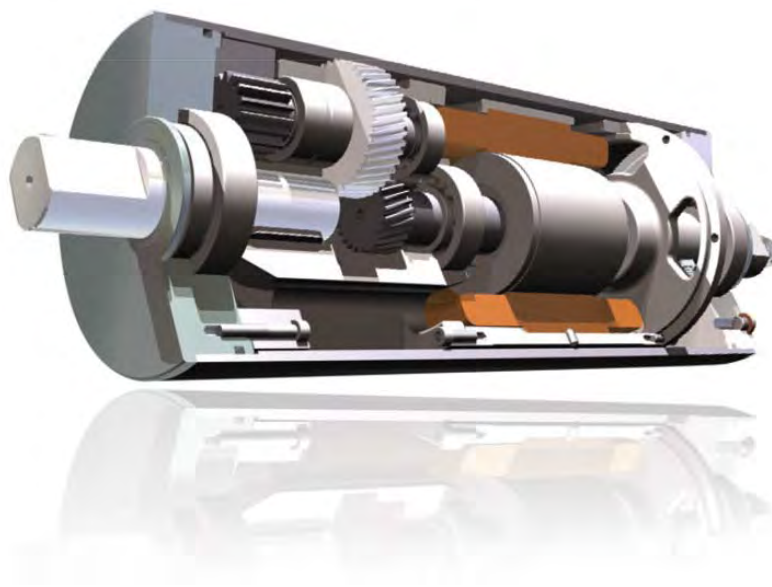


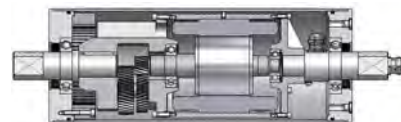


HIMMEL[®] - Drum Motors



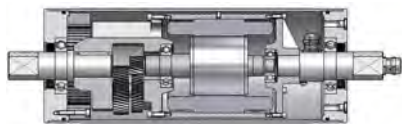
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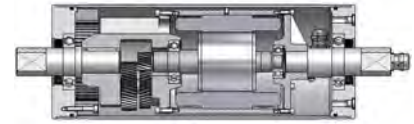
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Drum Motors

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1 Important instructions

1.1 Instruction symbols in the operating instructions

The instructions, which concern safety or industrial safety respectively, are designation as follows:



DANGER !

Possible consequences: Death or very severe injuries.



CAUTION !

Possible consequences: Damage to the drive and the environment.



NOTE .

Pointers for application and useful information.



ATEX .

Instructions and measures applying in particular to drives in ATEX version.

1.2 General Instructions

The present manual is a component of supply.

This manual applies to all standard versions of the **HIMMEL®**-drum motors:

TM60, TM80, TM82, TM111, TM113, TM135, TM138, TM160, TM165, TM174, TM216, TM321, TM415, TM518, TM620, TM630 and TM800.



Special types of drive and their accessory components are governed by the special contractual agreements and technical document.

Please consider the further provided manuals for accessory components, etc...



We accept no responsibility for damage or disruption resulting from disregard of these operating instructions.

Please keep the operating instructions near to the motor.

Read the operating instructions first before working with the motor.

Only the complete knowledge of this operating instruction guarantees a safe and error free use of the drum motor by avoiding user errors and improper use.

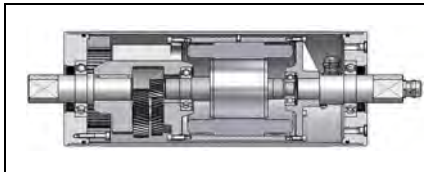
The **HIMMEL®**-Drum motors described here correspond to the state of the art technology at the time of printing of this operating instruction.

In the interest of further development we reserve the right to make changes to the single components and accessories which contribute to maintaining the fundamental criteria for increasing the performance and safety of the drives.

The copyright of this operating instruction lies with **LAT® Maschinen und Antriebstechnik GmbH & Co. KG**

This operating instruction may not be duplicated in full or in part, used unauthorised for competition or supplied to third parties without our agreement.

Changes or amendments to this operating instruction may only be performed through us; otherwise all guarantee claims on us expire.



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2 Safety Notes

2.1 Intended Use

The **HIMMEL**[®]-drum motors covered in these operating instructions have been developed for the stationary use in general engineering. As long as not otherwise agreed, the motors are designed for use in industrial areas in machines and plants.

The motors are built state of the art and are supplied safe for operation. Unauthorized modifications which lead to impairment of the reliability are not permitted.

Modifications and rebuilding on **HIMMEL**[®]-drum motors together with additions (e.g. a rubber lining) must be approved by the manufacturer otherwise all warranties are void.

The motors are only designed for use as described in Chapter 3 („General Information“). They may not be used outside the laid down power range. Differing operating conditions require new contractual agreements.

2.2 General safety instructions

The drives must be installed, started up, operated, maintained and, if necessary, repaired only by authorised, properly trained and qualified personnel. For definition of expert staff, refer to e.g. IEC 364.

The operator must ensure that all persons involved in installation, operation, maintenance and repair have read and understood these operating instructions and comply with them at all times in order to:



- avoid injury or damage
- ensure the safety and reliability of the drive
- avoid disruptions and environmental damage through incorrect use

Carry out work on the drives only when they are at a standstill.

Secure the drive units against unintentional starting (e.g. lock key switches or remove fuses in the power supply).

A notice should be attached to the start switch stating clearly that work on the drives is in progress.

Carry out all work with great care and with due regard to safety.

Always observe the instructions on the plates on the drives. The plates must be kept free from paint and dirt at all times. Replace any missing plates.

Ensure compliance with the relevant safety and environmental regulations during transport, assembly and dismantling, operation, and care and maintenance of the unit.

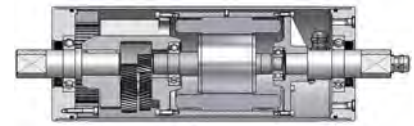
Secure rotating drive parts, against contact by means of suitable safety devices.

Ensure adequate ventilation when working with solvents. Do not inhale vapours. Do not smoke.

Collect and dispose of used oil in accordance with regulations. Remove any oil spillage immediately with an oil-binding agent in compliance with environmental requirements.

Do not wear loose garments or objects which could be seized from moving parts.

It is also recommended to wear solid and slide free boots during work in the open air.



During installation of drum-motors it is to be guaranteed, that by means of precautionary measure the injuring of operating- and service personal as well as non-participating persons is prevented.. In this case special care has to be taken to prevent, that persons do not come into contact with movable and rotating components, or do not reach for components between belt and drum.

The machine must be checked regularly for continuous ground. Interruptions must be removed immediately. When mounting the drum motor to a band-conveyor the customer has to secure, that there is a equipotential bonding.

3 General Information

3.1 Electric motors

- i** The electric motors of the **HIMMEL®**-drum motor series are wound according to DIN/VDE 0530 in IEC standard cores. The insulation class is as per IEC 60034-1 class "F".
If the drum motor is operate without a belt, please inform LAT® Maschinen und Antriebstechnik.

3.2 Voltage

- i** All **HIMMEL®**-drum-motors are supplied with wide range voltage windings, up to 2,2 kW with 230/400V $\pm 5\%$ and from 3 kW onwards with 400/690 V $\pm 5\%$.

3.3 Frequency - Inverters

- i** All **HIMMEL®**-drum-motors are supplied with squirrel-cage rotor motors and are therefore infinitely variable by means of static frequency converters within the frequency-range of 20 to 75 Hz.



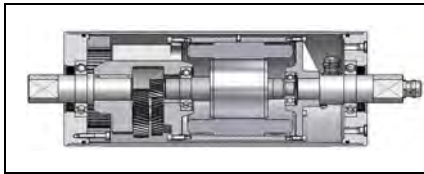
HIMMEL®-drum-motors in ATEX-version can not be driven with frequency converter.

3.4 Output rating

- i** The nominal output ratings refer to continuous duty as per VDE 0530 part 1, at a frequency of 50Hz, nominal voltage, a coolant temperature of up to 40°C and an altitude of 1000m above sea level.

3.5 Noise Levels

- i** The noise level (sound pressure level) at drum-motors is measured according to DIN EN ISO 1680, using measuring instruments according to DIN IEC 651



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4 Receipt of goods and storage

4.1 Receipt of goods

i Immediately after receipt, the consignment has to be checked for transport damage. If necessary a claim for damage has to be raised at presence of a member of the carrier, otherwise no charge free damage regulation is possible.

4.2 Storage

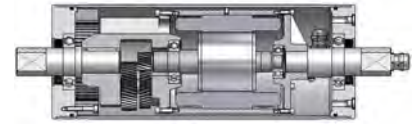
4.2.1 General aspects

i In case of storing the **HIMMEL**[®]-drum-motors, the storing area should exclude strong vibrations ,as this may cause damage to the bearing systems. Additionally it has to be observed that dry rooms, free from excessive temperature variations have to be selected for storage.

After approximately two months, the motors have to be operated on no load for a short time, to prevent damage to the radial seals (seal lip). These rules have to be applied also after a longer stand still period.

4.2.2 Motors with rubber coatings

i **HIMMEL**[®] -drum-motors with rubber lining have to be jacked up on the trunnions during storage.



5 Installation and assembly of HIMMEL®-drum motors

5.1 General information on installation



Before you begin

The drive unit maybe installed only if:

- ▶ the data on the type identification plate of the drum motor agree with the permissible Ex-application on site.
- ▶ the drive unit is intact, i.e. not damaged.
- ▶ there are no potentially explosive atmospheres, oils acids, gasses, vapours etc. in the area during installation.
- ▶ the lubricant viscosity agrees with the ambient temperature on site.
- ▶ steps have been taken to ensure that the drive unit is sufficiently ventilated and that there are no sources of external heat input.



Drives in ATEX version .

Affect on bearings of stray electric currents from electrical equipment.

When mounting or connecting the drum motor to the machine care must be taken that potential is equalised.



Drives in ATEX version .

Only drive and output elements with an ATEX approval must be used. Observe the operating instructions provided with the power transmission elements.

Due to the radial forces produced, power transmission elements, such as flat belts or V-belts, gearwheels and sprockets, cranks, eccentric cams etc., are to be arranged as close to the drum motor as possible. The bearings and drive shaft are then subject to the lowest possible load. Refer to out technical sales documentation for the maximum permissible load values.

The protective coating on the end of the shaft must be removed by suitable means prior to mounting the transmission elements. The same procedure applies for transmitting the drive power to the gear unit in connection with a free drive shaft.



DANGER !

When working with solvents, ensure adequate ventilation. Do not inhale vapours. Do not smoke!



CAUTION !

Overheating of the drives through exposure to direct sunlight. Provide suitable safety equipment, such as covers and roofs.



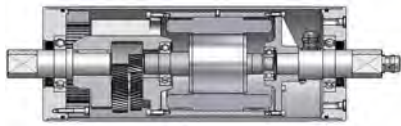
CAUTION !

Irreparable damage to toothed components and bearings from fusing. Do not carry out any welding work on the drive. The drives must not be used as an earthing point for welding operations.



NOTE .

Use headless bolts of strength class 8.8 or higher to fasten the drives.

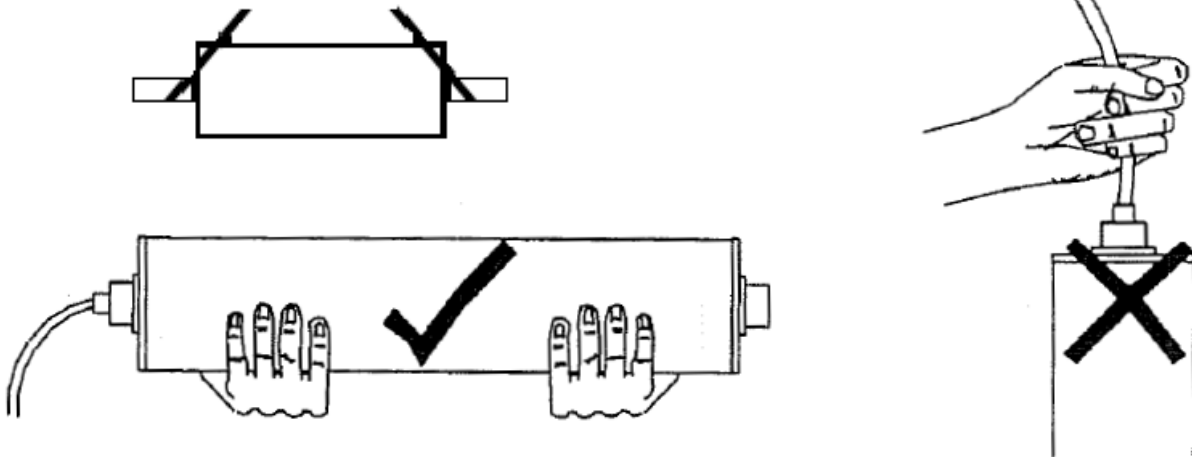


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5.2 Handling / Transport

Handle with care. DO NOT lift with cable.
Drum motors from size TM630 lifted only by the shaft!



