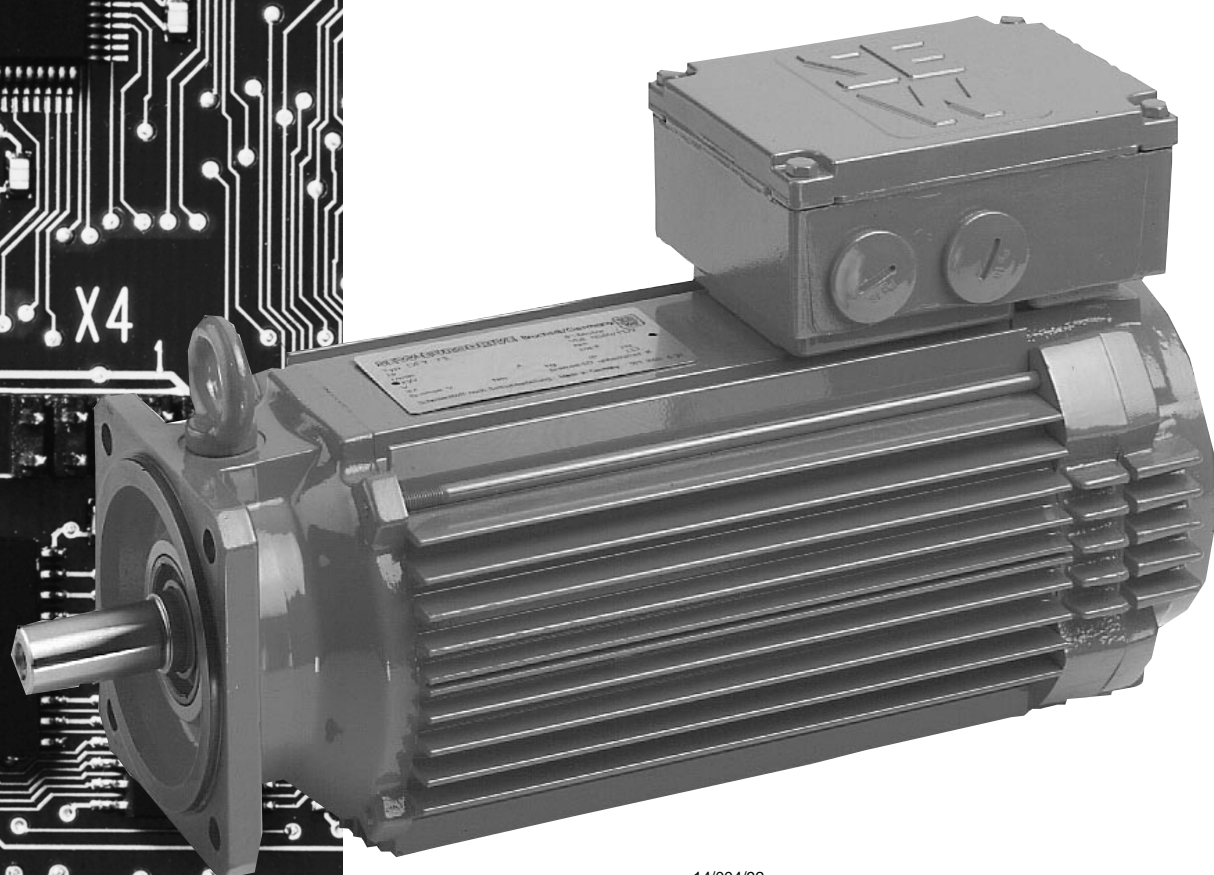


# DFY Synchronous Motors with and without Brake and Accessories

Installation, Commissioning and Maintenance

Edition 09/96



14/004/92

0922 7113 / 0996



# SEW EURODRIVE

## Safety Notes

- Be careful never to operate damaged products!
- Read these Operating Instructions carefully before you start commissioning.
- Always follow the relevant safety notes. They are marked as follows:



**Electrical hazard, e.g. during live working.**



**Mechanical hazard, e.g. when working on hoists.**



**Important instructions** for safe and fault-free operation,  
e.g. pre-setting before commissioning.



### **WARNING:**

**Live and rotating parts of electrical machines can cause serious or fatal injuries.**

**Installation, connection, commissioning and maintenance and repair work may only be carried out by qualified specialists taking into account**

- **these instructions**
- **all other instructions for commissioning as well as wiring diagrams relating to the drive**
- **current national/regional regulations (safety/accident prevention regulations)**

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### Preliminary remarks (guarantee, storage, disposal, etc.)

- **A requirement of fault-free operation and fulfilment of any rights to claim under guarantee is that these instructions and remarks are followed.**
- Each motor is manufactured and tested to current SEW-EURODRIVE technical specifications, subject to alterations to technical data and designs made in respect of further technical progress.
- Check the delivery for possible damage which may have occurred during transportation as soon as you receive it. Inform the carrier of any damage immediately.
- If the motor is not being installed immediately, store it in a dry, dust-free room (permissible storage temperature -20 °C ... +40 °C).
- Disposal (please observe current regulations).
- **Depending on the material they are made of stator and rotor are to be disposed of in accordance with the applicable waste disposal regulations for:**
  - steel scrap
  - aluminium
  - copper
  - plastic material

### Note

In these instructions, cross-references are marked with a →

("→ Sec. x.x" means: further information can be found in section x.x)

# 1 Installation/Assembly

## 1.1 Before you begin

The drive must only be assembled if:

- The entries on the motor nameplate match the project specifications.
- The drive is undamaged (no damage caused by carriage or storage).
- The following prerequisites are met:

Standard design: No oil, acid, gases, vapours, radiation, etc.  
 Permissible humidity: 85%. No condensation!  
 Permissible without derating are:  
 - Coolant temperature between  $-25^{\circ}\text{C}$  and  $+40^{\circ}\text{C}^{1)}$   
 - Installation height max. 1000 metres above mean sea level.

Special design: For deviating ambient and/or operating conditions the design must be in accordance with the project specifications



### Tools / resources required

- Standard tools
- Pull-off device if necessary
- If end ferrules are used:  
 crimping tool and end ferrules  
 (without insulating sleeve, DIN 46228, Part 1, Material E-Cu, Fig. 1)



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Fig. 1

If necessary:

- Crimping tool (for connector)
- Removal tool

## 1.2 Preparatory work after an extended period of storage

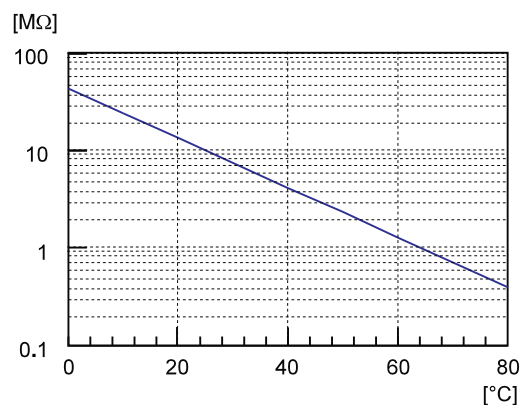
Check whether the motor has absorbed any moisture during the extended period of storage. For this purpose the insulation resistance of the motor winding (U, V, W against housing) must be measured (test voltage 500V) (Fig. 2).

### Note:

The insulation resistance is heavily dependent on the temperature.

