9 Encoders

9.1 Product description

Unit designation

/ES7 + letter for the electrical interface

/EG7 + letter for the electrical interface

/EV7 + letter for the electrical interface

/AS7 + letter for the electrical interface

/AG7 + letter for the electrical interface

/AV7 + letter for the electrical interface

Description

These encoder types are mounted on the B end of the motor or brakemotor (shaft-centered). The encoder housings are supported by the fan guard.

- Encoders ES7. and AS7. are **shaft-centered with spread shaft**.
- Encoders EG7. and AG7. are **shaft-centered with plug-in shaft and end thread**. They are available a reinforced design compared to ES7./AS7.
- The variants ES7./AS7. can also be mounted to the DR motors **via coupling and flange hood**. The unit designation then changes to EV7./AV7.

For project planning notes and technical data, see page 287 ff.

Pin assignment

For the pin assignment of the respective encoder, refer to chapter "Prefabricated cables" on page 376 ff and page 381 ff.

Standardized encoder mounting adapter

Unit designation

/ES7A or /EG7A

Description

The encoder from SEW is not included in the scope of delivery. Only prepared for installation of an encoder. The shaft is predrilled and an additional protective canopy is mounted.

Principle of installation:

DR.71 - 132 .../ES7A

The encoder is connected as non-positive connection with the shaft bore using a spread shaft. The torque arm is attached to the fan guard from outside.

Bore with ∅ 10 mm, H7 fit.

DR.160 - 225 .../EG7A

The encoder with outer thread on the encoder shaft is fastened in the shaft bore (with internal thread). The torque arm is attached to the fan guard from inside.

Bore with ∅ 14 mm, H7 fit, and additional end thread in M6.

For project planning notes and technical data, see page 298 and subsequent pages.

Mounting non-SEW encoders

Unit designation /XV..

Description The non-SEW mounting option enables SEW to mount non-SEW encoders to the motor. The non-standard encoder requested by the customer is installed by SEW.

The encoder can be fixed to the motor shaft via the flange hood. The encoder shaft is connected to the motor shaft via spread shaft coupling.

If the customer wants to mount a non-SEW encoder, the /X*A mounting attachment must be ordered.

For project planning notes and technical data, see page 299 ff.

Standardized mechanical interface for mounting of non-SEW encoders by the customer

Unit designation Mounting devices for non-SEW encoders

- /XV0A Any shaft diameter and centering device
- /XV1A Shaft diameter 6 mm; centering device 50 mm
- /XV2A Shaft diameter 10 mm; centering device 50 mm
- /XV3A Shaft diameter 12 mm; centering device 80 mm
- /XV4A Shaft diameter 11 mm; centering device 85 mm

Description The non-SEW mounting option allows non-SEW encoders to be mounted to the motor via a shaft coupling.

The non-SEW encoder itself is not installed yet, only the mechanical interface is installed for mounting the encoder.

The encoder shaft is connected to the motor shaft via a coupling.

For project planning notes and technical data, see page 298 ff.

Built-in encoder

Unit designation /EI71, /EI72, /EI7C, /EI76

Description Hall sensors (A and B track).

Suitable for simple positioning and speed monitoring tasks.

A pole ring is molded in the PVC fan. The sensor unit is located directly behind the B-side endshield, or, when a brakemotor is used, on two spacers behind the brake coil.

For project planning notes and technical data, see page 297 and subsequent pages.

9.2 Project planning, technical data

Speed sensor

Various encoder types are available as standard for installation in DR. series AC motors. The encoders can be combined with other optional additional features, such as brake and forced cooling fan.

For questions, please contact your contact partner for drives at SEW-EURODRIVE.

Delivery

The encoder types ES7./EG7./EV7. and AS7./AG7./AV7 can be delivered in two connection variants:

- With connection cover
- Without connection cover

SEW-EURODRIVE recommends the use of prefabricated cables (see chapter 'Prefabricated cables' on page 359 and subsequent pages). When purchasing the cables from SEW-EURODRIVES, you can order the encoders without a connection cover because this cover is already part of the prefabricated cable.

Encoder connection

When connecting the encoders to the inverters, always follow the operating instructions for the relevant inverter and the wiring diagrams supplied with the encoders.

- Maximum line length (inverter - encoder): 100 m for a cable capacitance:
  - < 83 nF/km (core/core) according to DIN VDE 0472 part 504
  - < 110 nF/km (core/shield)
- Core cross-section: 0.25 - 0.5 mm^2
- Use shielded cables with twisted pair conductors and apply the shield over large area on both ends:
  - At the encoder in the cable gland or in the encoder plug
  - To the inverter on the electronics shield clamp or to the housing of the sub D plug
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm.
- Encoder with cable gland: Observe the permitted diameter of the encoder cable to ensure that the cable gland functions correctly.