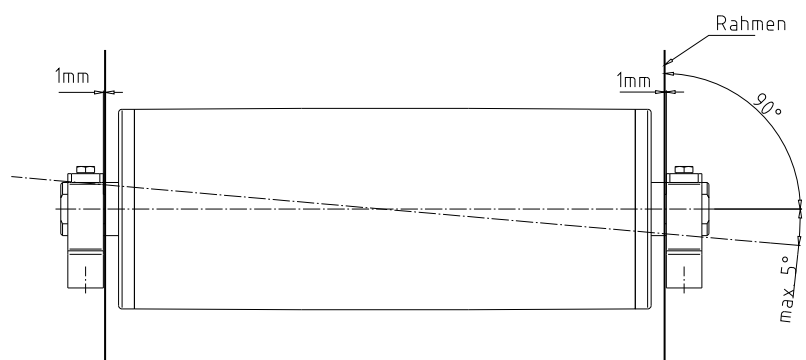
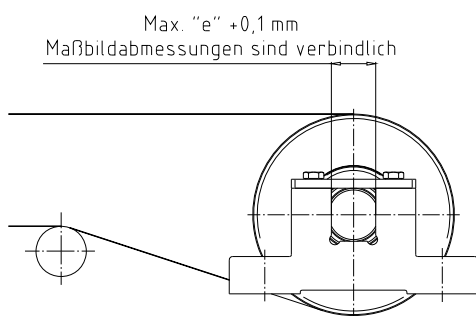
5.3 Motor mounting position

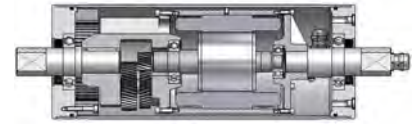
The **HIMMEL**[®]-drum motors are designed for horizontal mounting. Furthermore there are mounting parallel to idler rollers and rectangular to the conveyor belt, as long as no other mounting position was agreed during ordering. Since the **HIMMEL**[®]-drum motors have two identical trunnions they can be mounted according to the structural conditions.

At amounts differ installation position, inform the producer!



Should the drum motors be installed other than shown here, damage to the plant or the drum motor can result meaning loss of the guarantee.





5.4 Mounting of the trunnions



The trunnions must be securely fastened by means of tab washers. It must be observed that as from Ø82 mm the marking “**up**” or “**oben**” may only point upwards or maximal 30° to the left or right otherwise the cooling and lubrication of the motors is no longer guaranteed.

The inclination of the motor may also not be increased during operation. (Picture 1)

The bolts for securing the **HIMMEL®** support bearings are to be chosen so that the weight of the drum motor and the expected belt tension can be adequately taken.

The **HIMMEL®** support bearings must lie on the framework over the full surface to avoid tensioning and twisting of the trunnions.

Should no **HIMMEL®** support bearings be used it must be made sure that the trunnions are mounted with no play and no pre-tensioning. (Picture 3)

Where a low noise level is required, it should be observed during development of the conveyor that vibrations are reduced to a minimum and vibration dampeners are used where possible.

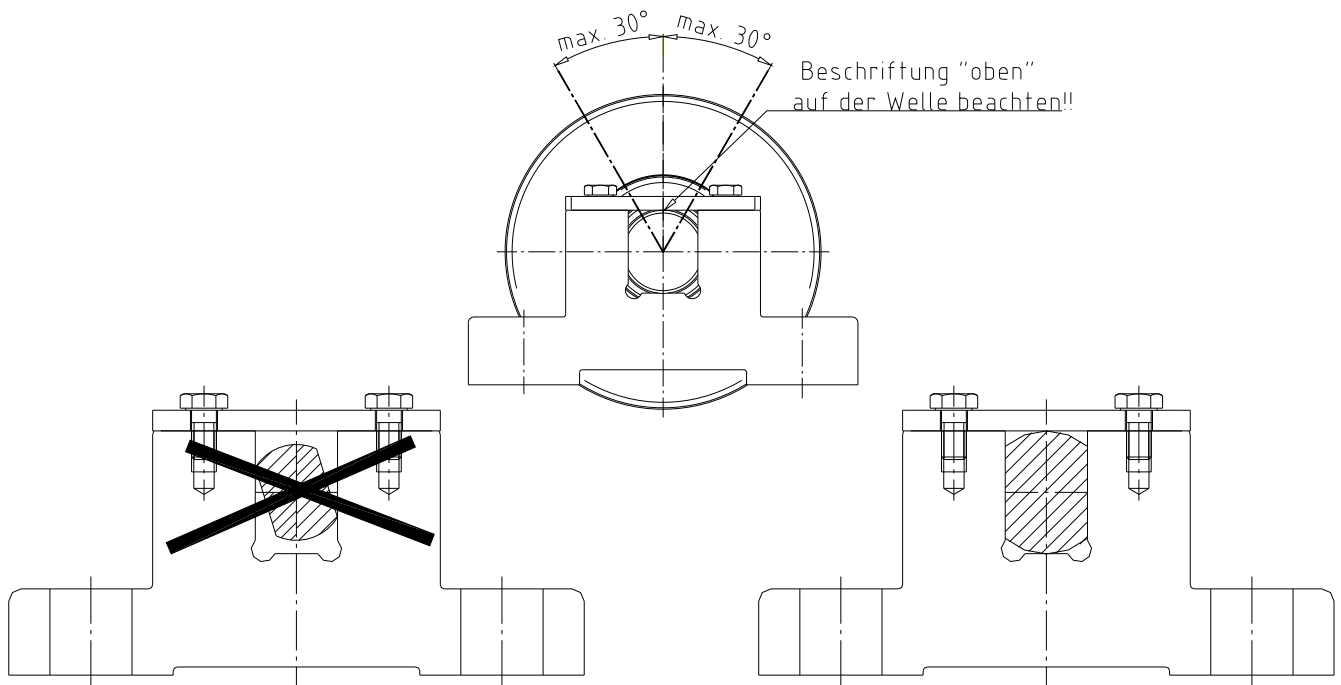
From motor size TM630 the tightness of the keys has to be checked regularly according to the prevailing operating conditions and if appropriate be repaved.

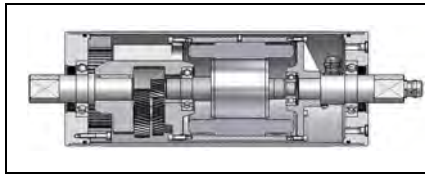


Where no **Himmel®** support bearings are used, the following must be observed:

1. The individual trunnion mountings must cover at least 80% of the trunnion.
2. The drum motors must be installed without axial play.
3. The play between the trunnions and the mounting may only be maximum 0.2mm.

For reversals or high switching frequency larger than that given in catalogue, the drum motor must be installed without play.





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5.5 Reversing duty



All **Himmel**-drum-motors without back-stop are allowed to be used for operation in reversed direction, but it has to be guaranteed that the motor comes to rest before reversal.

5.6 Drum motors with backstop



In case of **Himmel** -drum-motors with back stop it is important to observe the correct phase sequence. Connecting the lines L1,L2, L3 with terminals U1,V1,W1 the **Himmel** –drum motor runs in the free direction of rotation. If there is any doubt regarding the correct sequence of phases, you should test it with a three-phase meter. A test with only two phases is not permitted, as the motor may be damaged.

The permitted sense of direction is marked with a label showing an arrow.



ATTENTION!

Incorrect connection can lead to damage of the backstop or the electric motor already during the first installation.



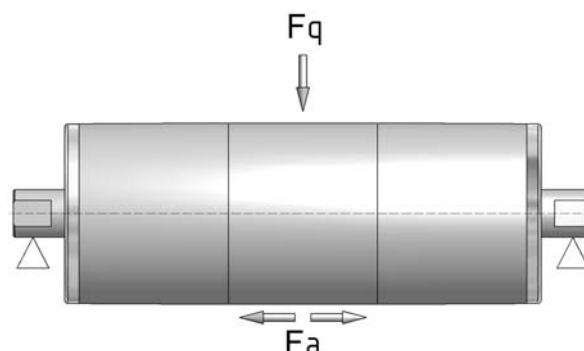
At ATEX-drum motors must be the output speed from motor greater than 1000 rpm.

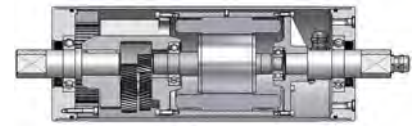
5.7 Belt tension

The belt should only be tensioned so far that during usage under nominal load the belt does not slip. The maximum permissible belt tension at mean speed can be found in the following table. At higher speeds HIMMEL® Antriebstechnik must be make a separate calculation.

Drum	Ø	60	80	82	110	111 / 113	135	138	160	165
Max. Tension [Fq]	[N]	1.500	2.000	2.000	4.000	*4.500 **3.800	5.250	8.300	5.250	8.000
Drum	Ø	174.0	216	321	415	518	620	630	800	
Max. Tension [Fq]	[N]	4.500	10.000	16.000	18.000	35.000	35.000	88.300	1) 88.300 2) 180.000	
* 3-stage / ** 2-stage						1) up to 55 kW		2) 55 - 132 kW		

If there is no overhung load Fq, then an axial force Fa (tension or compression) amounting to 50% of the overhung load given in the selection table is permitted.





6 Electrical connection of a HIMMEL[®]-drum motor



Before working on the drum motor, disconnect fully from all mains supplies.

Cables must be checked for possible damage.

Connection may only be performed by qualified personnel.

All relevant regulations in the area of electrical engineering must be observed during all work.

The user is liable for all accidents or costs resulting from none observation of these rules.

6.1 General

Squirrel cage rotor motors are started either direct or with star delta starting. Before **HIMMEL[®]**- drum motors are finally put into operation, they are to undergo a trial start under no-load conditions. In cable design, the wires have either an alphanumeric or colour coding. The grounding connection is always green-yellow striped.

Before connecting the motor it must be assured that the mains voltage available corresponds with the voltage given on the name plate.

The connection of the motor must be observed.

A correct phase sequence L1 L2 L3 (R-S-T) and connection according to the given connection diagram, causes the motor to rotate clockwise when looking at the side of the electrical connection (cable or terminal box). Counter clockwise rotation is achieved by interchanging two phases.

The voltage 230/400 V $\pm 5\%$ given on the name plate means that the motor can be driven with 230 V $\pm 5\%$ in delta and with 400 V $\pm 5\%$ in star connection.

6.2 Motor Protection

The winding of electrical motors has to be protected against over-current and non permissible temperature rise. The protection devices provided for the **HIMMEL[®]**-drum-motors guarantee the safe protection against overload with slowly occurring deviations. The suitable type of protection system for the motor should be selected according to the duty-types given as follows:

Guidelines for the position of different protection systems (supply of system is optional)

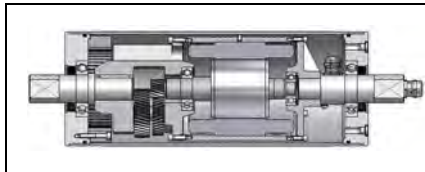
PTO or PTF = (bimetallic thermostats) to be incorporated into the auxiliary circuit

PTO (WT-opener) = The thermostat opens the contacts at the predetermined temperature

PTF (WT-closer) = The thermostat closes the contacts at the predetermined temperature

PTC (Thermistor)= to be arranged within the auxiliary circuit along with the control unit.

Thermistor: A thermally sensitive semi-conductor resistor, whose primary function is to exhibit an considerable change in electrical resistance causing the controller to activate.



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Warning and Switch-Off



If there is dual protection devices employed (with different nominal duty temperature ranges) the first device may take over the warning operation (in an acoustic or optical manner, without interrupting the line circuit) whereas the second protection device can be used to switch off the line circuit (all power supply for the concerned drive will be stopped). At a lack of protective equipment will void the warranty

6.3 Motor Types

6.3.1 Drum -motors with single speed

Dependent on the supplied design, drum-motors with single speed have to be connected according to the wiring diagram supplied.

6.3.2 Drum motors with double speeds

For drives which require two different non-variable speeds, the motors will be supplied in a pole changing version. The standard design of pole changing motors is calculated for direct starting conditions.

Motors with a ratio of speed 1:2 are executed with tapped wound winding (Dahlander).

6.4 Connection Versions


6.4.1 Terminal block and direction of rotation

The **HIMMEL**[®]-drum motors with terminal box are equipped with a terminal board with either six or eight terminal-bolts, which correspond to the standard IEC-60034-8.

If the motor is connected according to the given wiring diagram, it rotates clockwise when facing the side of the electrical connection.

If the motor is equipped with additional accessories (e.g. winding thermostats or a brake), the connection results on the marked strip-terminals.