If the insulation resistance is insufficient, the motor must be dried by skilled personnel.

End the drying process when the limit shown in Fig. 2 is exceeded.



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Fig. 2: Minimum insulation resistance

1) When using the standard design AGY absolute encoder the coolant temperature is limited between  $+0^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$ . Please note that the permissible temperature range for the gear unit may also be limited (\* Installation and Operating Instructions of the gear unit).

Check the terminal box/connector to ensure that:

- the inside is clean and dry
- connecting and mounting components are free of corrosion
- joint seals are in order
- screwed cable glands are tight.

If not, clean or replace them.

### 1.3 Installing the motor

The motor or geared motor may only be mounted or installed in the specified mounting position on a level, vibration-free and torsionally rigid support structure.

- Thoroughly remove anti-corrosion agents from the shaft ends and flange (use a commercially available solvent). Do not allow the solvent to penetrate the bearings and oil seals - this could cause material damage.
- Carefully align the motor and the driven machine, to avoid placing any unacceptable strain on the motor shafts (observe permissible overhung load and axial thrust data).
- Avoid thrusts and blows on the shaft ends.
- **Protect motors in vertical mounting positions with VY forced cooling fan with an appropriate cover against the ingress of foreign matter and liquid!**
- Ensure an unobstructed cooling air supply.
- Balance components for subsequent mounting on the shaft without key.
- The surface temperature of the motor may exceed 65°C during operation. Therefore appropriate measures must be taken to safeguard against accidental contact.



#### Tolerances

Shaft ends	Flanges
Diametric tolerances – ISO k6 for ≤ 50 mm – ISO m6 for > 50 mm (Centring hole to DIN 332, shape DR... Use centring hole for mounting transmission elements to make sure the anti-friction bearings do not get damaged.)	Centring shoulder tolerances – ISO j6 for ≤ 230 mm – ISO h6 for > 230 mm

→ “Geared Servomotors” catalogue, Sec. “Notes on Dimension Sheets”

#### 1.3.1 Installation in damp areas or in the open air

- Mount the terminal box so that the cable inlets point downwards if possible
- Use suitable screwed cable glands for the supply leads (use reducing adapters if necessary).
- Coat the threads of screwed cable glands and sealing plugs with sealant and tighten them well, then coat them again.
- Seal the cable inlets well.
- Clean the sealing faces of terminal boxes and their covers well before reassembly; gaskets must be cemented in on one side. Replace brittle gaskets.
- Restore the anticorrosive coating if necessary.
- Check the type of enclosure.

## 2 Electrical Connection

Carefully read and follow the Safety Notes on page 2.



### 2.1 EMC-compliant wiring

EMC-compliant wiring → installation and operating instructions of the servo controller (e.g. MOVIDYN®)

**Make sure that**

- The cabling is in accordance with the applicable regulations (see nameplate for rated current data).
- The signal leads are stranded pairs with a common screen (one pair each for reference, sine, cosine signals and TF PTC thermistors / TH thermostat).
- **Brake leads are run separately from power cables or, alternatively power cables are screened to avoid any electromagnetic interference with the brake.**



### 2.2 Connecting the motor

Strictly follow the installation and operating instructions of the servo controller.

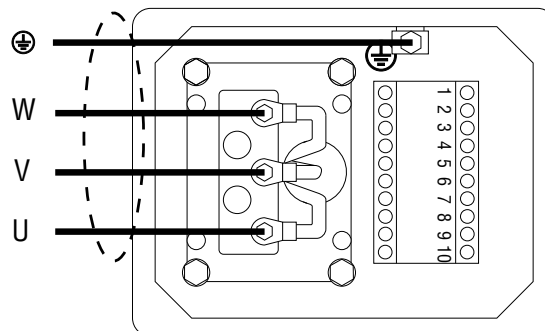


#### 2.2.1 Motors with terminal boxes

- Connect the motor in accordance with the wiring diagram:

Connect motor the power leads to the terminal strip (Fig. 3):

U	U phase
V	V phase
W	W phase
	PE



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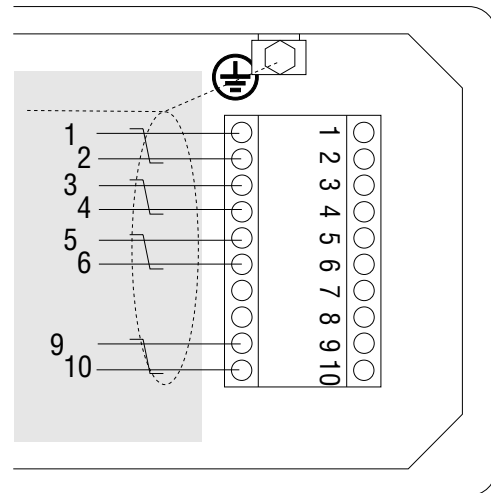
Fig. 3: Terminal box connection

**Note:**

It is not possible to reverse the direction of rotation by changing over the phases.

Connect the signal leads of the resolver and the thermal motor protection feature (TH/TF) to the terminal strip (Fig. 4):

1	R1	Reference
2	R2	
3	S1	Cosine
4	S3	
5	S2	Sine
6	S4	
9	TH/TF	Thermal motor protection
10		



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Fig. 4: Terminal box terminal strip

Tighten all connections.

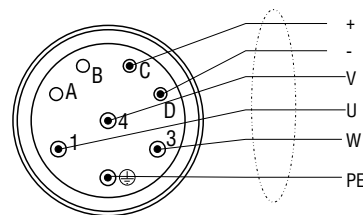
### 2.2.2 Motors with connectors

The diagrams show the connector pin assignment for the cable on the connecting side (rear).

Prefabricated cables are available from SEW for plug connection. The marking (core no. or core colour) of these cables is given in the tables below. Commercially available screened cables do not always provide these optimum cross-sections.

#### DFY 56 / DFY 56 ... B

Connector pin	Connection	Core
1	Phase U	1
3	Phase W	2
4	Phase V	3
	PE	yw/gn
C	Brake +	5
D	Brake -	6



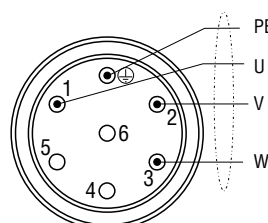
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Fig. 5: DFY 56 power and brake connector

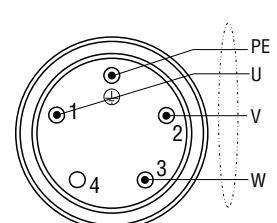
#### DFY 71, 90, 112

Connector pin	Connection	Core
1	Phase U	1
2	Phase V	2
3	Phase W	3
	PE	yw/gn

DFY 90  
DFY 112 S / DFY 112 M



DFY 71  
DFY 112 ML / DFY 112 L



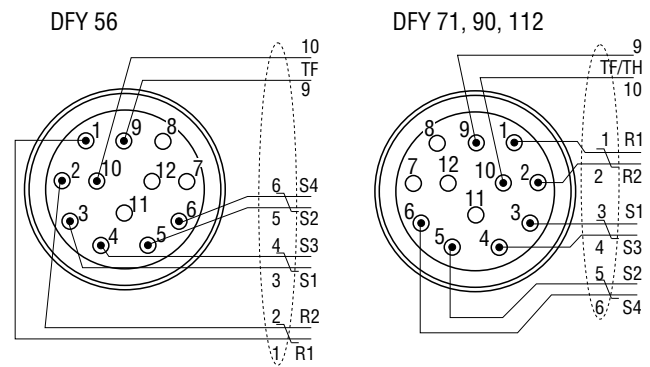
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Fig. 6: DFY 71, 90, 112 power connector



**Resolver / TF/TH**

Connector pin	Connection		Core
1	R1	Reference	pink
2	R2		grey
3	S1	Cosine	red
4	S3		blue
5	S2	Sine	yellow
6	S4		green
9	TH/TF	Motor protection	white
10			brown



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The power connectors (on DFY 56 .. B motors also brake connection) and the resolver/thermal motor protection connection (TH/TF, DFY 56 only TF) must be wired by the customer. SEW also offers prefabricated cables of any length.