For the pin assignment of the respective encoder, refer to chapter "Prefabricated cables" on page 376 ff and page 381 ff.

Absolute encoder overview

Electrical interface RS-485 + 1 V_{SS} Sin/Cos

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
AS7W	71 - 132	Absolute encoder (multi-turn)	Shaft centered	2048	DC 7 - 30
AG7W	160 - 225				
AV7W	71 - 225		Coupling		

Electrical interface MSSI + 1 V_{SS} Sin/Cos

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
AS7Y	71 - 132	Absolute encoder SSI® (multi-turn)	Shaft centered	2048	DC 7 - 30
AG7Y	160 - 225				
AV7Y	71 - 225		Coupling		

Electrical interface MSSI + TTL

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
AH7Y	315	Absolute encoder SSI® (multi-turn)	Hollow shaft	2048	DC 9 - 30

Speed sensor overview

Electrical interface 1 V_{SS} Sin/Cos

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
ES7S	71 - 132	Speed sensor	Shaft centered	1024	DC 7 - 30
EG7S	160 - 225				
EH7S	315		Hollow shaft		DC 10 - 30
EV7S	71 - 225		Coupling		DC 7 - 30

Electrical interface TTL (RS-422)

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
ES7R	71 - 132	Speed sensor	Shaft centered	1024	DC 7 - 30
EG7R	160 - 225				
EV7R	71 - 225		Coupling		

Built-in encoder overview

Electrical interface
HTL (push-pull)

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
EI7C	71 - 132	Built-in encoder	Integrated	24	DC 9 - 30
EI76				6	
EI72				2	
EI71				1	
ES7C		Speed sensor	Shaft centered	1024	DC 4.75 - 30
EG7C	160 - 225				
EV7C	71 - 225		Coupling		

Technical data for absolute encoders

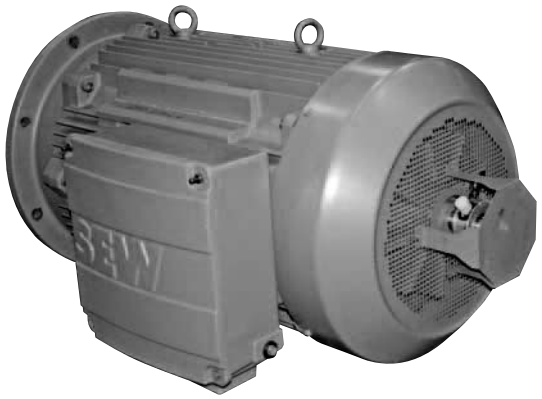
M-SSI + sin / cos

60602AXX

Encoder	AS7Y	AG7Y
For motor size DR.	71 - 132	160 - 225
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 7 - 30	
Max. current consumption I_{in} [mA]	140	
Output amplitude [V]	1	
Signal output	Sine/cosine	
Output current per track I_{out} [mA]	10	
Max. pulse frequency f_{max} [kHz]	200	
Periods per revolution: A, B C	2048 -	
Phase angle A : B	90° ± 3°	
Absolute encoder scanning code	Gray code	
Resolution Single-turn Multi-turn	8196 increments / revolution 4096 revolutions	
Data transfer of absolute value	Synchronous, serial (SSI)	
Serial data output	Driver to EIA RS-485	
Serial clock input	Optocoupler, recommended driver to EIA RS-485	
Clock rate [kHz]	Permitted range: 100 - 2000 (max. 100 m cable length with 300 kHz)	
Clock-pulse space period [ms]	12 - 30	
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)	≤ 200 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 1000 (EN60088-2-27)	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	6000	
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)	
Degree of protection	IP66 (EN60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	1.15	1.45

For a product description, see page 285.