6.4.2 Grounding with Terminal Box

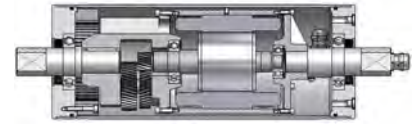
The grounding terminal is situated on an elevated portion within the terminal box. It is marked with the symbol . As special equipment a second grounding terminal can be provided on the housing itself. This is also marked in the same way.

The grounding has to be executed with at least the same cable cross-section as the cables for the power-supply.

6.4.3 Material

The standard material for the terminal boxes is either aluminium-alloy, cast-iron GG25 or plastic in enclosure IP 65.

The cable gland or strain relief is positioned downwards when looking at the terminal box.



6.5 Brake



During operation of drum-motors with brake it has to be observed that the brake has to be disengaged by connecting the coil voltage given on the name plate before starting of the motor. Otherwise damage to the brake may result.



HIMMEL®-drum motors in ATEX-version will be delivered generally without brake.

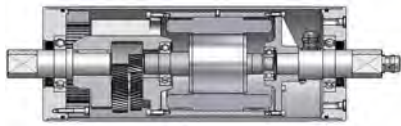
7 Operation of HIMMEL®-Drum Motors

7.1 Temperature rise / Insulation Class

The insulation system of the standard motors corresponds to insulation class F according to VDE 0530 (IEC34 Part 1, IEC86). For a cooling temperature of 40°C, the permissible temperature rise of the winding is 155°C (105 K).

7.2 Operation with conveyor belt

Should the drum-motor be operated in connection with a conveyor-belt, it must be observed, that no transport particles or obstacles are present between the belt and the drum. If this occurs either the drum, the belt or the rubber-lining may be damaged. Should then the drum motor block, the electric motor or gearbox can be destroyed. To avoid this deflecting equipment and preventive mechanisms can be used.



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8 HIMMEL® drum motors in hazardous areas



Warning: This total chapter 8 is for **HIMMEL®**-drum motors in ATEX-version. Only an exact knowledge and abidance by this chapter warranted a safety mode by **HIMMEL®**-drum motors in hazardous areas.

8.1 Conditions for safe operation

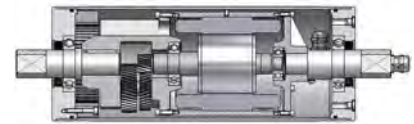
Dust explosion-proof **HIMMEL®** drum motors of the TM82, TM111, TM113, TM135, TM138, TM160, TM165, TM174, TM216, TM321, TM415, TM518, TM620, TM630, TM800.0 and TM800.1 are suitable for use in Zone 22 according to **II 3 D Ex tc IIIC T120 ° C Dc** (Old name: II 3 D EX tD A22 IP 65 120 ° C) performed in accordance with EG-Directive 2014/34/EU.

Use for cable entry only ATEX compliant (against dust), approved cable glands, for the protection of at least IP65 is guaranteed.

8.1.1 Before the installation :

This checklist lists activities, that will have to be performed before starting a drum motor according to EC Directive 2014/34/EU in a hazardous area.

What needs to be examined?	see chapter	Tested:
Inspect the shipment immediately upon receipt for shipping damage. Immediately inform the transport company. The installation or commissioning is, where appropriate, to exclude.	4.1	
It is necessary to check whether the information given on the rating plate of the drum motor and the order confirmation with the permissible ex-conditions: <ul style="list-style-type: none"> ► Explosion Group ► Category ► type of dust (conductivity) in Zone 22 ► maximum surface temperature 	8.3	
Is it ensured, that during installation explosive atmospheres, oils, gases, vapors, etc. are there?	5.1	
If the lubricant viscosity match the ambient temperature?	9.2	
Is the oil level correct?	9.2	
Do all to be mounted input and output elements have an ATEX approval for use in potentially explosive dust-air mixtures? Are these fitted guidelines compliant?	5.1	



What needs to be examined?	see chapter	Tested:
When using a backstop in the drum motor the drive speed must be greater than 1000 rpm.	5.6	
Additional measures must be observed, when drum are not installed horizontally e.g. a special oil level, spec. seals, motor and gear unit always lying in the lower part of the upright drum motor etc.	5.3	
A version of the drum motor with brake is not allowed. Therefore, also no subsequent customer cultivation is allowed!	6.4	
At an input speed (engine speed) > 3000 1/min may occur to increase the temperatures. Therefore, the engine must <u>not</u> be operated with a frequency-inverter!	3.3	
Drum motors in ATEX design are always executed with winding protection (PTC), which is to clamp accordingly.	8.2 and 11	

Drives in ATEX version:

When everything is checked and answered with **"yes"**, only then the drive can be put into operation.

8.1.2 During commissioning:

When connecting the terminal board must be observed

Clipboard M5 allowed up to 25A. Tighten the nuts with 2 Nm.

Clipboard M6 permitted up to 63A. Tighten the nuts to 3 Nm.

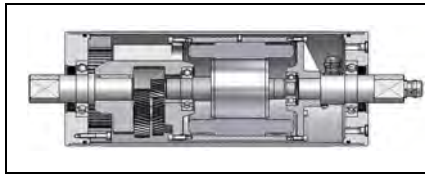
During commissioning of the transmission, it is imperative to measure the surface temperature at maximum load carry. The maximum surface temperature is reached after 4 hours.

The housing temperature may not exceed a difference of 80K to the ambient temperature (max. 40°C) therefore, T max of 120°C. Otherwise the drive is immediately shut down. The operator must contact Neudecker & Jolitz.

The explosion-proof drum motor provides a maximum surface temperature of 120 ° C with dust safely. In the operation instructions a note was taken that the ambient dust-site must have an ignition temperature / ignition temperature greater than 180 ° C.

Measure the temperature on the cover plates or the drum shell with a suitable temperature sensor. Changes indicate possible incipient damage.

By damaged insulation of the connecting cable or missing cover of the terminal box (not closed) it can create sparks from electric shock.



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8.1.3 During operation:

During operation, the seals and shaft seals should be checked for leakage location.

All surfaces must be checked for paint and corrosion damage at regular intervals, every 200 hours of operation, at least twice a year. Any damage must be repaired or renew protective coat.

The bearings should be checked regularly and replaced before failure.

Indication of defective bearings are changes in the vibration and noise characteristics.

Dust deposits prevent the heat radiation and cause high housing temperatures.

The drive system has to be kept free of dirt and dust.

All measures, checks and the results must be documented by the operator.

8.2 Temperature monitoring

Dust explosion-proof **HIMMEL**® drum motors in category 3D ensure a safe operation under normal operating conditions. When overloaded, the **HIMMEL**® drum motor must be safely switched off to avoid unacceptably high surface temperatures.

The mode of switch off is standard with motor protection switch or thermistors (TF).

The motor protective dependent permissible operating modes can be found in the table below.

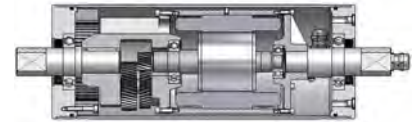
Note when installing the motor protection switch to EN 60947 the following:



- The motor protection switch must turn off immediately in case of failure of a phase
- The motor protection switch must be adjusted to the nominal motor current given on the nameplate
- The PTC thermistor must be evaluated using a suitable device
- The valid installation regulations must be adhered to
- The effectiveness of the protective device is required prior to commissioning

Protection against excessive temperatures	Permissible operating mode
Temperature coefficient thermistors (TF)	<ul style="list-style-type: none"> • S1 • S6 • Switching frequency shall be calculated at idle and under load • Heavy starting

According to EN 50019 Annex A there is a heavy starting, if for the normal operating conditions selected and set motor protection switch off already shuts off during the starting period. This is generally the case, when the starting time is more than 1.7 times of the time t_E .



8.3 Execution ATEX nameplate

General Specifications (nameplates):

The rating plate of the **HIMMEL**® drum motors in ATEX design contains the most important technical data. These data and the contractual agreements on the drive determine the limits of its intended use.




Drive in ATEX version.
 Construction nameplate
 ATEX drum motors:

8.3.1 Construction Standard TM type plate

TM Standard

Characteristics:

- | | |
|----------------------|------------------------|
| 1. Type | 11. Protection class |
| 2. Number of phases | 12. Insulation class |
| 3. Production number | 13. Operating mode |
| 4. Index number | 14. speed |
| 5. circuit | 15. Oil type |
| 6. tension | 16. Oil quantity |
| 7. frequency | 17. Brake control |
| 8. power | 18. voltage |
| 9. electricity | 19. Customer number |
| 10. CosPhi | 20. weight |
| | 21. Date of production |

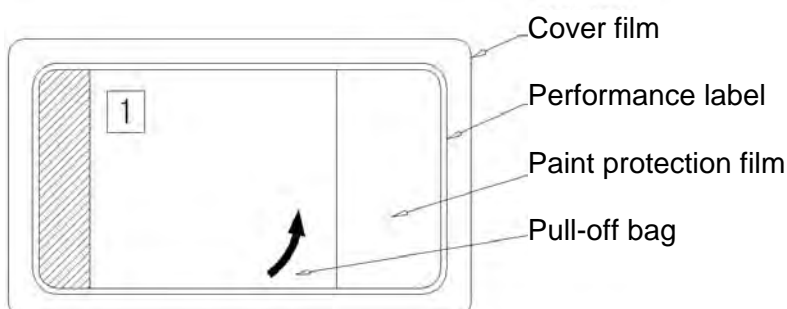
HIMMEL® technologies		48712 Gescher Germany		CE EN 60034	
TM82.1x425BS		3~		P-660725/1	
Y	220-240V	50Hz	0,07kW		
0,52A	cosφ 0,69	IP66			
Ins.Cl.F	S1	v=0,17m/s			
☞ CLP E 100 Synth.oil					
0,3L					
br.230V	Kd.Id.Nr.:00888675-15				9,00 1/17
Logo				Norm/ Directive	
1		2		3 4	
5		6		7 8	
9		10		11	
12		13		14	
15					
16					
17		18		19 20	

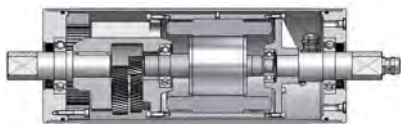
The type plates of the HIMMEL® drum motors normally consist of coated aluminum foil. They are covered with a special cover film, which ensures a long-term resistance to UV radiation and media of all kinds (oils, greases, salt water, detergents, etc.).

The adhesives and materials are selected in such a way that an extremely firm adhesion and permanently good readability is also given at the limits of the temperature application range (- 40 ° C ... + 155 ° C).

In special cases, i. For special specifications, riveted or screwed metal plates are used.

8.3.2 Remove the protective paint film





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9 Maintenance and Care

Careful maintenance and care according to our advice is the basis for a long life of the drum-motor. Extensive maintenance work has to be executed within the given intervals, smaller check-ups whenever possible but at the latest to the above mentioned interval periods.

9.1 Cleaning

When cleaning the drum-motor it has to be observed that only motors with labyrinth seals und V-ring seals are allowed to be cleaned with high pressure cleaning equipment. All other motors have to be cleaned without pressure application.

9.2 Lubrication / Oil Change

9.2.1 Lubrication

Greasing of the ball-bearings or roller-bearings used within the **HIMMEL**[®]-drum-motors is not required.

9.2.2 Oil Change



It is not necessary to change the oil, but it may be done for special reasons. We advise a change after 10.000 operating hours.

The oil filled by the manufacturer, and the quantity can be read on the nameplate.

All **HIMMEL**[®]-drum-motors are supplied with the quantity of oil necessary for correct operation. The primary oil-filling at the factory complies with the following technical specifications:

100 cST / 40°C or 8° angle / 50°C, the pourpoint is -20°C.

The oil is suitable for ambient temperatures from -20°C up to +50°C.



Should other types of oil be used, please verify that the oil has no additives that could affect the insulation of the winding wires in a harmful way.

Furthermore **NO** oil types which include substances like graphite, molybdenum-sulphide or other conductive agents may be used, as the insulation system of the motor will be damaged.

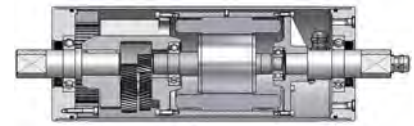
Technical Data (Guidelines)

ISO-VG	Viscosity mm ² /s (cST)		Flash Point	Pour Point	Gear oil acc. to DIN 51517 part 3
	40° C	100° C	° C	° C	
100	102	11,3	240	-21	CLP 100

Recommended oil types of differing suppliers:

Supplier	FINA	Castrol	BP	ESSO	Mobiloil	Shell	Texaco	DEA
Type	Giran	Alpha	Energol	Nuto	Mobil-gear	Omala S2 G	Meropa	Falcon
	N 100	ZN 100	GR-XP100	H 100	627	100	100	CLP 100

On the flange of the drum-motor are two oil drain plugs, facing the side of the electrical connection. The two plugs have to be removed during oil changing and the drum has to be turned so long that the outer thread reaches the bottom position, to archive a free run out of the old used oil.