- The socket contacts are designed as crimp contacts (exception: motor connection with SM46 and resolver connection in DFY 56 motors is by way of solder contacts). Only use suitable crimping tools for crimping.
- Strip insulation off litz wires over length A (see Table 1 of the Appendix).
- Remove incorrectly assembled socket contacts with suitable removal tools only.
- Secure connector with union.

**2.3 Connecting the brake**

The brake is released electrically. Braking is by mechanical means after the voltage has been removed.

**Important:**

Observe the applicable instructions of the respective Employers' Liability Insurance Associations on phase failure protection and the respective wiring circuits/modifications to wiring circuits.

**Note:**

Check the cross-section of the cables - see Appendix, Table 3, for brake currents.

**Note:**

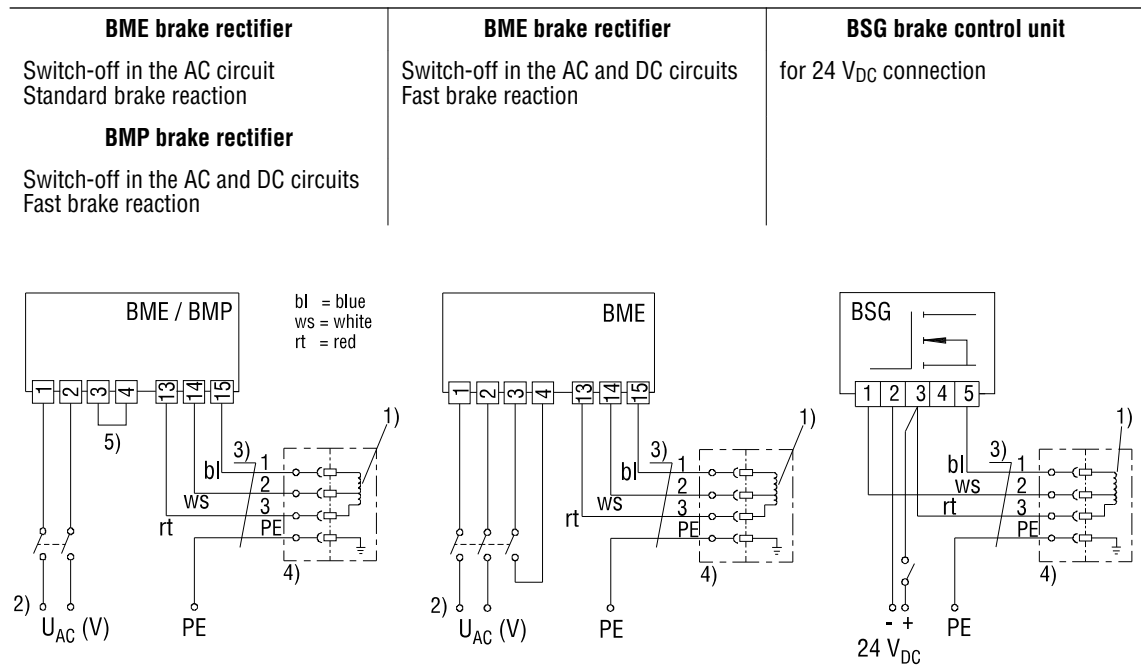
In view of the DC voltage to be switched and the high current load either special brake contactors or AC contactors with contacts in duty class AC3 to EN 60 947-4-1 must be used.

**2.3.1 DFY 56 .. B**

In DFY 56 .. B brake motors the brake is controlled directly with 24 V<sub>DC</sub> (24 V - 10% ... 24 V +6%).

### 2.3.2 DFY 71 - 112 .. B

BME/BMP brake rectifiers and the BSG brake control unit are installed in the switch cabinet. The brake is connected with a 4-core cable.



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Fig. 8: Wiring diagram for the brake

- 1) Brake coil
- 2) To release the brake apply the voltage given on the nameplate. Switching contacts in duty class AC3 to EN 60 947-4-1
- 3) Brake cable
- 4) Connector 193 682 X
- 5) The BMP does not have this jumper

The respective connector for brake connection is to be wired by the customer.

Connector pin	Connection	Core
1	Phase 1	1
2	Phase 2	2
3	Phase 3	3
	PE	yw/gn

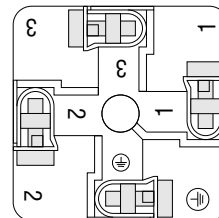


Fig. 9: Brake connector

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#### Note:

Secure connector with central screw. Do not service while energized!

## 2.4 Connecting the accessories

Connect the accessories supplied in accordance with the wiring diagrams enclosed.

### TF PTC thermistors

Resistance temperature detector characteristic to DIN 44 082 (triple PTC thermistor).

Check resistance test (measuring instrument with test voltage < 7.5V).

Measurement: cold resistance 60 ... 750  $\Omega$ , thermal resistance > 4000  $\Omega$ .

### TH embedded thermostats


The thermostats are connected in series and open when the permissible winding temperature is exceeded. They can be wired up to the drive monitoring loop.

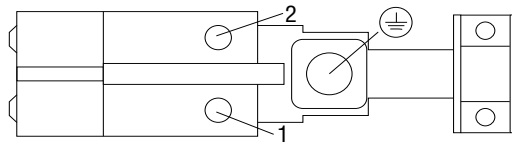
TH Data	AC	DC	
Max. voltage	60 V <sub>AC</sub> <sup>1)</sup>	60 V <sub>DC</sub>	24 V <sub>DC</sub>
Current (cos $\phi$ = 1.0)	2.5 A <sub>AC</sub>	1.0 A <sub>DC</sub>	1.6 A <sub>DC</sub>
Current (cos $\phi$ = 0.6)	1.6 A <sub>AC</sub>		

<sup>1)</sup> Versions with terminal boxes are 250 V<sub>AC</sub> permissible.