M-SSI + TTL
(RS-422)



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Encoder	AH7Y
For motor size DR.	315
Mounting type	Hollow shaft
Supply voltage V_B [V]	DC 9 - 30
Max. current consumption I_{in} [mA]	150
Output amplitude V_{high} [V_{SS}] V_{low} [V_{SS}]	≥ 2.5 ≤ 0.5
Signal output	TTL (RS-422)
Output current per track I_{out} [mA]	20
Max. pulse frequency f_{max} [kHz]	120
Periods per revolution A, B C	2048 -
Mark space ratio	1 : 1 ± 20 %
Phase angle A : B	90° ± 20°
Absolute encoder scanning code	Gray code
Resolution Single-turn Multi-turn	4096 increments / revolution 4096 revolutions
Data transfer of absolute value	Synchronous, serial (SSI)
Serial data output	Driver to EIA RS-485
Serial clock input	Optocoupler, recommended driver to EIA RS-485
Clock rate [kHz]	Permitted range: 100 - 800 (max. 100 m cable length with 300 kHz)
Clock-pulse space period [ms]	12 - 30
Data memory	-
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	3500
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)
Degree of protection	IP56 (EN60529)
Connection	Terminal strip on encoder
Clamping range of the cable gland [mm]	∅ 5 - 10
Additional weight [kg]	4.55

For a product description, see page 285.

RS-485 + sin / cos

60602AXX

Encoder	AS7W	AG7W
For motor size DR.	**71 - 132**	**160 - 225**
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 7 - 30	
Max. current consumption I_{in} [mA]	150	
Output amplitude [V]	1	
Signal output	Sine/cosine	
Output current per track I_{out} [mA]	10	
Max. pulse frequency f_{max} [kHz]	200	
Periods per revolution A, B C	2048 -	
Phase angle A : B	90° ± 3°	
Absolute encoder scanning code	Binary code	
Resolution Single-turn Multi-turn	8192 increments / revolution 4096 revolutions	
Data transfer of absolute value	Asynchronous, serial (RS-485)	
Serial data output	Driver to EIA RS-485	
Serial clock input	Optocoupler, recommended driver to EIA RS-485	
Data memory	1.792 bytes	
Vibration resistance [10 Hz – 2 kHz] [m/s²]	≤ 100 (EN60088-2-6)	≤ 200 (EN60088-2-6)
Shock resistance [m/s²]	≤ 1000 (EN60088-2-27)	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	6000	
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)	
Degree of protection	IP66 (EN60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	1.15	1.45

For a product description, see page 285.

Technical data for incremental encoders

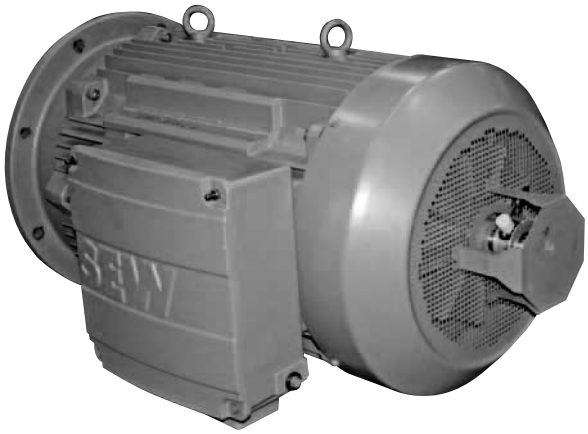
sin / cos

60602AXX

Encoder		ES7S	EG7S
For motor size DR.		71 - 132	160 - 225
Mounting type		Shaft centered	
Supply voltage	V_B [V]	DC 7- 30	
Max. current consumption	**I_{in} [mA]**	140	
Output amplitude per track	**V_{high} [V_{SS}]** **V_{low} [V_{SS}]**	1	
Signal output		Sine/cosine	
Output current per track	**I_{out} [mA]**	10	
Max. pulse frequency	**f_{max} [kHz]**	150	
Pulses (sine cycles) per revolution	**A, B** **C**	1024 1	
Phase angle A : B		90° ± 3°	
Data memory		1920	
Vibration resistance [m/s²] (10 Hz - 2000 Hz)		≤ 100 (EN 60068-2-6)	
Shock resistance [m/s²]		≤ 1000 (EN 60068-2-27)	≤ 2000 (EN 60068-2-27)
Maximum speed n_{max} [min^{-1}]		6000	
Ambient temperature [°C]		-30 to +60 (EN 60721-3-3, class 3K3)	
Degree of protection		IP66 (EN 60529)	
Connection		Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]		∅ 5 - 10	
Additional weight [kg]		1.1	1.4

For a product description, see page 285.

sin/cos



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Encoder	EH7S
For motor size DR.	315
Mounting type	Hollow shaft
Supply voltage V_B [V]	DC 10 - 30
Max. current consumption I_{in} [mA]	140
Output amplitude V_{high} [V_{SS}] V_{low} [V_{SS}]	1
Signal output	Sine/cosine
Output current per track I_{out} [mA]	10
Max. pulse frequency f_{max} [kHz]	180
Periods per revolution A, B C	1024 1
Phase angle A : B	90° ± 10°
Data memory	-
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 1000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	3000
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)
Degree of protection	IP65 (EN60529)
Connection	12-pin plug connector
Clamping range of the cable gland [mm]	∅ 5 - 10
Additional weight [kg]	2.85

For a product description, see page 285.