CAUTION:

It is to be observed that the marking „up“ or “oben” on the connection side **never** shows downwards otherwise the cooling / lubrication is no longer guaranteed.

Typ	Erforderliche Ölmengen in Liter – waagerechter Einbau																							
L [mm]	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350
60.1				0,10	0,14	0,17	0,21	0,24	0,28	0,31	0,35	0,38	0,42	0,45	0,49	0,52	0,56	0,59	0,63	0,66	0,70	0,73	0,77	0,80
80.1				0,20	0,24	0,28	0,32	0,36	0,40	0,44	0,48	0,52	0,56	0,60	0,64	0,68	0,72	0,76	0,80	0,84	0,88	0,92	0,96	1,00
82.1	0,05	0,13	0,14	0,19	0,24	0,30	0,35	0,40	0,42	0,45	0,51	0,58	0,65	0,72	0,79	0,86	0,93	1,00	1,07	1,14	1,21	1,28	1,35	1,42
111.0			0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	1,90	2,00	2,10	2,20	2,30	2,40
111.1			0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	1,90	2,00	2,10	2,20	2,30	2,40
113			0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	1,90	2,00	2,10	2,20	2,30	2,40
135.1			0,45	0,50	0,70	0,80	0,90	1,00	1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	1,90	2,00	2,10	2,20	2,30	2,40	2,50	2,60
138.1			0,70	0,80	1,00	1,10	1,30	1,40	1,60	1,70	1,90	2,00	2,20	2,30	2,50	2,60	2,70	2,90	3,00	3,20	3,30	3,50	3,60	3,80
160.0			0,70	0,90	1,10	1,30	1,50	1,70	1,90	2,10	2,40	2,60	2,80	3,00	3,20	3,40	3,60	3,80	4,00	4,20	4,50	4,70	4,90	5,10
165.1					0,90	1,10	1,30	1,50	1,70	2,00	2,20	2,40	2,60	2,80	3,10	3,30	3,50	3,70	3,90	4,20	4,40	4,60	4,80	5,00
174.0					1,20	1,50	1,80	2,00	2,30	2,50	2,80	3,00	3,30	3,50	3,80	4,00	4,30	4,50	4,80	5,00	5,30	5,50	5,80	6,00
174.1					2,30	2,60	2,80	3,10	3,30	3,60	3,80	4,10	4,30	4,60	4,80	5,10	5,30	5,60	5,80	6,10	6,30	6,60	6,80	7,10
216.0					4,10	4,50	5,00	5,40	5,90	6,30	6,80	7,20	7,70	8,10	8,60	9,00	9,50	9,90	10,40	10,80	12,20	13,50	14,90	16,20
216.1					3,60	4,10	4,50	5,00	5,40	5,9	6,30	6,80	7,20	7,70	8,10	8,60	9,00	9,50	9,90	10,40	10,80	11,30	11,70	12,20
321.0							10,80	12,60	14,40	16,2	17,1	18,00	18,90	20,30	21,60	22,50	23,40	24,80	25,70	27,00	29,30	31,50	33,80	36,00
321.1							9,90	11,30	11,70	13,1	14,4	15,80	17,10	18,50	19,80	21,20	22,50	23,00	24,30	27,00	29,30	31,50	33,80	36,00
415.0									21,20	22,8	24,4	26,00	27,60	29,20	30,80	32,40	34,00	35,60	37,20	38,80	40,40	42,00	43,60	45,20
415.1									16,20	17,8	19,4	21,00	22,60	24,20	25,80	27,40	29,00	30,60	32,20	33,80	35,40	37,00	38,60	40,20
518.0												36,90	40,90	45,00	49,10	53,10	57,20	61,20	65,30	69,30	73,40	77,40	81,50	85,50
518.1												27,00	30,60	34,20	37,80	40,50	44,10	47,70	51,30	54,00	60,80	67,50	72,10	76,50
620.0																90,00	93,60	97,20	100,80	104,40	108,00	112,00	116,00	119,00
630																51,5	53,0	54,0	56,5	59,0	60,5	63,0	64,5	66,0
800.0																61,5	64,0	66,5	69,0	71,0	73,0	74,5	76,0	78,0
800.1																				126,0	128,0	130,0	132,0	134,0

Additional quantities of oil are available on request

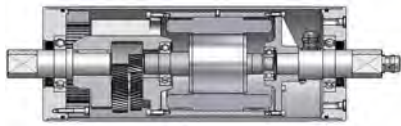


If the drum motor is not mounted horizontally the required quantity of oil changes.
It will be adjusted on request to the respective conditions.
The drum motors TM60.1 and TM111.1 with stainless steel cap are lubricated for life.

An environmentally compatible method of disposal of used oil is to be observed.



When changing the oil it has to be ensured that no oil contaminates the floor or penetrates the earth by use of special collecting trays. Should oil escape it must be removed immediately with an oil binding agent in an environmentally compatible way. The oil, oil-binding agents and polluted soil must be disposed of professionally.



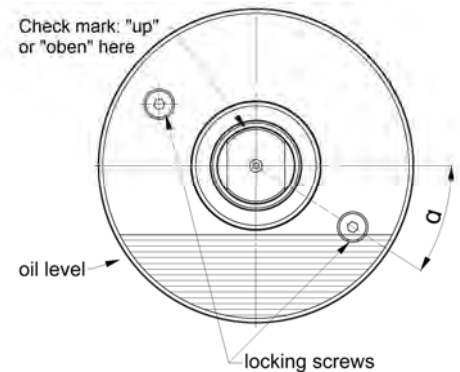
Operating Instructions Drum Motors 1NJ005390 EN 01-2017



9.3 Oil level check

Course of action:

1. Before the oil level can be checked, the **HIMMEL**[®]-drum-motor shall be fixed in a horizontal position by using the spanner flats.
Caution: Consider the check mark "up" or "oben", graven on the shaft.
2. Rotate the **HIMMEL**[®]-drum-motor until one of the locking screws are positioned on angle α (see table below).
3. Screw these "lower" locking screw out.
The oil level is correct, when oil stands exactly below the hole



Angle for oil level control:

Type (TM)	80.1	82.1	111.0	111.1	113	135.1	138.1	160.0	165.1
angle α	15°	15°	22°	22°	22°	20°	22°	16°	28°
Type (TM)	216.0	216.1	321.0	321.1*	321.1**	415.1	518.1		
angle α	18°	16°	13°	13°	18°	12°	***		

* until 4,0 kW / ** from 5,5kW / *** to enquiry

9.4 Replacing bearings



The bearing life depends very much on the operating conditions. It is therefore very difficult to calculate it reliably. If the operating conditions are specified by the operator, the bearing life can be calculated and indicated on the rating plate. If no information is given, changes in the vibration and noise pattern can serve as an indication that an immediate bearing replacement is necessary.

9.5 Sealing system



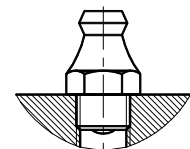
Labyrinth seals have to be checked visually for possible defects at short intervals or at least once a month.

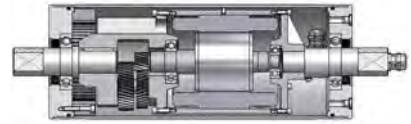
Every 2000 operating hours, or at least once a year, the labyrinth-seals have to be completely cleaned. To do this you have to unscrew the protective cap and remove the V-ring or the labyrinth-seal from the shaft. During this cleaning procedure the satisfactory conditions of the seals have to be checked, otherwise the correct functionality of the seal is no longer guaranteed.

If there is a labyrinth seal with grease nipple it must be, according to the operating conditions as soon as after any cleaning relubricated or new lubricated, to secure the ingress of dirt into the drum motor and to guarantee a trouble-free run. It has to be secured that the grease which comes out of the labyrinth, is not dirty.

Failure to follow of these instructions can cause oil leaks and it will void the product warranty.

If the frequency of relubrication intervals are too large, an automatic relubrication can be upgraded from the drum motor size TM630.





9.6 Brake



The brake dust of the internal brake of **HIMMEL**[®]-drum motors is removed automatically during every oil change.

9.7 Rubber lining



Drum-motors with rubber linings have to be visually checked at short intervals to ensure there is no damage to the rubber lining. Damage of the lining causes unbalance during operation of the drum and may lead to a bearing failure.

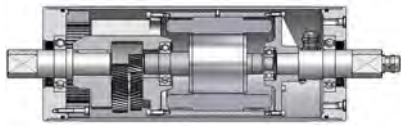


With drum motors in ATEX design is to ensure that an antistatic rubber is used

10 Radio frequency interference suppression

The frame of the three-phase squirrel-cage motors are designed in such a way that electromagnetic disturbance sources are kept at such a distance that no real penetration into the magnetic circuit takes place to disturb the normal operation of the motor.

The normal three-phase squirrel-cage motor does not produce radio frequencies. But the conductors which are used to connect the motor to the mains (circuit breakers) may need additional components to clear interferences.



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11 Warranties

All drum-motors which are returned during the guarantee period agreed to by us will be repaired on a no charge basis, if there is a damage or failure the factory itself is liable for.



We accept **no** liability for any damage or malfunction resulting from:

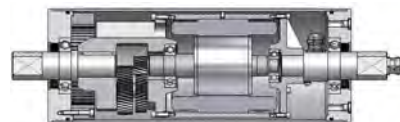
- ⇒ *Non observance of the information and rules given in this maintenance instruction, e.g. wrong belt tension, wrong electrical connections, not correct or missing maintenance or careful handling.*
- ⇒ *Incorrect selected and calibrated motor-conductor or faulty connections of the winding protection contacts.*
- ⇒ *Overloading of the motor.*
- ⇒ *Operation on reversed speed without observing stopping position of the motor.*
- ⇒ *Running the motor in the wrong direction against locked back-stop.*
- ⇒ *Changing of operation condition against the given operating instructions*
- ⇒ *Changes on motor and auxiliary units without written confirmation by the manufacturer.*
- ⇒ *Repair and modification on motors without written confirmation by the manufacturer.*
- ⇒ *Willful mishandling and damaging.*
- ⇒ *Normal wear and tear of components*

Our guarantee promise is only bound to failures on our supplied product.

We accept by no means charges due to disassembling and assembling of units, transport, package or shutdown of machinery .

In case of further inquiries or ordering of spare parts, please indicate the motor number. If there is no motor number shown on the name plate, the number can be read on the face of the shaft extension.

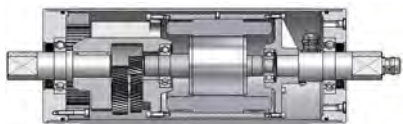
All given technical data in this operating instruction are liable to changes and therefore without obligation.



12 Spare parts list

Pos.	Component part	Pos.	Component part	Pos.	Component part
1	drum shell	66	bearing	122	copper shim
2	drum end shield	68	bearing	123	/ copper shim
3	drum end shield	71	bearing	125	screw
4	gear box	75	supporting ring	126	screw
5	bearing cover	76	key	127	screw
6	bearing cover	77	key	128	grub screw
7	labyrinth seal	78	key	129	screw
8	V – ring seal	79	key	132	screw
9	labyrinth seal	80	key	134	grub screw
10	pedestal bearing	81	key	135	screw
11	pedestal bearing	83	key for brake	136	screw
12	intermediate ring	85	key for Backstop	138	grub screw
13	stator housing	87	key	139	screw
14	cover for brake	90	circlip	140	screw
15	terminal box	91	circlip	141	screw
16	terminal box-cover	92	circlip	142	screw
17	pinion 1. stage	93	circlip	143	locking screw
18	helical 1. stage	94	circlip	144	screw
19	pinion shaft 2.stage	95	circlip	147	cylindrical pin
20	helical 2.stage	96	circlip	149	shim ring
21	pinion shaft 3. stage	97	circlip for brake	150	grub screw
22	hollow shaft 3. stage	98	circlip	151	shim ring
23	rotor complete	99	circlip	152	shim ring
24	output shaft	100	circlip	153	grounding plate
25	connection shaft	102	circlip	154	adapter sleeve
27	connection head	103	circlip	155	adapter sleeve
29	distance ring	104	circlip for backstop	156	distance ring
31	distance ring	105	circlip	159	gasket
34	washer for reverse lock	106	friction disk for brake	160	sun gear 1. stage
35	stator complete	107	driver for brake	161	sun gear 2. stage
36	Motor end shield	108	brake complete	162	planet gear 1. stage
37	end shield for brake	110	backstop	163	planet gear 2. stage
38	end shield	111	terminal board	164	pinion cage 1. stage
42	Rotor complete for brake	112	gasket	165	pinion cage 2. stage
43	Rotor complete for reverse lock	113	gasket	166	driving cam
47	O-ring	114	Nilos-Ring	167	washer
50	shaft seal	115	bolting for terminal box	168	cover disk for cable
51	shaft seal	116	cable gland	169	snap ring
60	bearing	117	cable gland	170	washer
61	bearing	117.1	reducing nipple	171	locking screw
63	bearing	118	seal for cable	172	bearing spacer
64	bearing	119	pressure bushing	174	cover disk (stainless steal)
65	bearing	120	shim ring for cable seal		

In case that you need spare parts it is necessary to inform us about the motor number. You will find this number on the type plate or/and on the end of one shaft.