### VY forced cooling fan

Connect the VY forced cooling fan in accordance with the wiring diagram:

Connector pin	Connection	Core
1	Phase	1
2	Neutral conductor	2
	PE	yw/gn



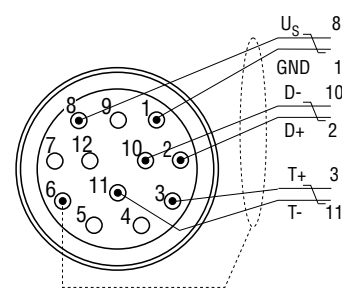
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Fig. 10: Forced cooling fan connection (top view)

### 2.4.1 AGY absolute encoder

The respective connector for encoder connection is to be connected by the customer:

Connector pin	Connection	Core
1	GND	Electr. isolated from housing
8	U <sub>s</sub>	+ 13 ... 15 ... 24 V <sub>DC</sub> , polarized
2	Data +	High = "1" (positive logic)
10	Data -	High = "0"
3	Pulse +	7 mA in direction pulse + = "1"
11	Pulse -	7 mA in direction pulse - = "0"
6	Screen	Connected to PE in AGY housing



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Fig. 11: AGY connection

- Twisted pair cable with screen connected at both ends over as large an area as possible.
- Clip on with strain relief clamps (over as large an area as possible)
- The socket contacts are designed as crimp contacts. Only use suitable crimping tools for crimping.
- Strip insulation off litz wires over length A (see Appendix, Table 1). Pull shrink sleeve over connections.
- Remove incorrectly mounted socket contacts with suitable removal tools only.
- Secure connector with union nut.



### 3 Commissioning

Carefully read and follow the Safety Instructions on page 2.



#### 3.1 Before you begin

**Before commissioning, ensure that:**

- All the connections have been made correctly and the connectors have been secured against coming loose.
- All motor protection features are active while commissioning.
- The drive is not blocked.
- No other sources of danger are present.
- The drive is not damaged (no damage caused by transportation / storage).
- In the event of extended periods of storage/transportation: → Sec. 1.2.

#### 3.2 Commissioning

- Follow the installation and operating instructions of the servo controller (e.g. MOVIDYN®)
- Use software support if available (e.g. MD\_SHELL and MD\_SCOPE).



### 4 Inspection / maintenance

**Isolate the drive from the supply before you start any maintenance work and safeguard the drive against unintentional power-up. Do not undo connectors while the drive is energized.**

**Only use original spare parts in accordance with the valid parts list.**

#### 4.1 Inspection and maintenance periods

The service life of a part is influenced by many factors and differs for the various parts. Inspection and maintenance periods must therefore be determined individually in accordance with the project specifications. Carry out regular visual inspections of the drive.

The bearings should only be changed by SEW-trained personnel since the resolver must be adjusted each time the motor has been disassembled.

#### 4.2 Tools / resources required

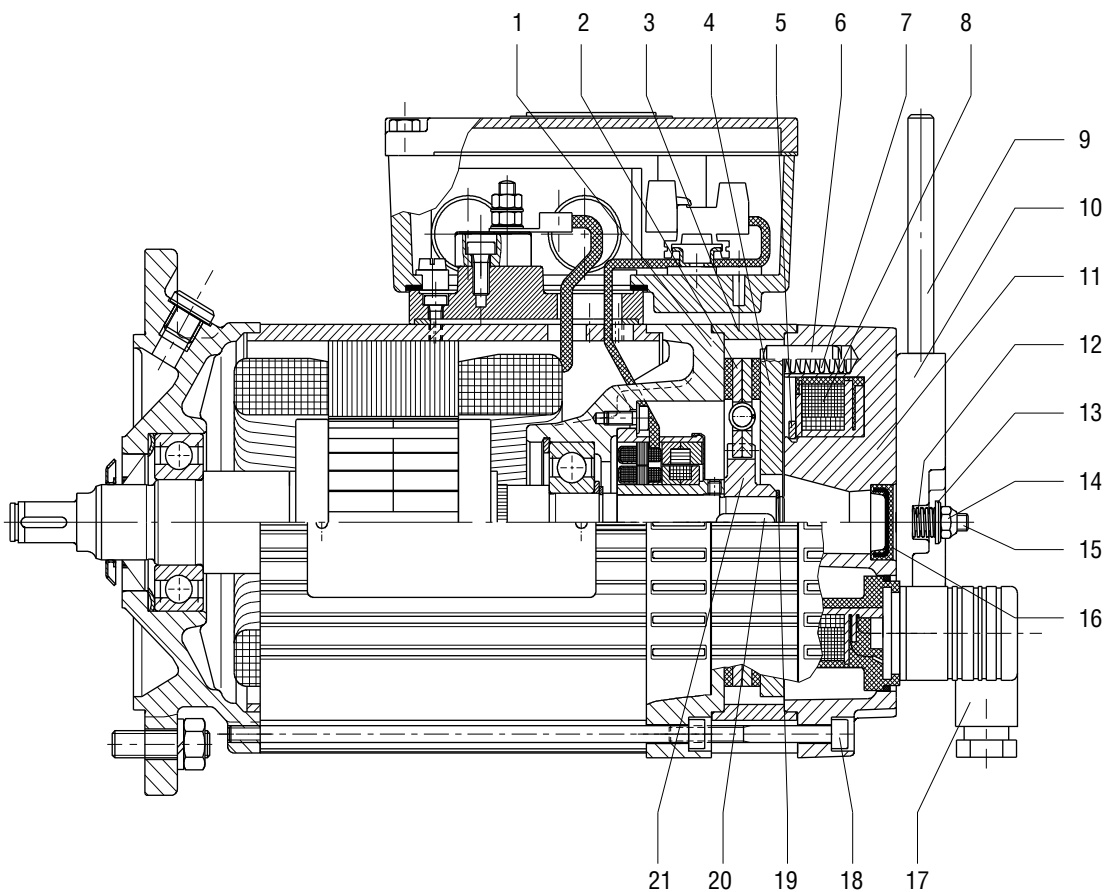
- Standard tools
- Tools for mounting the encoder  
(EW 1 setting tool by Stegmann, art. no. 81 B 001 003 001)
- Stud to DIN 938:  
DFY 71: M5-45  
DFY 90: M6-60  
DFY 112: M8-70

### 4.3 Brake inspection and maintenance

#### 4.3.1 DFY 56 .. B brake

The brake of the DFY 56 .. B motor does not require any maintenance work.

#### 4.3.2 DFY 71 ... DFY 112 .. B brake



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Fig. 12: Cutaway view of the DFY 71 ... 112 brake motor

1 Brake end shield	7 Brake spring	13 Disc	19 Circlip/snap ring
2 Brake disc, complete	8 Brake coil, complete	14 Lock nut	20 Key
3 Intermediate ring	9 Manual release lever	15 Stud	21 Carrier
4 Pressure plate	10 Releasing yoke	16 Closing cap	
5 Circlip/snap ring	11 Brake coil body	17 Connector	
6 Parallel pin	12 Compressing spring	18 Cheese head screw	

##### 4.3.2.1 Checking the working air gap

To check the working air gap measure the travel of the pressure plate when the brake is released (permissible range: 0.25 ... 0.8 mm).

In brakes with manual brake release:

- Measure the travel on a stud (15) of the releasing yoke.

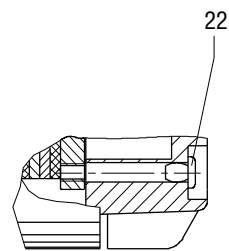
In brakes without manual brake release:

- Remove plug (22).
- Screw stud (Sec. 4.2) into pressure plate.
- Measure travel.
- Remove stud and replace plug.