TTL (RS-422)

60602AXX

Encoder	ES7R	EG7R
For motor size DR.	71 - 132	160 - 225
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 7 - 30	
Max. current consumption I_{in} [mA]	160	
Output amplitude V_{high} [V] V_{low} [V]	≥ 2.5 ≤ 0.5	
Signal output	TTL (RS-422)	
Output current per track I_{out} [mA]	25	
Max. pulse frequency f_{max} [kHz]	150	
Periods per revolution A, B C	1024 1	
Mark space ratio	1 : 1 ± 10 %	
Phase angle A : B	90° ± 20°	
Vibration resistance [10 Hz – 2 kHz] [m/s²]	≤ 100 (EN60088-2-6)	≤ 200 (EN60088-2-6)
Shock resistance [m/s²]	≤ 1000 (EN60088-2-27)	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	6000	
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)	
Degree of protection	IP66 (EN60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	1.1	1.4

For a product description, see page 285.

HTL

60602AXX

Encoder	ES7C	EG7C
For motor size DR.	**71 - 132**	**160 - 225**
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 4.75- 30	
Max. current consumption I_{in} [mA]	100	
Output amplitude per track V_{high} [V_{SS}] **V_{low} [V_{SS}]** **U_b = 4.75 - 6 V, terminating resistor = 120 Ohm**	≥ 2.5 ≤ 1.1	
Output amplitude per track V_{high} [V_{SS}] **V_{low} [V_{SS}]** **U_b = 6 - 30 V, terminating resistor = 1-3 kOhm**	≥ U_b - 2.5 ≤ 3	
Signal output	HTL	
Max. pulse frequency f_{max} [kHz]	120	
Pulses (sine cycles) per revolution **A, B** **C**	1024 1	
Mark space ratio	1 : 1 ± 10 %	
Phase angle A : B	90° ± 20°	
Vibration resistance [m/s²] (10 Hz - 2000 Hz)	≤ 100 (EN 60068-2-6)	
Shock resistance [m/s²]	≤ 1000 (EN 60068-2-27)	≤ 2000 (EN 60068-2-27)
Maximum speed n_{max} [min^{-1}]	6000	
Ambient temperature [°C]	-30 to +85	
Degree of protection	IP66 (EN 60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	0.35	0.35

For a product description, see page 285.

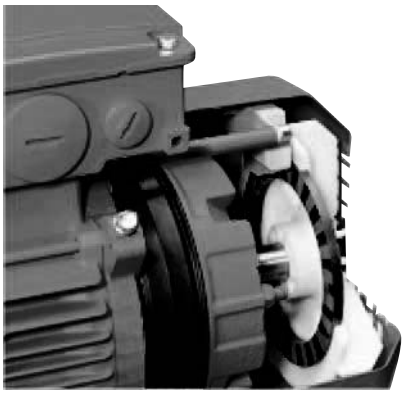
Built-in encoder

The built-in encoder is also available in a simple version with fewer pulses. Available are HTL built-in encoders with push-pull for 24, 6, 2 or 1 period(s) per motor revolution.

For a product description, see page 286.

Technical data for built-in encoders

HTL (push-pull)



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Encoder	**EI7C**	**EI76, EI72, EI71**
For motor size DR.	**71 - 132**	
Mounting type	Integrated	
Supply voltage V_B [V]	DC 9 - 30	
Max. current consumption I_{in} [mA]	120	
Output amplitude V_{high} [V] **V_{low} [V]**	≥ U_b - 2.5 ≤ 0.5	
Signal output	HTL (push-pull)	
Output current per track I_{out} [mA]	60	
Max. pulse frequency f_{max} [kHz]	1.44	
Periods per revolution A, B **C**	24 0	6, 2, 1 0
Mark space ratio	1 : 1 ± 20 %	
Phase angle A : B	90° ± 20°	
Vibration resistance [10 Hz – 2 kHz] [m/s²]	≤ 100 (EN60088-2-6)	
Shock resistance [m/s²]	≤ 1000 (EN60088-2-27)	
Maximum speed n_{max} [rpm]	3600	
Ambient temperature [°C]	-30 to +60	
Degree of protection	IP65	
Connection	Terminal strip in the terminal box or M12 (8-pin)	
Additional weight [kg]	see page 314	

For a product description, see page 285.