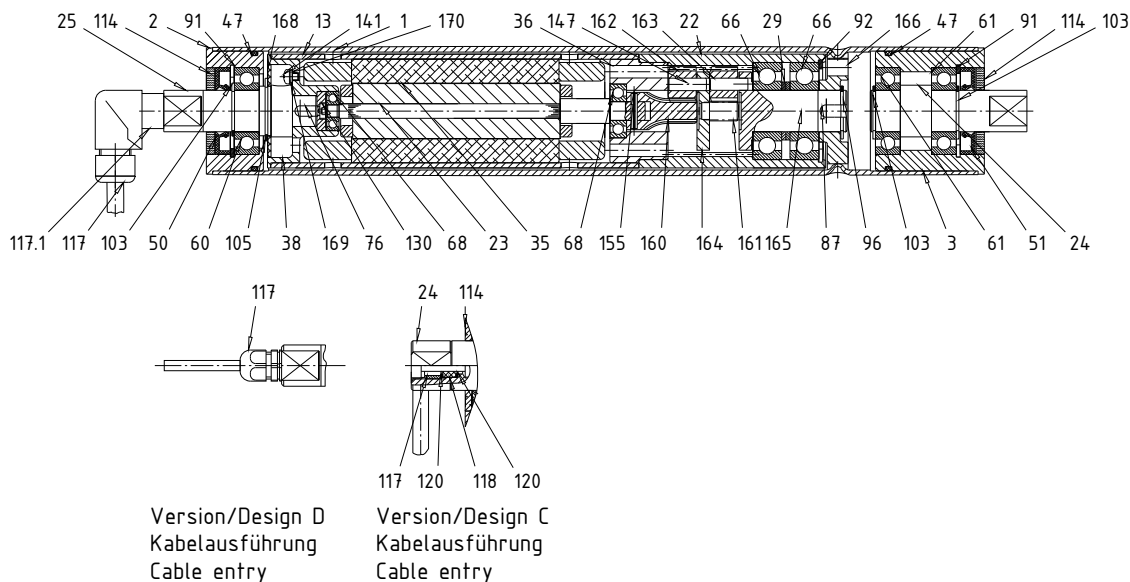


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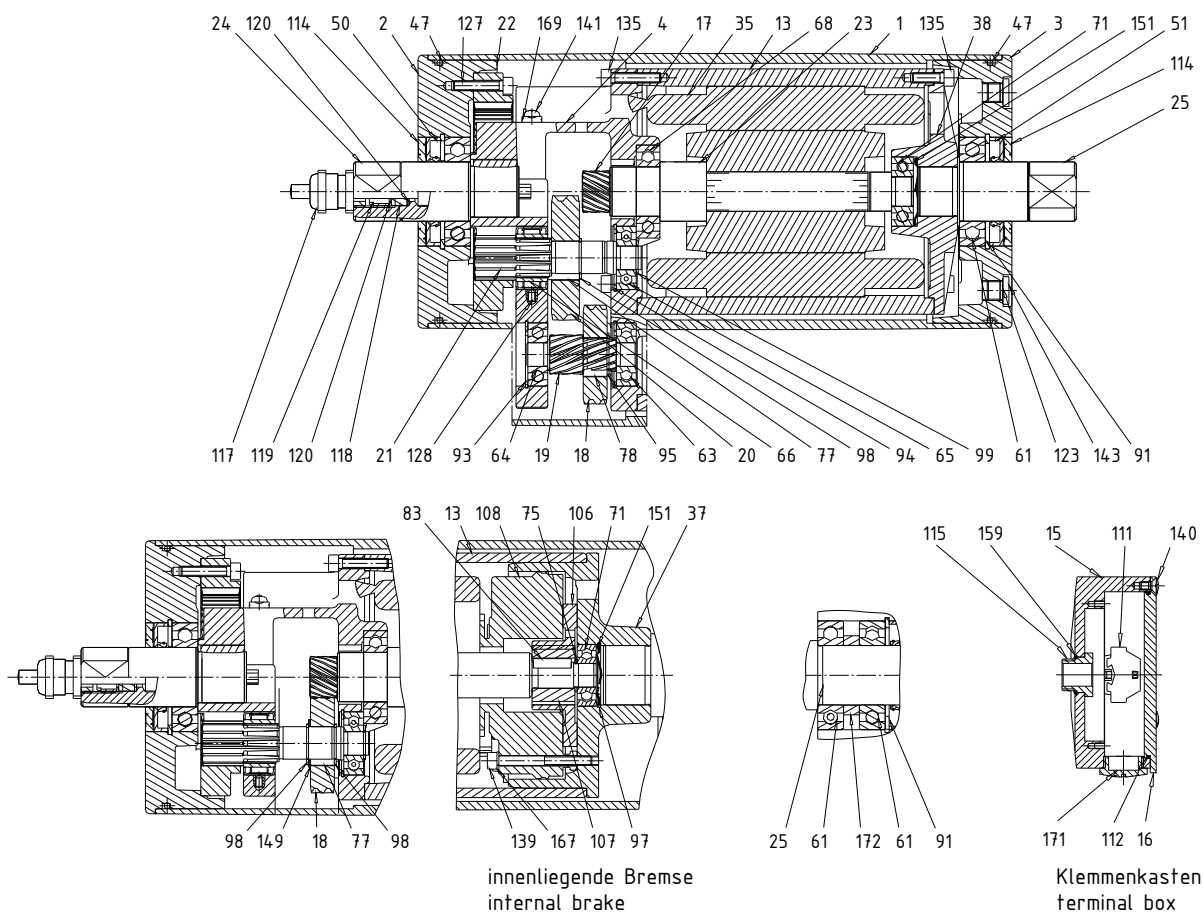


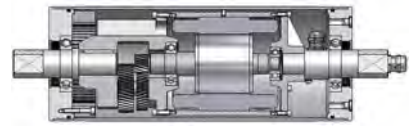
13 Assembly drawings

13.1 Size TM60.1 / TM80.1

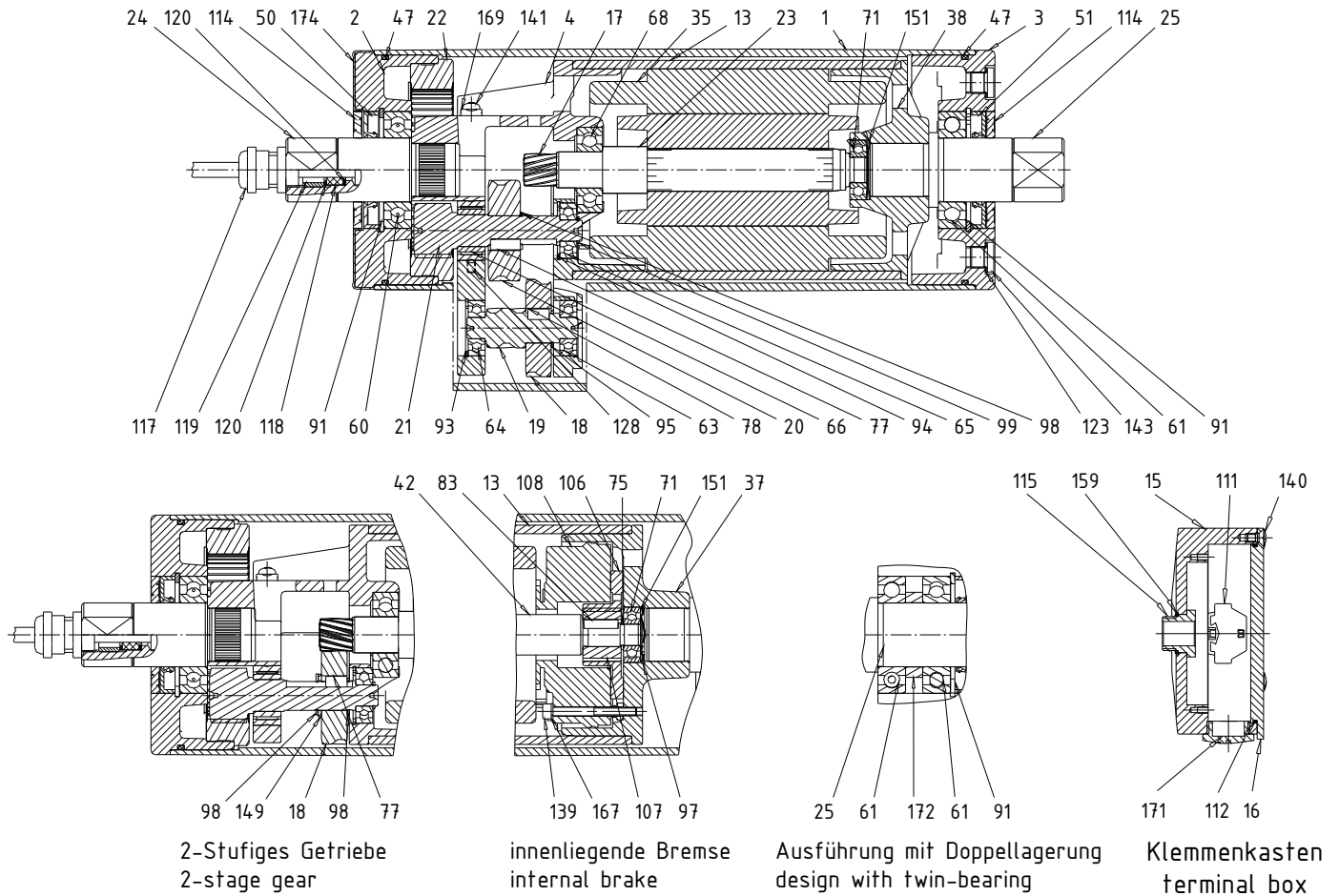


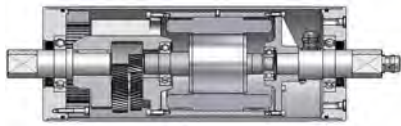
13.2 Size TM82.1 / TM138





Size TM111.1 / TM113

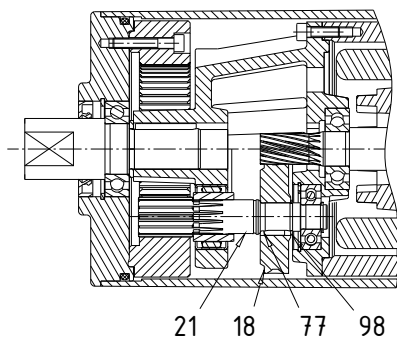
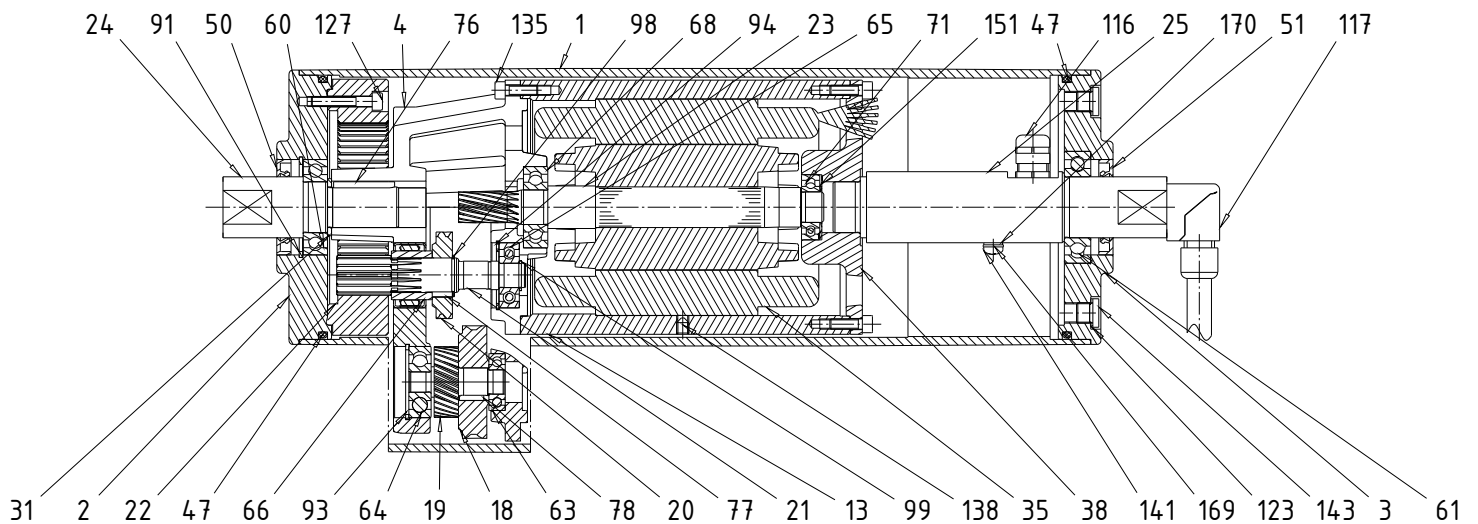