#### 4.3.2.2 Replacing the brake disc

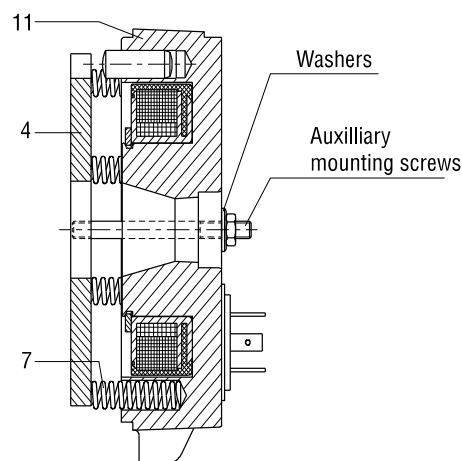
1. Remove connector (17) and flat gasket.
2. In brakes with manual brake release:  
Remove the manual release lever.  
In brakes without manual brake release:  
Remove plugs (22) from holes.
3. Pull pressure plate (4) on to brake springs using two auxiliary mounting screws and washers. Use studs as per Sec. 4.2.
4. Unscrew coil body (11).
5. Pull off brake disc (2)
6. Remove abraded material.
7. Slide on new brake disc.  
**Be careful not to contaminate the brake disc with grease or oil.**
8. Screw on coil body (11). Remove auxiliary mounting screws.
9. Remount manual brake release or closing plug. Position gasket and connector and secure with central screw.

**Mounting the manual brake release:** The play between the disc (13) and the releasing yoke (10) must be 2 mm to ensure correct functioning of the brake.



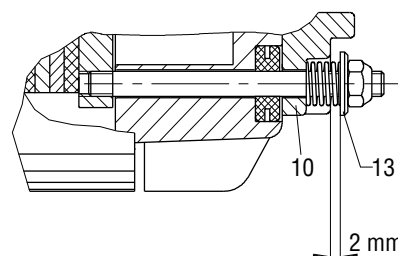
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Fig. 15: Detail of Fig. 12



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Fig. 13: Detail of Fig. 12



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Fig. 14: Detail of Fig. 12

#### 4.3.2.3 Changing the holding torque

1. to 4. see Sec. "Replacing the brake disc".
5. Remove abraded material.
6. Loosen pressure plate (4). Insert new brake springs in accordance with Table 4 in the Appendix.  
**Arrange symmetrically.**
7. Pull pressure plate on to brake springs again.
8. and 9. see Sec. "Replacing the brake disc".



#### 4.3.2.4 DFY 71 ... 112 B brake motors with AGY absolute encoder

Before carrying out any maintenance work on the brakes of motors DFY 71 ... 112 B AGY the AGY absolute encoder must first be removed:

– **Make sure the bolt (12) does not get damaged.**

1. Remove the right-angle connectors for the brake (3) (with flat gasket (2)) and for the AGY absolute encoder (1).
2. Undo the PG screw plug (14).
3. Hold the shaft in the encoder through the assembly hole, using an 8mm spanner. Then undo the screw counterclockwise using a 4mm hexagon socket spanner. This will release the expanding shaft, and undo the connection with the coupling (10). For this step the EW1 setting tool by Stegmann can be used (art. no. 81B 001 003 001).
4. Undo the taut band (6) and carefully pull off the AGY (7) encoder.
5. In DFY 90 ... AGY and DFY 112 ... AGY motors: undo flange screws (5).  
In DFY 71 ... AGY motors: remove board (8), then undo internal flange screws (5).
6. Pull off flange (9). Do not overstretch or bend brake cable.
7. Undo central screw on connector (11). Remove connector and flat gasket.  
In DFY 112 ... AGY motors: remove packing rubber (13) from groove in coil body (4).
8. Undo coupling clamping screw (10). Remove coupling.
9. You may now carry out the brake maintenance work (see Sec. 4.3.2).

Reassemble in reverse order:

Coat the flange centring seat (9) with a suitable sealant. Recommended: Sonderhoff no. 40.

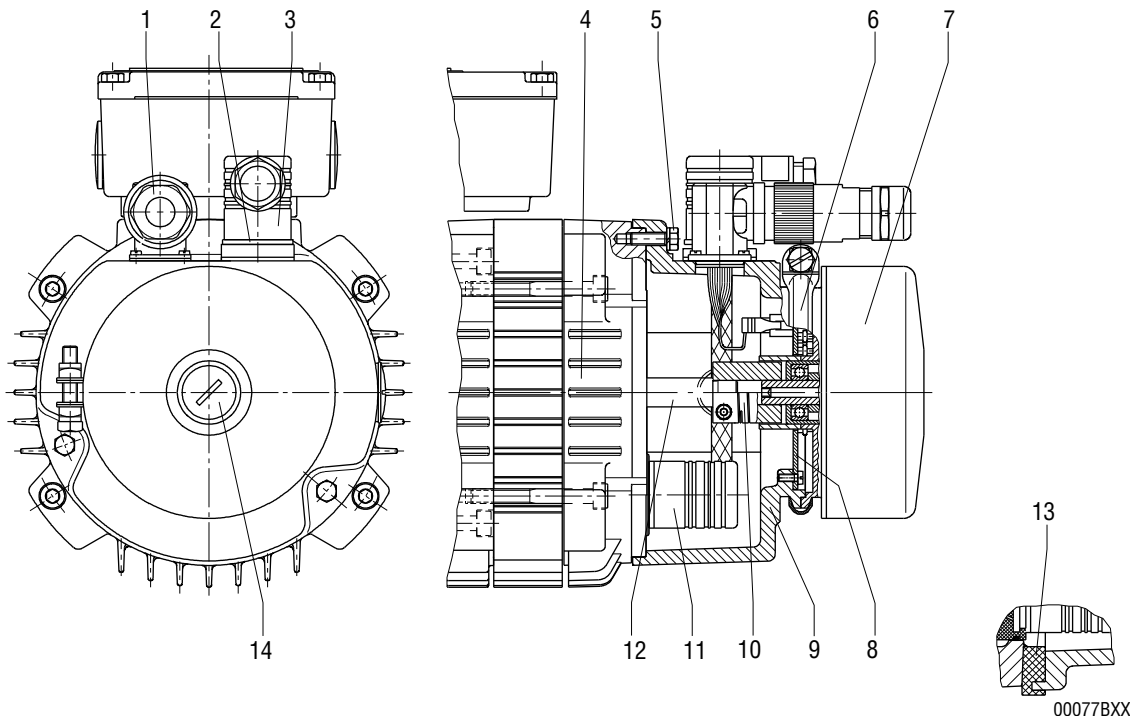


Fig. 16: ...DFY 71 ... 112 ... B AGY brake motor

- |                     |                          |                    |                             |
|---------------------|--------------------------|--------------------|-----------------------------|
| 1 Encoder connector | 5 Hexagon head cap screw | 9 Encoder flange   | 13 Sealing rubber (DFY 112) |
| 2 Flat gasket       | 6 Taut band              | 10 Coupling        | 14 PG screw plug            |
| 3 Brake connector   | 7 Encoder                | 11 Brake connector |                             |
| 4 Coil body         | 8 Board                  | 12 Bolt            |                             |

## 5 Retrofitting the Brake

Check the received parts for completeness.

### 5.1 Preparing the motor

**Part references: (213/17) means part 213 in Fig. 17.**

- Remove the cheese head screws (213/17) holding down the housing cover.
- Remove the housing cover (304/17).
- Clean centring fit on the non-drive end bearing end shield (42/17) of sealant.
- Remove circlip/snap ring (62/17) from free second shaft end.
- Pull off bush (308/17) from shaft, using a suitable pull-off device.