Encoder mounting adapter

On request, DR motors can be equipped with various encoder mounting adapters for mounting customer-specific encoders from different manufacturers.

These encoders are usually attached to the synchro flange using 3 encoder mounting clamps (bolts with eccentric disks).

The encoder is not included in the scope of delivery of SEW-EURODRIVE but is purchased and installed by the customer itself.

For a product description, see page 285.

Technical data for encoder mounting adapters

For encoders from SEW-EURODRIVE

Encoder mounting adapter	ES7A	EG7A	EH7A
For motor size DR.	71 - 132	160 - 225	315
Mounting type of encoder	Shaft centered		Hollow shaft
Motor shaft type	10 mm bore	14 mm bore with M6 end thread	Shaft end 38 mm × 116 mm
Suitable for encoder	ES7S ES7R AS7Y AS7W	EG7S EG7R AG7Y AG7W	EH7S - AH7Y -

For a product description, see page 285.

For dimension sheets of motors, refer to page 107 and subsequent pages.

For encoders provided by customer

AC motor with encoder mounting adapter and forced cooling fan:

60599AXX

Encoder mounting adapter		XV0A	XV1A	XV2A	XV3A	XV4A
For motor size DR.		71 - 225				
Mounting type of encoder		Flange centered with coupling				
Variant shaft	Encoder	Any	6 mm	10 mm	12 mm	11 mm
	Centering	Any	50 mm	50 mm	80 mm	85 mm
Suitable for encoder		Provided by the customer or by SEW-EURODRIVE on behalf of the customer.				

For a product description, see page 286.

Please request the necessary dimension sheets, if required.

Mounting non-SEW encoders

All mounting adapters described above are available if the customer wants SEW-EURODRIVE to install a customer-specific encoder.

The encoder is usually provided by the customer. SEW-EURODRIVE can also provide the encoder if the customer submits an exact specification.

For questions, please contact your contact partner for drives at SEW-EURODRIVE.

For a product description, see page 286.

10 Additional Features

10.1 Motor protection

For general project planning notes on switching and protection devices for DR motors, see page 29.

Take the information of that chapter into account for your selection.

Thermal motor protection with PTC resistor

Unit designation /TF

Description Thermal motor protection prevents the motor from overheating and consequently from being damaged. The TF is a triplet thermistor. There is one TF in each motor phase.

The TF is available in thermal classification 155 (F) or 180 (H).

It consists of a resistor whose resistance increases with rising temperature.

/TF The PTC thermistors comply with DIN 44082.

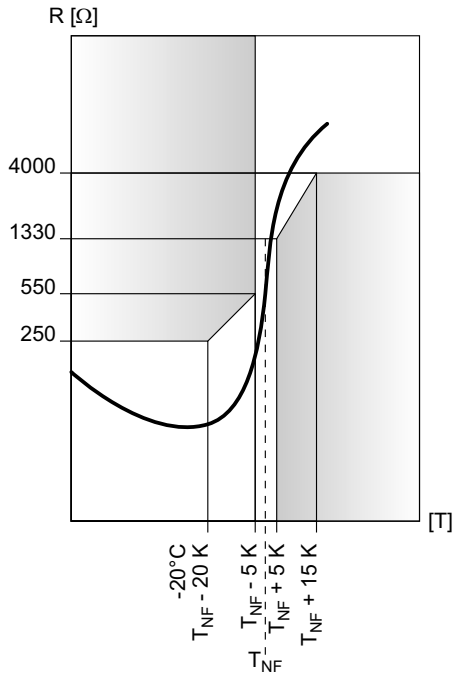
Resistance measurement (measuring instrument with V ≥ 2.5 V or I < 1 mA):

- Standard measured values: 20 - 500 Ω
- Hot resistance: > 4000 Ω

When using the temperature sensor for thermal monitoring, the evaluation function must be activated to maintain reliable isolation of the temperature sensor circuit. If the temperature reaches an excessive level, a thermal protection function must be triggered immediately.

	TIP
	The temperature sensor TF may not be subjected to voltages > 30 V.

Below figure shows the characteristic curve of the TF with reference to the rated response temperature (referred to as T_{NF}).



