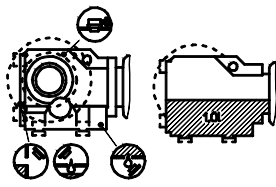
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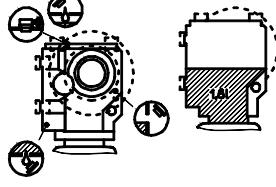
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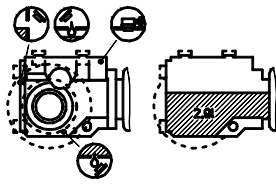
M1 (H1)



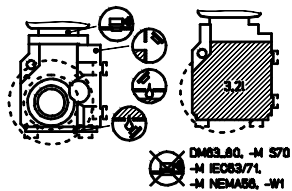
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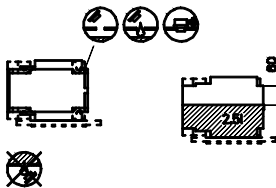
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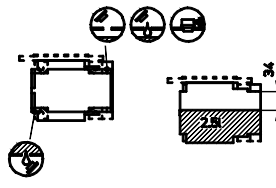
M4 (H3)



M5 (H5)



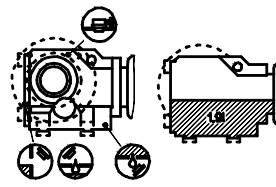
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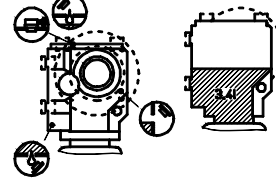
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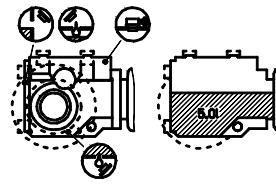
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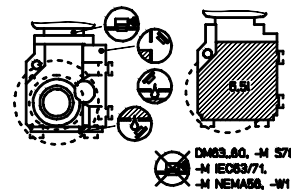
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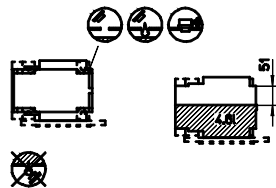
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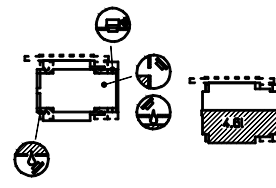
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M5 (H5)



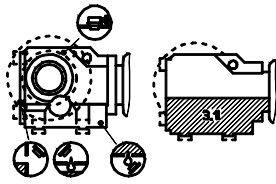
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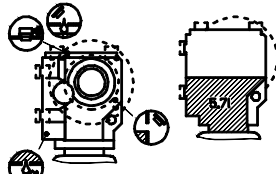
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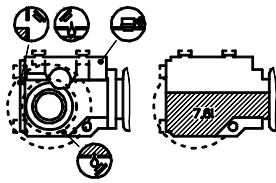
M1 (H1)



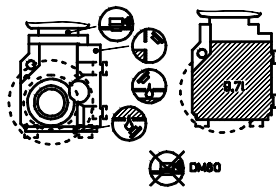
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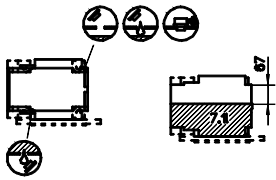
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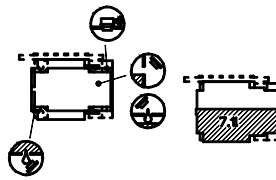
M4 (H3)



M5 (H5)



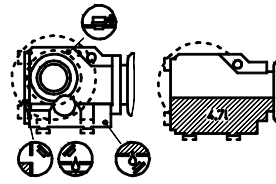
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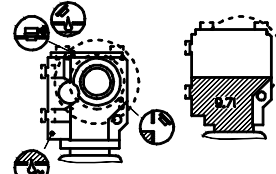
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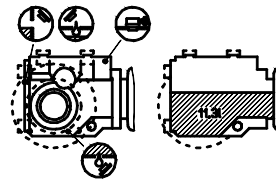
M1 (H1)



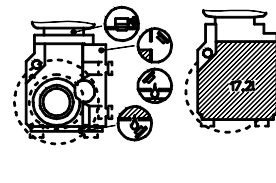
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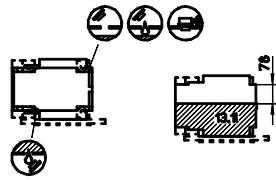
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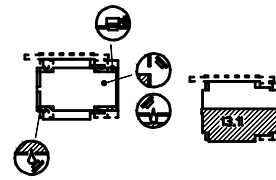
M4 (H3)



M5 (H5)



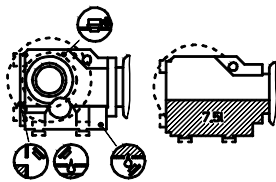
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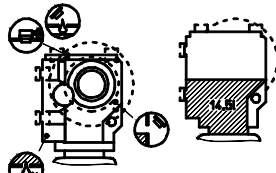
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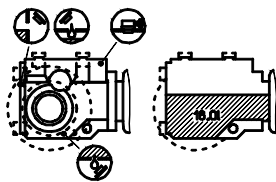
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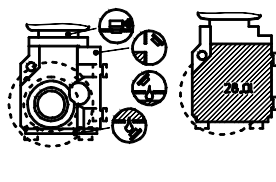
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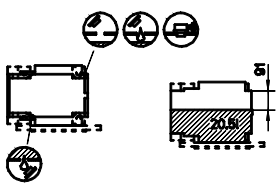
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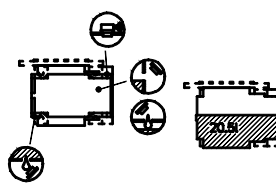
M4 (H3)