**Be careful not to damage the shaft seat and the resolver fitted behind.**

- The key (71/17) remains where it is.
- Heat the brake carrier (70/18) and pull on to the shaft on the non-drive end.
- Fit new circlip/snap ring (62/18).
- **Allow the carrier to cool down (warm to the touch).**

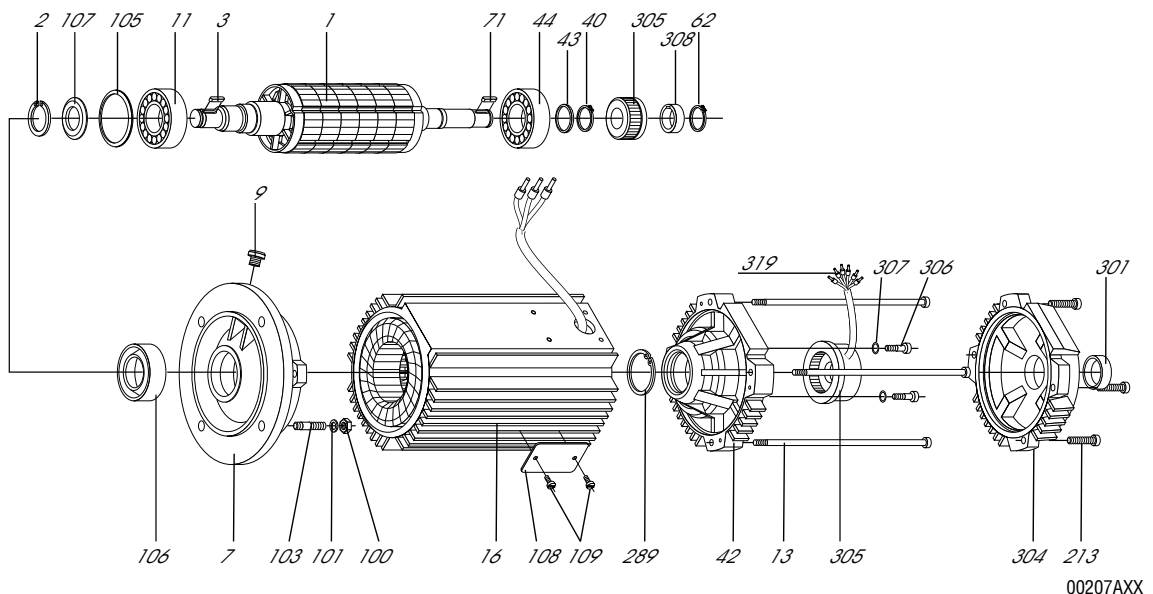


Fig.17: DFY motor without brake

### 5.2 Preassembly of the brake coil

- Insert the O-ring (281/18) in the groove provided on the plug connection of the brake coil (286/18).
- Screw the terminal link (294/18) to the brake coil through either hole, using one of the two cheese head screws (295/18) and lock washers (310/18) (there is a thread provided for this at the rear of the plug connection).

**Do not tighten yet!**



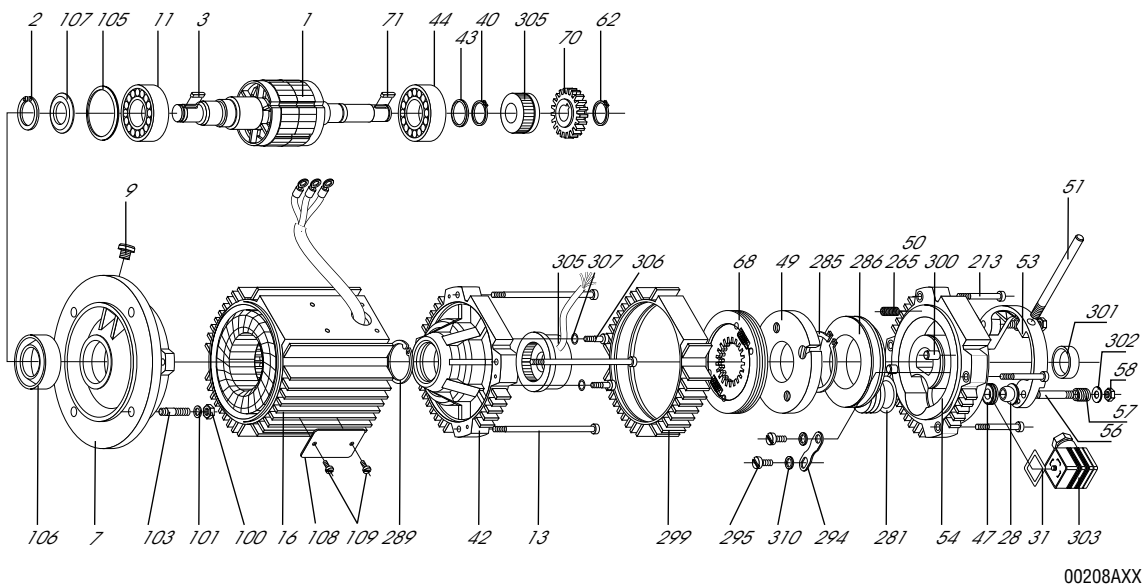


Fig. 18: DFY motor with brake

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### 5.3 Preassembly of the brake

- Insert the preassembled brake coil (see 5.2) in the coil body (54/18) and lock it axially with the circlip/snap ring (285/18).  
**Take care not to damage the O-ring!**
- Screw the brake coil to the coil body through the second opening on the terminal link using the second cheese head screw and lock washer.
- The protective earth connection is provided by screwing the terminal link to the brake coil.
- Push the two parallel pins (300/18) into the hole provided in the coil body.
- The pins are pushed in deep enough if they do not project from the pressure plate (49/18).
- Insert the brake springs (265/18) symmetrically into the holes provided over the perimeter of the brake coil, depending on the required brake torque (see Table 4).
- Screw one auxiliary mounting nut each on the two cheese head screws (56/18).
- Position the pressure plate (49/18) on the parallel pins and screw the two cheese head screws into the pressure plate through the holes in the coil body (provided for the manual brake release).
- Screw in so that no threads project from the pressure plate.
- Pull pressure plate on to the coil body by tightening the nut.

### 5.4 Mounting the brake to the motor

The two halves of the brake disc (68/18) are cross-located with springs.

- Position one half of the brake disc on the carrier and then push on to the carrier completely turning it slightly (hold motor shaft in place).
- The intermediate ring (299/18) is ribbed on three sides, the fourth is flat. The non-drive end bearing end shield is designed in a similar way. Position the intermediate ring on the cleaned centring fit of the non-drive end bearing end shield and align.
- Position the preassembled coil body with the pressure plate on to the intermediate ring (flat sides facing each other) and screw down loosely with the aid of the four cheese head screws (213/18).

**Do not screw tight yet!**

The brake disc may get damaged by auxiliary mounting screws that may project from the pressure plate.