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Thermal motor protection with bimetallic switch "NC contact"

Unit designation /TH

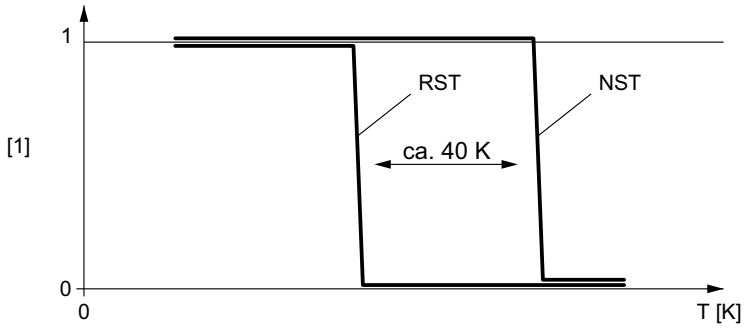
Description Thermal motor protection prevents the motor from overheating and consequently from being damaged. The two higher thermal classes 155 (F) and 180 (H) are monitored. The TH has a triplet design, which means that each motor phase contains a thermostat NC contact. These are connected in series.

The TH consists of a bimetallic switch that trips when a certain temperature is reached and opens the contact. Connection to a controller or feedback system ensures that the motor will be switched off. When the motor cools down, it does not immediately switch back to the rated switching temperature (NST) but only after approx. 40 K below the rated switching temperature (reset temperature RST).

/TH The thermostats are connected in series and open when the permitted winding temperature is exceeded. They can be connected in the drive monitoring loop.

	AC V	DC V	
Voltage U [V]	250	60	24
Current (cos φ = 1.0) [A]	2.5	1.0	1.6
Current (cos φ = 0.6) [A]	1.6	-	-
Contact resistance max. 1 ohm at DC 5 V / 1 mA			

Switching condition of the bimetallic switch "NC":



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RST Reset temperature

NST Rated switching temperature

Thermal motor information with KTY84 – 130

Unit designation /KY

Description This type detects the motor temperature continuously using a semi-conductor sensor for further processing in the inverter / controller.

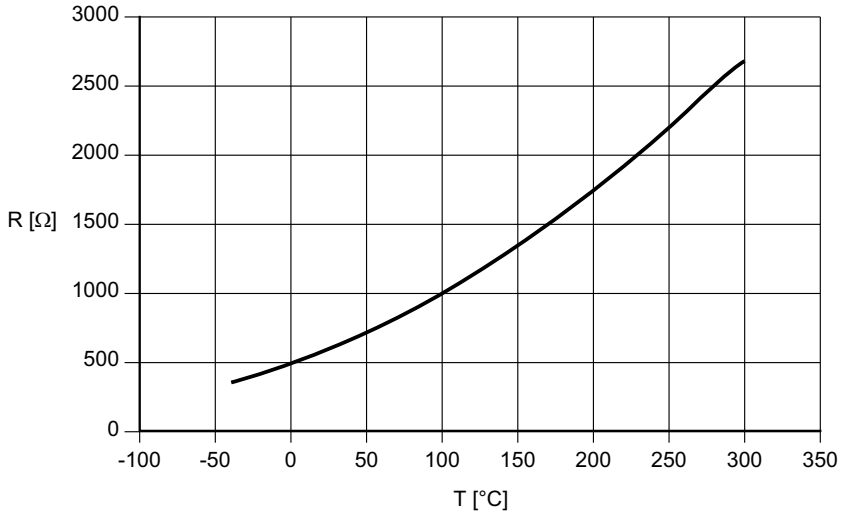
The option with a KTY does not replace the standard motor protection using TF and TH.

The inverter + /KY option can only take on the function of motor protection when it is used in combination with an inverter containing the thermal motor model.

/KY The temperature sensor KTY84 - 130 continuously detects the motor temperature.

Technical data	KTY84 - 130
Connection	Red (+) Blue (-)
Total resistance at 20 - 25 °C	540 Ω < R < 640 Ω
Test current	< 3 mA

Typical characteristic curve of KTY:



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Thermal motor information with PT100

Unit designation /PT

Description This type detects the motor temperature continuously using a linear platinum sensor for further processing in the inverter / controller.

Unlike the KTY semiconductor sensor, the platinum sensor has an almost linear characteristic curve and is more accurate.

The type with /PT does not replace the standard motor protection using /TF or /TH.

The inverter + /PT option can only take on the function of motor protection when it is used in combination with an inverter containing the thermal motor model.