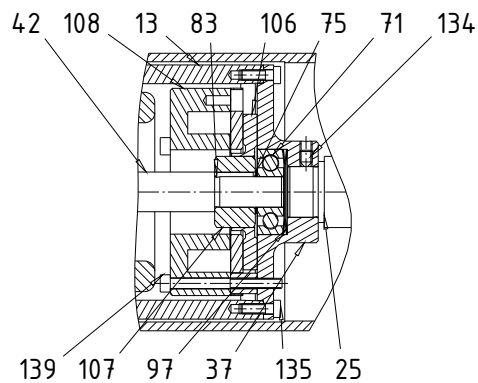
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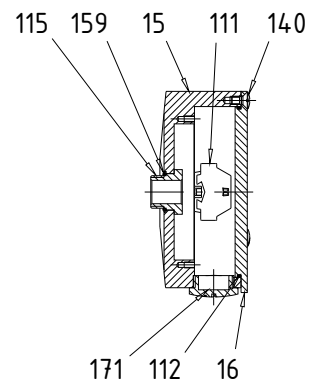
13.3 Size TM135.1



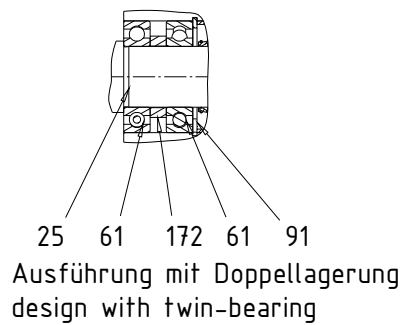
21 18 77 98
2-Stufiges Getriebe
2-stage gear



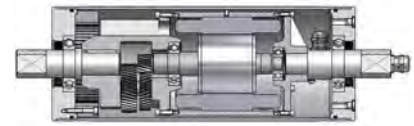
42 108 13 83 106 75 71 134
139 107 97 37 135 25
innenliegende Bremse
internal brake



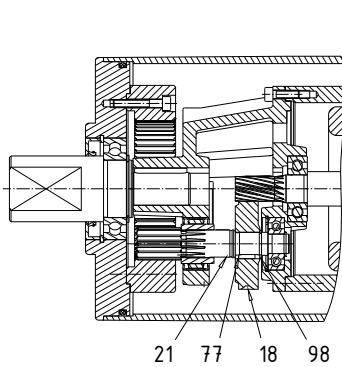
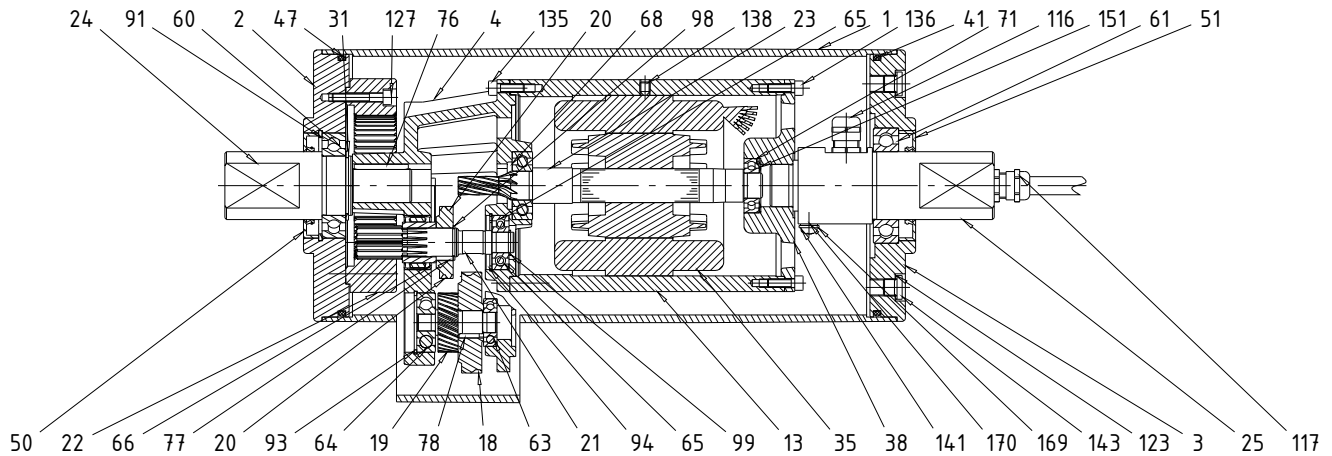
115 159 15 111 140
171 112 16
Klemmenkasten
terminal box



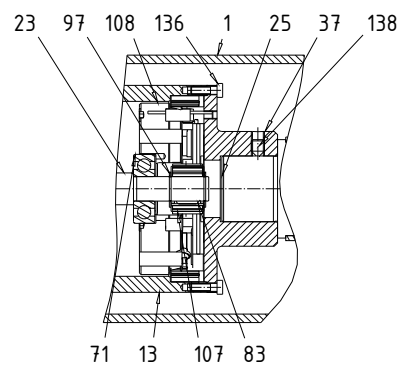
25 61 172 61 91
Ausführung mit Doppellagerung
design with twin-bearing



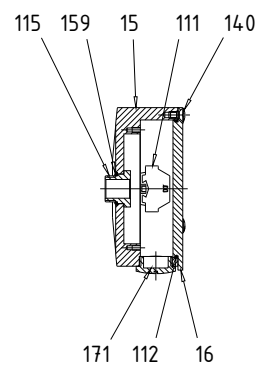
13.4 Size TM160.0



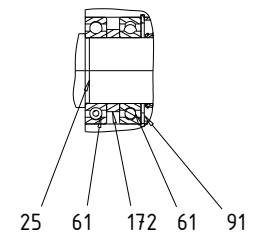
2-Stufiges Getriebe
2-stage gear



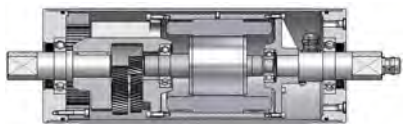
innenliegende Bremse
internal brake



Klemmenkasten
terminal box



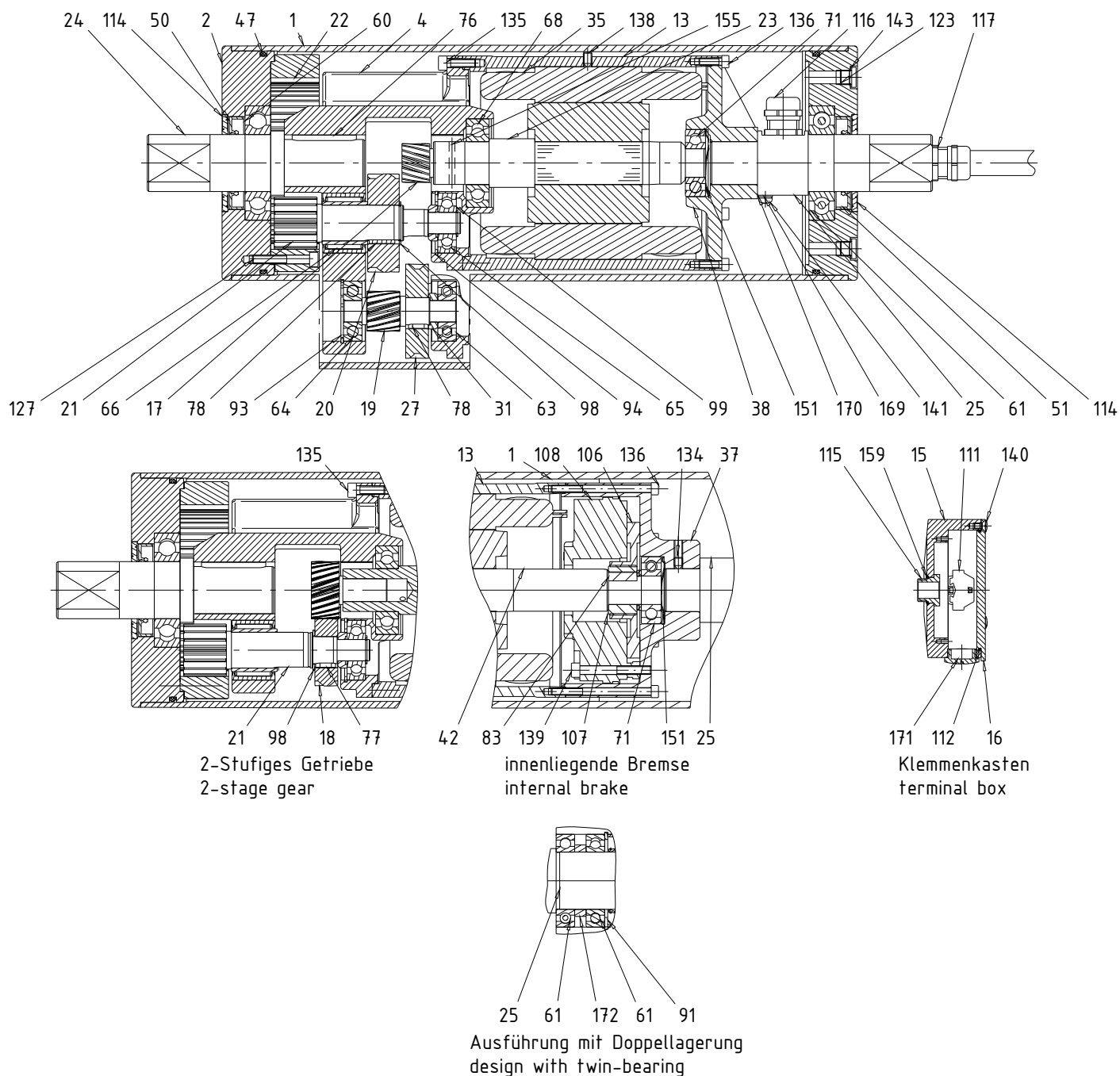
Ausführung mit Doppellagerung
design with twin-bearing