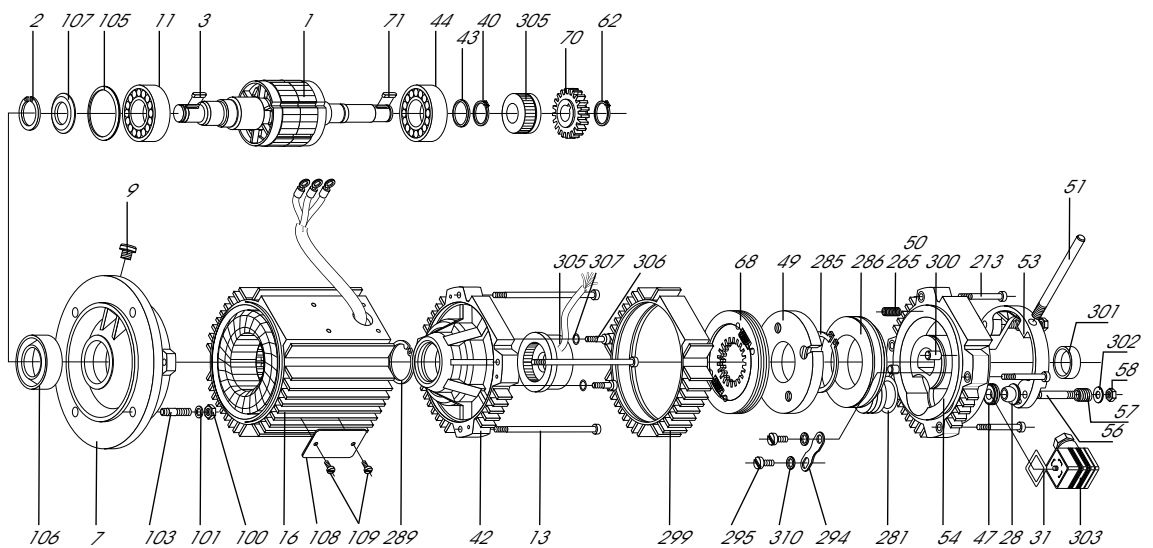
- Remove the auxiliary mounting screws.
- Tighten cheese head screws.
- Tap the protective cap (301/19) into the coil body.
- In versions without manual brake release: close through-holes on the coil body with closing cap (28/19).

### 5.5 Mounting the manual brake release

- Insert the two grommets (47/19) in the through-holes of the coil body.
- Fasten the releasing yoke (53/19) with the two studs (56/19), the pertinent springs (57/19), washers (302/19) and nuts (58/19) in the coil body. The play between the nuts and the releasing yoke must be 2 mm in each case.
- Insert the manual release lever (51/19) into the releasing yoke.

### 5.6 Electrical connection

Connect the right-angle connector (303/19) in accordance with the wiring diagram in Sec. 2.2.2. The brake is now ready for operation. Switch the brake several times to check correct brake operation.



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Fig. 19: DFY motor with brake

## 6 What to do if

### 6.1 Problems with the motor

Problem	Possible cause	Solution
Motor will not start	Lead broken	Check and restore the connections
	Fuse blown	Check the servo controller, replace the fuse
	Circuit-breaker tripped	Check the circuit-breaker; adjust if necessary, check drive for possible overload
	Servo controller defective, connected incorrectly, set incorrectly	Check servo controller and wiring
Motor will not start, or starts with difficulty	Servo controller not set correctly or overloaded	Check servo controller and wiring
Wrong direction of rotation	Incorrect control of motor	Check servo controller, check setpoints, change over setpoint leads
Motor hums	Drive blocking	Check the drive
	Fault on resolver lead	Check the resolver lead
	Brake cannot be released	Check the brake
	Servo controller not set correctly	Check servo controller
Motor overheats (check temperature)	Overload	Check load with inverter current if necessary check selection data
	Inadequate cooling	Adjust the cooling air supply, or clear the cooling air passage. Fit forced cooling fan if necessary.
	Forced cooling fan not operating	Check the connection and correct it if necessary
	Ambient temperature too high	Reduce the power
	Selected duty exceeded	Match motor duty to required operating conditions. We recommend getting expert advice for the selection of the correct drive
	Servo controller not optimized	Check servo controller
Too noisy	Ball bearings distorted or damaged	Re-align the motor, check the driven machine, replace the ball bearings (please refer to Sec. 4.1)
	Rotating parts vibrate	Rectify the cause or correct the imbalance if necessary
	Forced cooling fan: foreign matter in the cooling air passages	Clean the cooling air passages

### 6.2 Brake problems

Problem	Possible cause	Solution
The brake cannot be released	Wrong voltage at the brake.	Apply the correct voltage (see nameplate)
	Brake control unit failed.	Replace the brake control unit, check the brake coil (for resistances see Appendix, Table 5), the switching devices and the connection
	Max. permissible working air gap exceeded as the brake lining is worn.	Replace the whole brake disc
	Voltage drop on the supply lead > 10%	Ensure the correct supply voltage is connected and check the lead cross-section
	Brake coil interturn fault or short circuit to frame.	Change the complete brake with control unit (specialist workshop), check the switching devices.
Brake will not brake	Braking lining worn	Change the whole brake disc
	Manual release device incorrectly set.	Adjust the setting nuts
	Braking torque incorrect	Change the braking torque.
Brake operates after a delay	Brake is switched in the AC circuit	Simultaneous switch-off in the DC and AC circuits; please refer to the wiring diagram
Brake noise	Worn gearing due to jerky starting	Check drive selection
	Oscillating torques due to incorrect servo controller setting	Check / correct servo controller setting in accordance with the Installation and Operating Instructions

## Note:

Should you require the assistance of our customer service department:

- Quote the details on the nameplates of motor and servo controller
- Describe the nature and extent of the fault
- Explain when and under what background conditions the fault occurred
- State the suspected cause

## Appendix

**Table 1: Connector data**

Connection	Connector	Socket contacts	Stripped length A [mm]
DFY 56		4 · 1.5 mm <sup>2</sup>	6 ± 0.5
DFY 56 .. B		4 · 1.5 + 2 · 0.75 mm <sup>2</sup>	
DFY 56 resolver/TF		4 · 2 · 0.14 ... 0.60 mm <sup>2</sup> (solder contacts)	6 ± 1
DFY 71	SM21	4 · 1.5 mm <sup>2</sup>	7 ± 0.5
	SM22	4 · 2.5 mm <sup>2</sup>	11 ± 0.5
DFY 90 / DFY 112 S / M	SM32	4 · 2.5 mm <sup>2</sup>	11 ± 0.5
	SM34	4 · 4.0 mm <sup>2</sup>	
	SM36	4 · 6.0 mm <sup>2</sup>	
DFY 112 ML / L	SM46	4 · 6.0 mm <sup>2</sup> (solder contacts)	
	SM41	4 · 10 mm <sup>2</sup>	
DFY 71 ... 112 resolver / TF/TH		4 · 2 · 0.22 ... 0.56 mm <sup>2</sup>	5 ± 1
DFY 71 ... 112 brake		4 · 1.5 mm <sup>2</sup> / cable entry: Pg16	
DFY 71 ... 112 AGY		3 · 2 · 0.22 ... 0.56 mm <sup>2</sup>	5 ± 1
DFY 71 ... 112 VY		3 · 1 mm <sup>2</sup> / cable entry : Pg7	

**Table 2: Terminal box data**

Connection	Terminal block	Cable (max. Ø)	Cable entry
DFY 71	3 · M5	4 · 4 mm <sup>2</sup>	Pg 16
DFY 90	3 · M6	4 · 10 mm <sup>2</sup>	Pg 21
DFY 112			
DFY 71 ... 112 resolver		3 · 2 · 0.25 mm <sup>2</sup>	Pg 16
DFY 71 ... 112 TF/TH		2 · 1.5 mm <sup>2</sup>	Pg 16