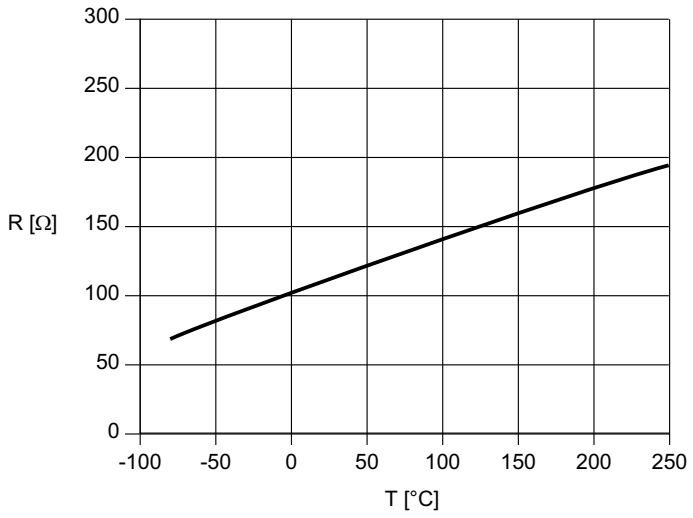
The following is installed:

- 1 sensor per stator stack
- 3 sensors per stator stack (one per phase)

/PT The temperature sensor PT100 continuously detects the motor temperature. One or three PT100 sensors are used depending on the requirements.

Technical data	PT100
Connection	Red/white
Resistance at 20 - 25 °C per PT100	107 Ω < R < 110 Ω
Test current	< 3 mA

Characteristic curve of PT100:



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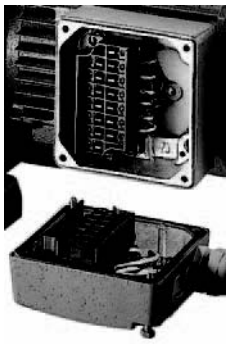
10.2 Connection alternatives

Integrated plug connector

Unit designation /IS



Description

This 12-pin plug connector is integrated in the terminal box. It replaces the terminal board and was developed by SEW-EURODRIVE in 1993. The successful market position is continued in the modular DR motor system.

Star or delta connection is implemented using a variable terminal link. One side contains the jumpers required for star connection, the other side contains the three jumpers for delta connection. Each side is clearly marked. This jumper is included in the scope of delivery.

/IS

The 12 pins of the IS plug connector are usually used as follows:

- 6 times motor winding,
- 4 times brake,
- 2 times auxiliary contacts (e.g. thermal motor protection).

The variable terminal link can be used to connect core cross section of max. 2.5 mm^2. Without jumper, the core cross section is increased to 4 mm^2. The power range of 4-pole motors with IS was extended to 7.5 kW.

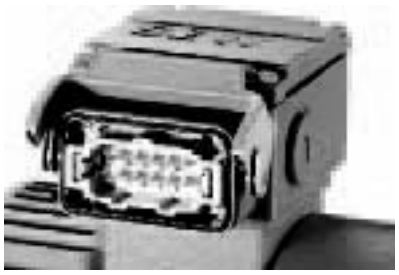
Technical data for integrated plug connectors

Plug connectors	IS
For motor size	71 - 132
Number of contacts	12 + 2 × PE
Contact connection	Screw connection
Contact type	Blade / bushing
Max. voltage/(CSA) [V_{AC}]	690 / (600)
Max. contact rating [A_{eff}]	16
Power range [kW]	7.5
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP56, IP65, IP66)
Ambient temperature [°C]	-40 to +40

As a rule, 6 power contacts are used for the winding connections and 6 for the control connections (brake, motor protection).

Mount-on plug connector

Unit designation AC.., AS.., AM.., AB.., AD.., AK..



Description

The many options of installing a plug connector at the side of the terminal box are maintained in the modular DR motor system. Plug connectors are available with single-clamp and two-clamp closure.

The assignments of the various contact types remain the same. As AC motors are more and more operated on frequency inverters, only the EMC type is taken account of.

The built-on housing of the plug connector is not a separate part anymore but is part of the terminal box.

/AS.., /AC.., /AM.., /AB.., /AD.., /AK..

The installed plug connector is based on two systems by Harting.

- HAN 10ES or HAN 10E
- HAN Modular with E, C or B modules

In the HAN modular systems, the modules contain a different number of contacts with different current carrying capacity.

The mating connector is not included in the scope of delivery of SEW-EURODRIVE.

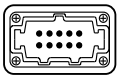
Two types of closing can basically be distinguished for the mating connector.

- Single clip longitudinal closing mechanism,
- Double clip transverse closing mechanism.

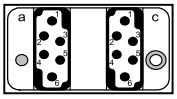
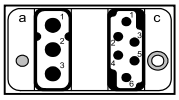
Technical data for mount-on plug connectors

Industrial plug connectors (AC.., AS.., AM.., AB.., AD.., AK..)

Technical data AC.., AS..