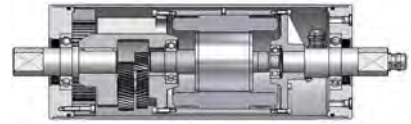


Operating Instructions **Drum Motors** **1NJ005390 EN 01-2017**

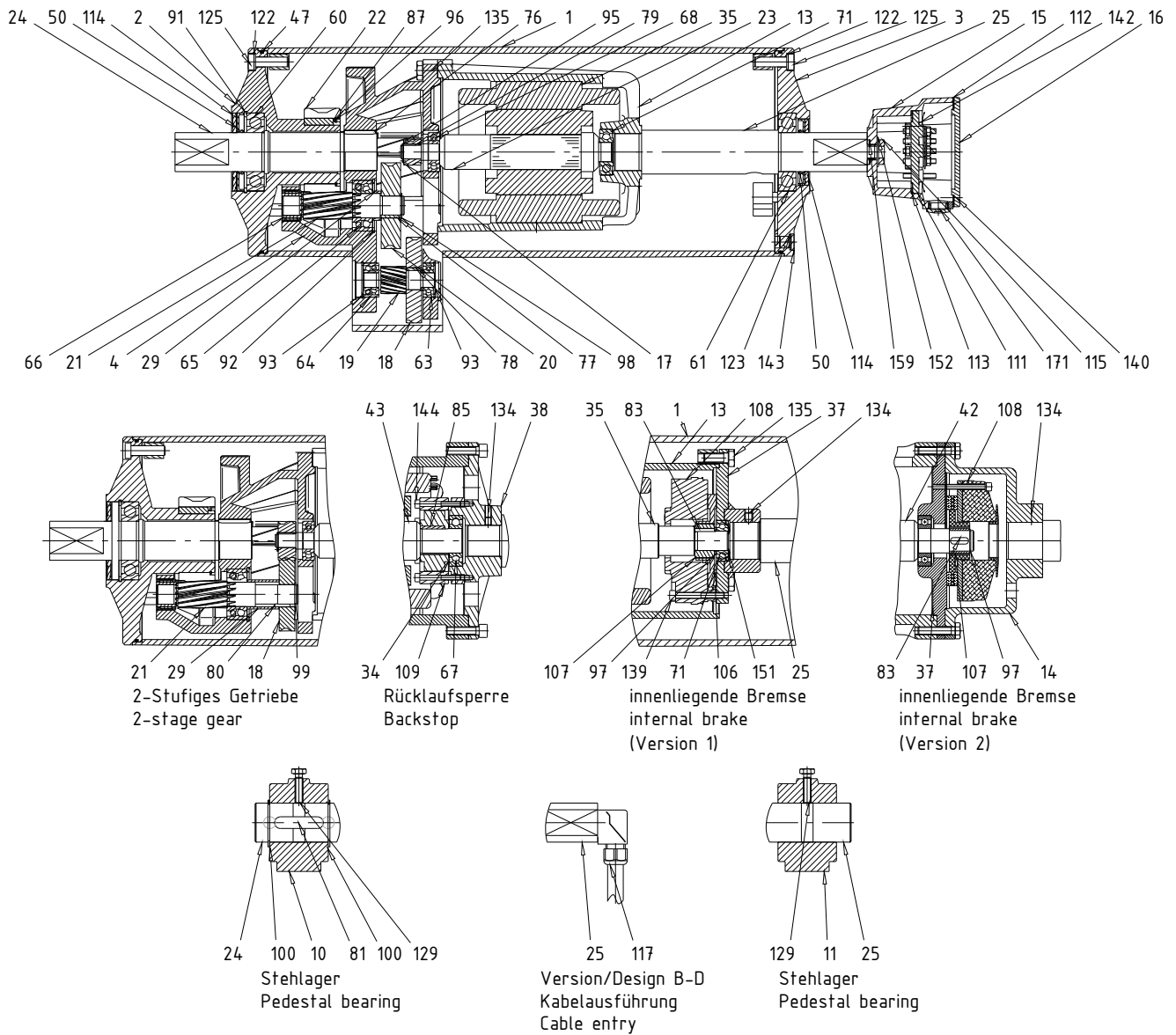


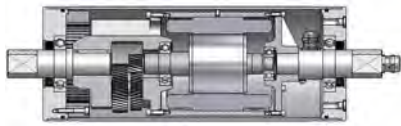
13.5 Size TM165.1 / TM216.0





13.6 Size TM216.1

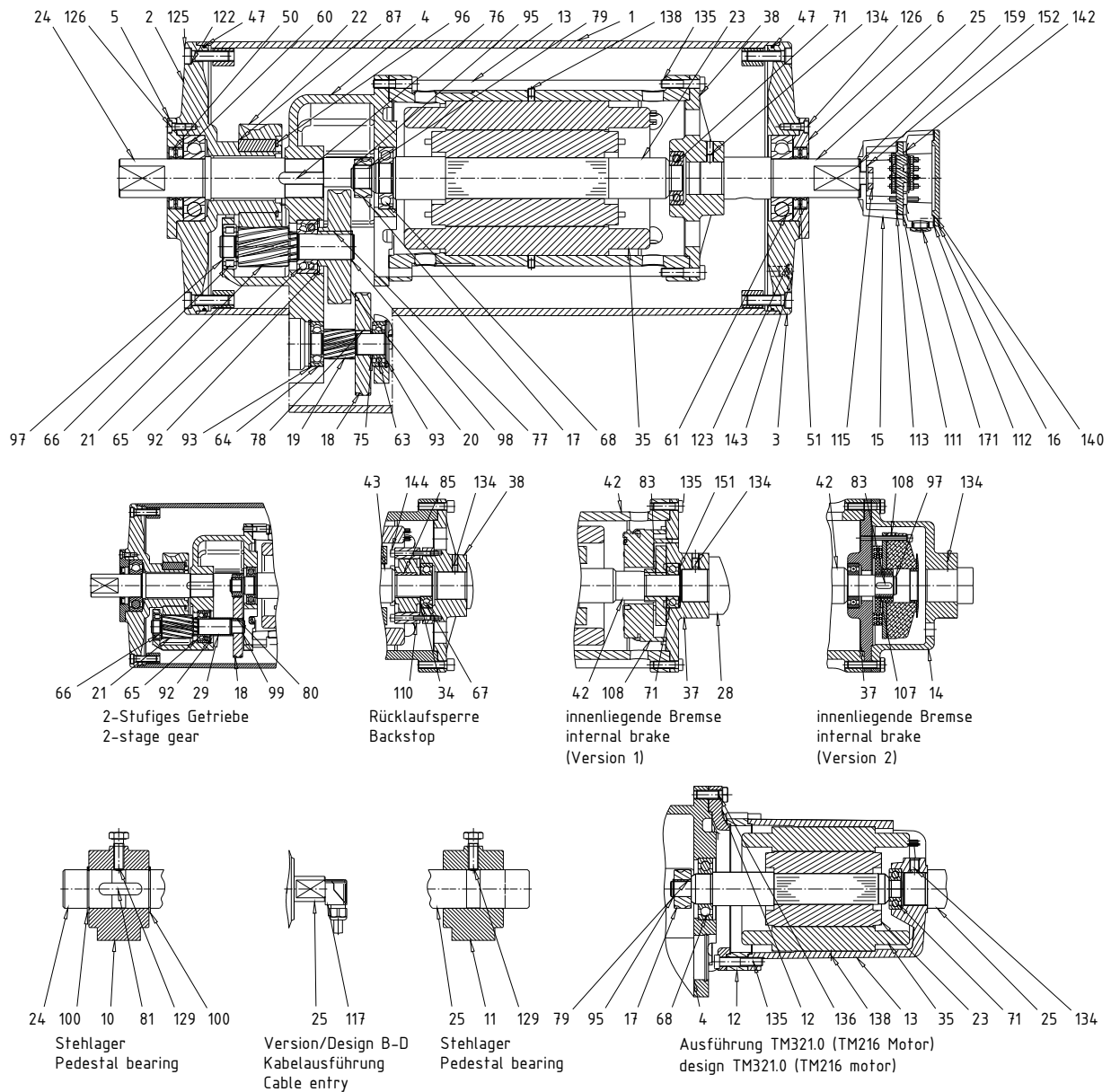


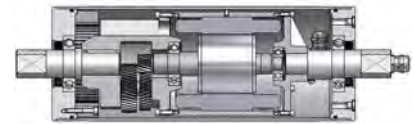


Operating Instructions Drum Motors 1NJ005390 EN 01-2017

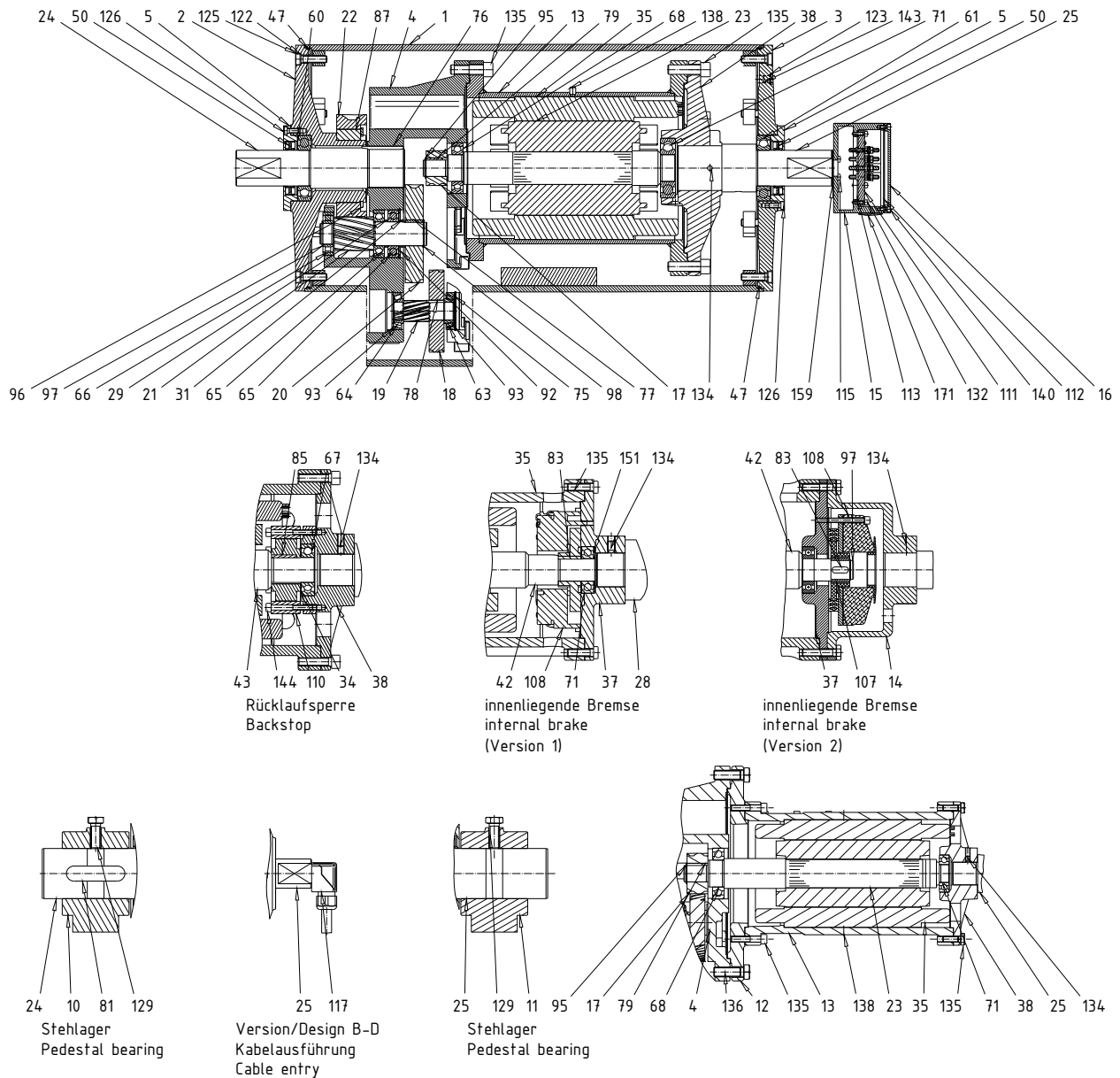


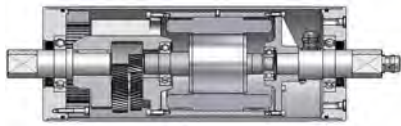
13.7 Size TM321.0 / TM321.1 / TM415.0





13.8 Size TM415.1 / TM518.0

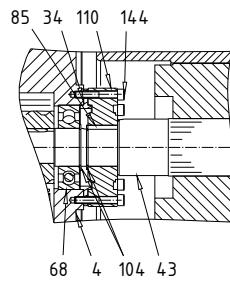
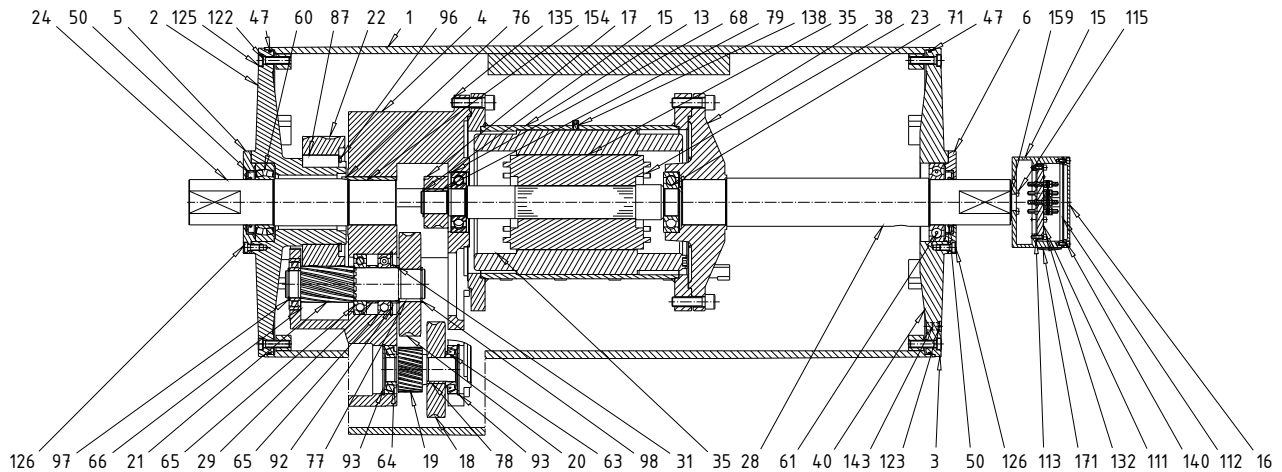




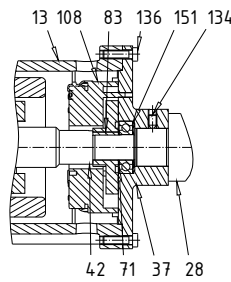
Operating Instructions Drum Motors 1NJ005390 EN 01-2017