**Table 3: Technical data of the brake**

Motor Typ	M <sub>B1</sub> [Nm]	M <sub>B2</sub> [Nm]	W [10 <sup>6</sup> J]	I <sub>H</sub> (110 V <sub>AC</sub> ) [A]	I <sub>H</sub> (230 V <sub>AC</sub> ) [A]	I <sub>H</sub> (400 V <sub>AC</sub> ) [A]	I <sub>H</sub> (24 V <sub>DC</sub> ) [A]	I <sub>B</sub> /I <sub>H</sub>
DFY 56MB DFY 56LB	/	2.5	/	/	/	/	0.5	/
DFY 71SB DFY 71MB DFY 71MLB DFY 71LB	6 10 10 15	3 6 6 10	60	0.30	0.15	0.10	1.0	6.7
DFY 90SB DFY 90MB DFY 90LB	20 30 40	12 12 20	90	0.45	0.23	0.13	1.5	6.0
DFY 112SB DFY 112MB DFY 112MLB DFY 112LB	35 35 60 90	17.5 17.5 35 35	180	0.70	0.35	0.20	2.15	6.0

where: M<sub>B1</sub> = maximum brake torque  
M<sub>B2</sub> = minimum brake torque

I<sub>H</sub> = holding current  
I<sub>B</sub> = starting current

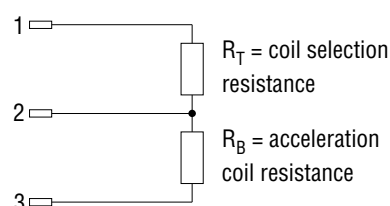
W = total brake work done until  
brake disc replacement

**Table 4: Adjustable brake torques**

Type Brake	Motor	Brake torque [Nm]				Number and type of springs		Part numbers	
		S	M	ML	L	standard	red	standard	red
<b>B2</b>	<b>DFY 71..</b>	3	-	-	-	-	3	183 623 4	183 742 7
		6	6	-	-	-	6		
		10	10	10	10	3	-		
		15	15	15	15	4	2		
<b>B4</b>	<b>DFY 90..</b>	12	12	-	-	-	6	184 002 9	184 003 7
		20	20	-	20	3	-		
		30	30	-	30	4	2		
		40	40	-	40	6	-		
<b>B10</b>	<b>DFY 112..</b>	17.5	17.5	-	-	-	3	184 007 X	184 008 0
		35	35	35	35	-	6		
		60	60	60	60	3	-		
		90	90	90	90	4	2		

**Table 5: Brake coil resistances**

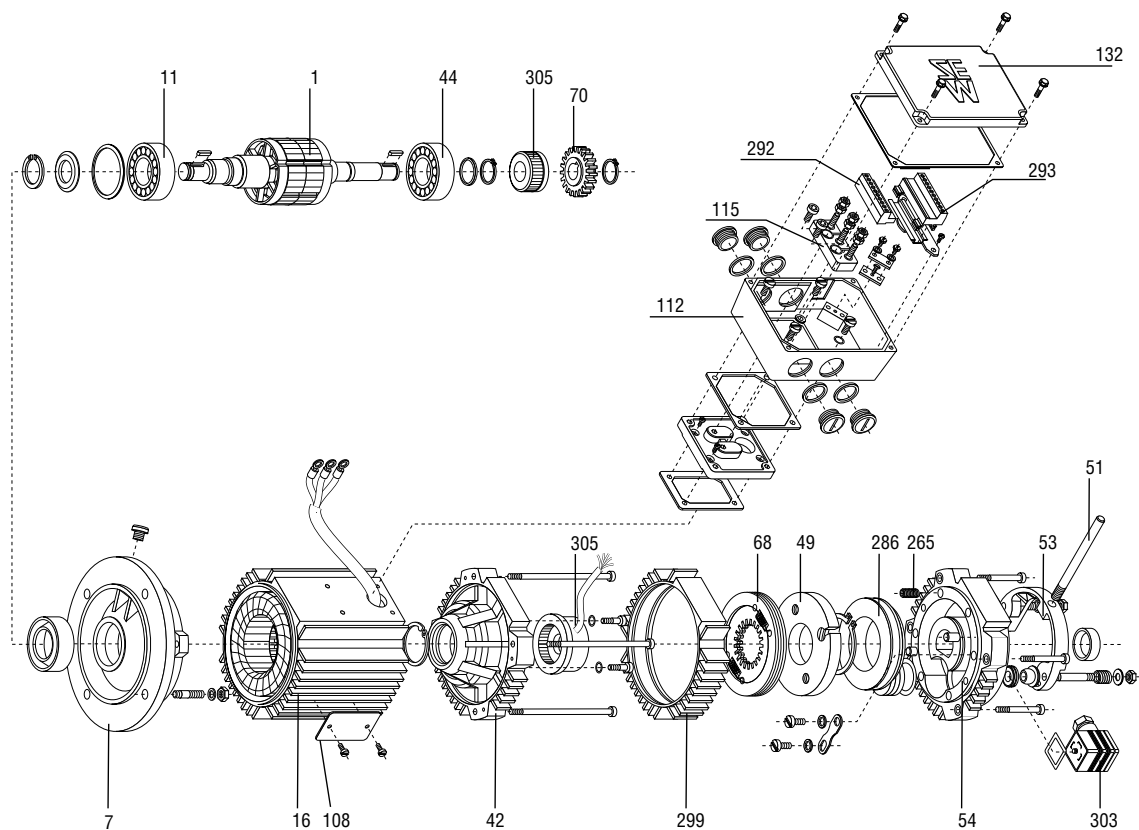
Motor type	Brake rated voltage							
	110 V <sub>AC</sub>		230 V <sub>AC</sub>		400 V <sub>AC</sub>		24 V <sub>DC</sub>	
	R <sub>B</sub> [Ω]	R <sub>T</sub> [Ω]	R <sub>B</sub> [Ω]	R <sub>T</sub> [Ω]	R <sub>B</sub> [Ω]	R <sub>T</sub> [Ω]	R <sub>B</sub> [Ω]	R <sub>T</sub> [Ω]
DFY 56 .. B	-	-	-	-	-	-	-	59
DFY 71 .. B	14.5	81	59	332	178	1000	3.6	20.2
DFY 90 .. B	9.9	50	40	203	121	610	2.5	12.4
DFY 112 .. B	7.3	37	30	151	90	454	1.8	9.2



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**Fig. 19: Brake coil resistances (DFY 71 ... 112)**

## General design of DFY motors frame size 71 ... 112 with brake and terminal box



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Fig. 20: General design of the DFY motor

1	Rotor, complete	53	Releasing yoke	265	Brake spring
7	Flanged end shield	54	Coil body	286	Brake coil
11	Deep groove ball bearing	68	Brake disc, complete	292	Connector part
16	Stator, complete	70	Carrier	293	Plug-in block
42	Non-drive end bearing end shield	108	Nameplate	299	Adapter plate
44	Deep groove ball bearing	112	Terminal box bottom section	303	Right-angle connector for brake connection, complete
49	Pressure plate	115	Terminal block	305	Resolver
51	Manual release lever	132	Terminal box cover		

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