M5 (H5)



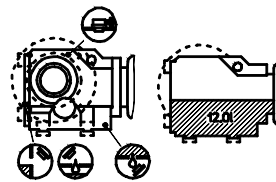
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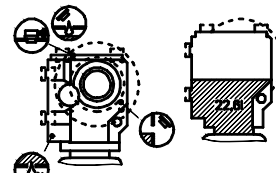
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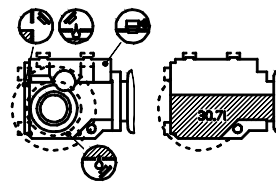
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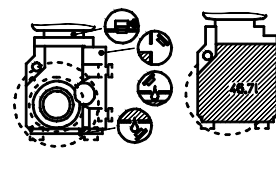
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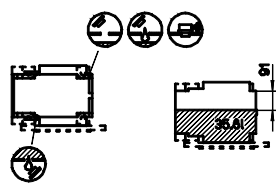
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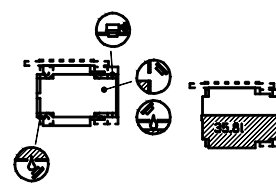
M4 (H3)



M5 (H5)



M6 (H6)



GZ00GU000K9

Lubrication table

Type of lubricant	Area of use			Products					
	Gear unit	θ [°C]	1) 2)	ARAL	ESSO	KLÜBER	MOBIL	SHELL	FUCHS
Mineraloil									
CLP VG220	G,F,K	-10... +40	O O	Degol	Spartan	Klüberoil	Mobilgear	Shell Omala	Renolin
	S	-20... +20	O O	BG 220	EP 220	GEM 1-220	630	220	CLP220
CLP VG680	S	0... +40	O O	Degol BG 680		Klüberoil GEM 1-680	Mobilgear 636	Shell Omala 680	Renolin CLP460
Synthetic oil – PG									
CLP PG VG460	G,F,K	-20... +80	+ +	Degol	Glycolube	Klübersynth	Glygoyle	Shell Tivela	Renolin
	S	-20... +80	++ +	GS 460	460	GH 6-460	HE460	S460	PG460
Synthetic oil – HC									
CLP HC VG220	G,F,K,S	-40... +60	+ ++	Degol PAS 220		Klübersynth EG 4-220	Mobilgear SHC XMP220	Shell Omala HD 220	Renolin Unisyn CLP220
Synthetic oil Food grade									
CLP HC VG220 USDA-H1	G,F,K,S	-20... +40	+ +	Eural Gear 220		Klüberoil 4 UH 1-220	Mobil DTE FM 220	Shell Cassida GL 220	
Bearing lubricants									
Mineral oil based		-25... +60			Mobilux 3			Alvania R3	
		-40... +80			Mobiltemp SHC100			Stamina EP2	
		-30... +40						Cassida RLS 2	
		Motor Iso H			Exxon Polyrex EM				

θ Ambient temperature

1) Load capacity

2) Resistance to ageing

O=normal, +=high, ++=very high

O=normal, +=high, ++=very high

Operating and maintenance instructions Gear unit Additional information for ATEX use



Valid for:

Motor DM/DA, marked with Ex nA IIC used for mains operation in zone 2

Motor DM/DA, marked with Ex tD 22 used for mains operation in zone 22

Gear unit, marked with Ex IIGD ck used in zone 1, 2, 21, 22

The installation and maintenance instructions and the additional information for ATEX use must be strictly followed to ensure the explosion protection according to ATEX and the validity of the declaration of conformity

In addition, all current standards and national regulations for the use of the product in hazardous areas have to be noted.

Startup

- operating temperature range: -20°C ... +40°C
- secure adequate ventilation of the motor and gear unit, supply no additional heat to the input and output shaft of the gear unit
- Provide protection against incursions of parts in the output elements - adequate covers
- Prevent dust between rotating and stationary parts, avoid static electricity
- For gear units without motor: consider equipotential bonding
- The permissible axial- and radial forces for the input shaft and output shaft of the gear unit must not be exceeded
- For gear units without motor
Motors may only be used if they do not exceed the permissible levels, according to nameplate:
P1max Maximum input power
T1max Permissible input torque
n1max Maximum input speed
- Perform test run at rated load
measure oil temperature and surface temperature at input of gearbox / between gearbox and motor
The oil temperature must not exceed 60K for mineral oil or 80K for synthetic oil above the ambient temperature and not more than 100°C
The surface temperature should not exceed 70K above the ambient temperature

Inspection and maintenance

- For repairs and maintenance work, the standard EN60079-19 and the standards for explosion protection have to be observed.
- Do not open the terminal box under explosive atmosphere when the engine is hot or is under tension
Open the terminal box not earlier than 30 minutes after shutdown
- Clean drive regularly, dust layers larger than 5mm are inadmissible
- Use only original spare parts