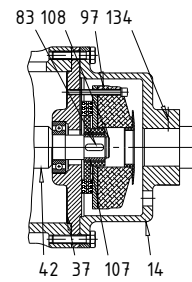
13.9 Size TM518.1



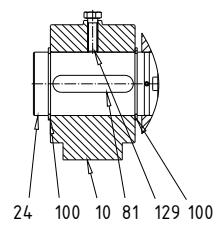
Rücklaufsperre
Backstop



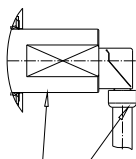
innenliegende Bremse
internal brake
(Version 1)



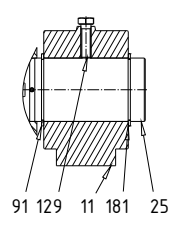
innenliegende Bremse
internal brake
(Version 2)



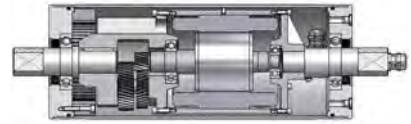
Stehlager
Pedestal bearing



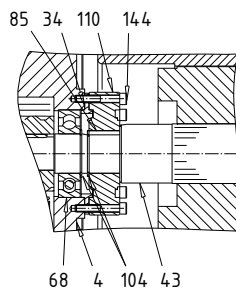
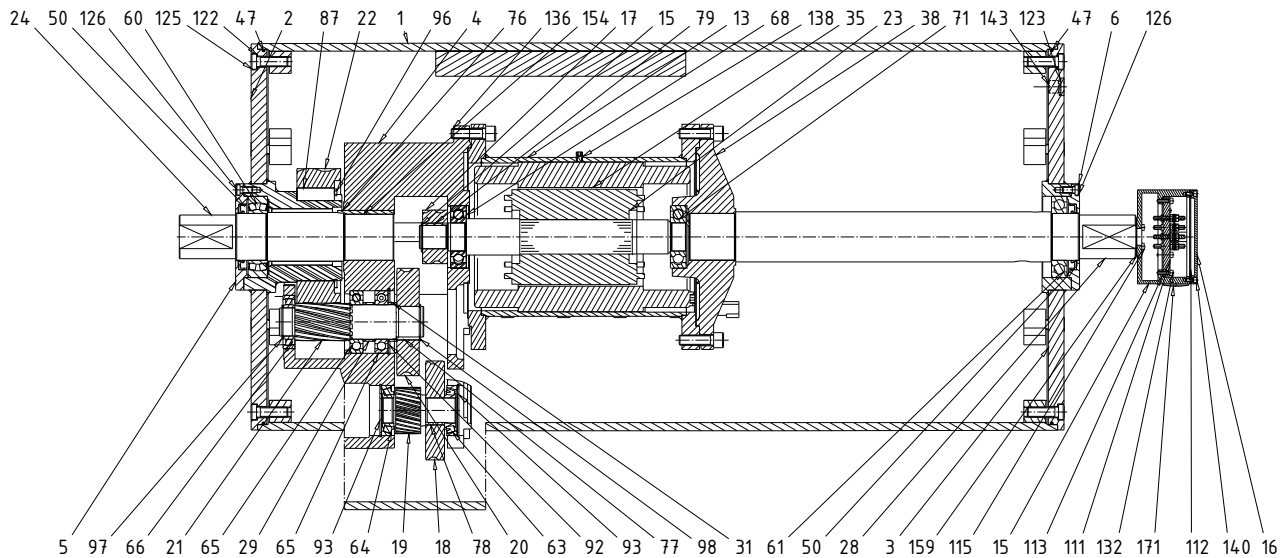
Version/Design B-D
Kabelauführung
Cable entry



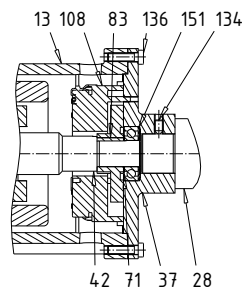
Stehlager
Pedestal bearing



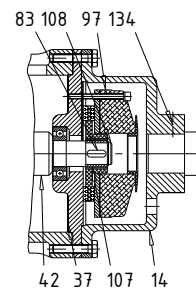
13.10 Size TM620.0



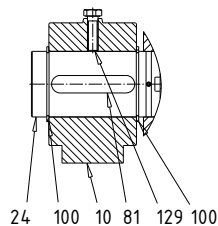
Rücklaufsperre
Backstop



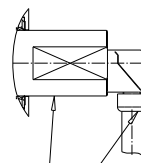
innenliegende Bremse
internal brake
(Version 1)



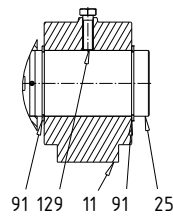
innenliegende Bremse
internal brake
(Version 2)



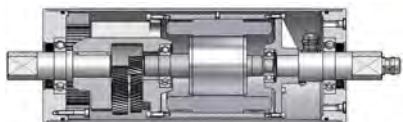
Stehlager
Pedestal bearing



Version/Design B-D
Kabelauführung
Cable entry



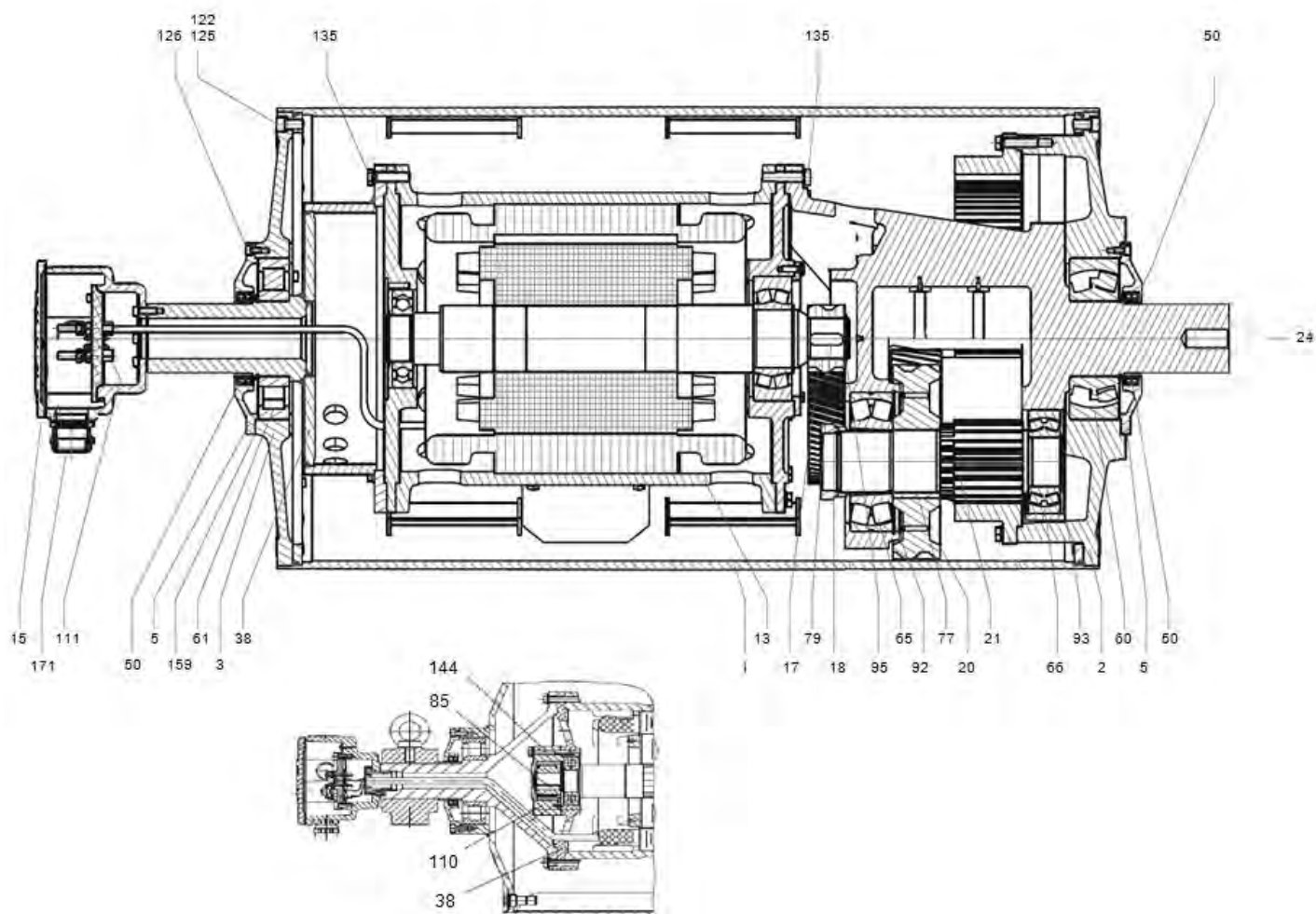
Stehlager
Pedestal bearing

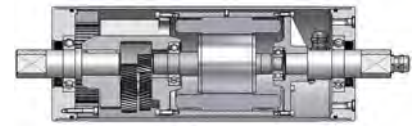


Operating Instructions Drum Motors 1NJ005390 EN 01-2017



13.11 Size TM630-800





Declaration of incorporation

In terms of the EC-Machine Directive 2006/42/EC, Annex II B.

We declare that it is our sole responsibility, that

HIMMEL®-Drum Motors with type designation:

TM60 - TM800

to which this declaration relates, fully comply with the safety and health requirements of the

EC-Machinery Directive 2006/42/EC, Appendix I

The relevant technical documents according to appendix VII B are available and will be presented to the competent national authorities electronically, if required.

The partly completed machinery complies with the following EC directive:

Low voltage directive	2014/35/EU
Regulation 640/2009/EC and Regulation (EU) No. 4/2014	2005/32/EC

EMC Directive 2014 / 30 / EU -(Electric motors are equipment that do not cause electromagnetic interferences due to their nature, and therefore need not to be regulated to this directive)

Applied harmonized standards:



DIN EN 60034-1:2010	DIN EN 60034-5:2001/A1:2007
DIN EN 60034-6:1996	DIN EN 60034-8:2014
DIN EN 60034-9:2005/A1:2007	DIN EN 60034-11:2005
DIN EN 60034-14:2004/A1:2007	

Marking: **CE**

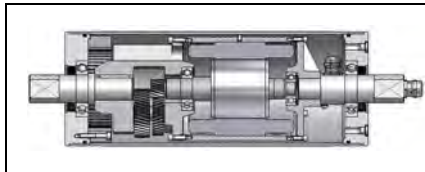
The designated product is intended for installation into/to another machine.
 Operation is prohibited until the final product is in compliance with regulation 2006/42/EC.
 This statement does not provide a confirmation of product characteristics in terms of product liability.

Safety instructions stated in the product documentation must be adhered to.

Gescher 06.07.2016

			
Place	Date	Paul Lütkenhaus Managing Director / Managing Director Technology a)	Dietmar Dammfeld Technology / Documentation b)

- a) Authorized representative for issuing this declaration on behalf of the manufacturer
 b) Authorized representative for compiling the technical documentation
 (address of the Authorized representative for documentation see above)



**Operating Instructions
Drum Motors
1NJ005390 EN 01-2017**



Declaration of conformity

In terms of the EC-Machine Directive 2006/42/EC, Annex II B.

We declare that it is our sole responsibility, that

HIMMEL®-Drum Motors with type designation: TM82 - TM620

Execution:  II 3D Ex IIIC T120°C Dc – Zone 22

to which this declaration relates, fully comply with the safety and health requirements of the

EC-Machinery Directive 2006/42/EC, Appendix I

The relevant technical documents according to appendix VII B are available and will be presented to the competent national authorities electronically, if required.

The partly completed machinery complies with the following EC directive:

- **Low Voltage Directive 2014/35/EU**
- **ATEX- Ex- Directive 2014/34/EU**

Applied harmonised standards:

DIN EN ISO 12100:2010/2011-03

DIN EN 1127-1:2011

DIN EN 60034-1:2010

DIN EN 60034-5: 2001/A1:2007

DIN EN 60079-31:2014

DIN EN 60204-1:2006

DIN EN 13463- 1,5,8:2001, 2011, 2003

DIN EN 60529:1991 + A1:2000

The designated product is intended for installation into/to another machine.

Operation is prohibited until the final product is in compliance with regulation 2006/42/EC.

This statement does not provide a confirmation of product characteristics in terms of product liability.

Safety instructions stated in the product documentation must be adhered to.

Gescher 06.0.2016

Place	Date	Paul Lütkenhaus Managing Director / Managing Director Technology a)	Dietmar Dammfeld Technology / Documentation b)
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c) Authorized representative for issuing this declaration on behalf of the manufacturer

d) Authorized representative for compiling the technical documentation
(address of the Authorized representative for documentation see above)