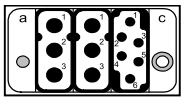
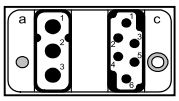
Plug connectors	ACB.., ASB..	ACE.., ASE..
For motor size	71 - 132	
Locking of mating connector	Double clamp	Single clamp
Connector viewed from motor end		
Basic connector system	Harting, Han® EMC housing 10B; terminal box: Aluminum	
Number of contacts	10	
Max. contact rating [A_{eff}]	10 × 16	
PE connection	2 contacts on insulator	
Max. voltage/(CSA) [V_{AC}]	500 / (600)	
Contact connection	AC = Crimp contacts / AS = cage clamps	
Contact type	Pin / (socket = from customer)	
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP65)	
Ambient temperature [°C]	-40 to +40	

Technical data AM.., AB..

Plug connectors	AMB..	AME..	ABB..	ABE..
For motor size	71 - 132		71 - 132; 160 - 225[1)]	
Locking of mating connector	Double clamp	Single clamp	Double clamp	Single clamp
Connector viewed from motor end				
Basic connector system	Harting, Han® EMC housing 10B; terminal box: Aluminum			
Number of contacts	2 × 6		1 × 3 + 1 × 6	
Module type	a, c: E module; b: Empty module		a : C module; b: Empty module; c: E module	
Max. contact rating [A_{eff}]	12 × 16		3 × 36 + 6 × 16	
PE connection	2 contacts on articulated frame			
Max. voltage/(CSA) [V_{AC}]	500 / (600)			
Contact connection	Crimping contacts			
Contact type	Pin / (socket = from customer)			
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP65)			
Ambient temperature [°C]	-40 to +40			

1) Can be mounted up to size 225 from a mechanical perspective, the rated current of the motor is decisive

Technical data for AD.., AK..

Plug connectors	ADB2	ADE2	AKB..	AKE..
For motor size	71 - 132; 160 - 225[1)]		160 - 225	
Locking of mating connector	Double clamp	Single clamp	Double clamp	Single clamp
Connector viewed from motor end				
Basic connector system	Harting, Han® EMC housing 10B; terminal box: Aluminum			
Number of contacts	2 × 3 + 1 × 6		1 × 3 + 1 × 6	
Module type	a, b: C module; c: E module		a : C module; b: Empty module; c: E module	
Max. contact rating [A_{eff}]	6 × 36 + 6 × 16		3 × 70 + 6 × 16	
PE connection	2 contacts on articulated frame			
Max. voltage/(CSA) [V_{AC}]	500 / (600)			
Contact connection	Crimping contacts		C module: Axial screw connection E module: Crimping contacts	
Contact type	Pin / (socket = from customer)			
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP65)			
Ambient temperature [°C]	-40 to +40			

1) Can be mounted up to size 225 from a mechanical perspective, the rated current of the motor is decisive

Contact rating depending on the temperature

Reduced current values apply to temperatures higher than the 40 °C given in the tables. The following figure shows the permitted contact load depending on the ambient temperature.

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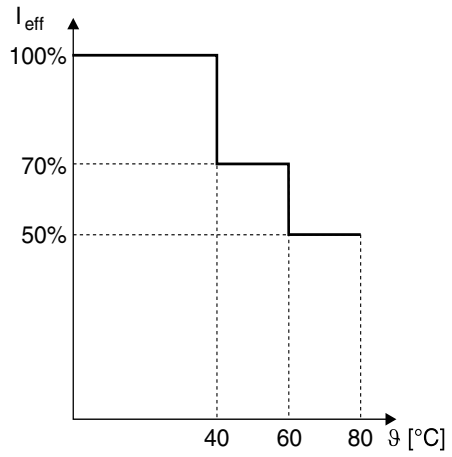

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Terminal strip with cage clamps

Unit designation /KCC

Description In this additional feature, the conventional way of connection to the bolts of the terminal board is replaced by a terminal strip.

Star or delta connection is implemented by one jumper for star connection and three jumpers for delta connection in the middle of the terminal strip. The 4 jumpers are included in the scope of delivery.

In a brakemotor, more terminal strips can be used as option for connecting the brake.

/KCC In addition to the only connection option of the motor, 6 times winding + 1 PE, two options are available when connecting brakemotors.

1. Seven terminal strips, 6 times winding + 1 PE. The brake is connected directly, not via the terminal strip.
2. Ten terminal strips, 6 times winding + 1 PE and additionally three terminals for the brake, prewired in the terminal box to the SEW rectifier, or only the terminal strip for supplying the BE brake by a rectifier in the control cabinet.

The auxiliary terminals, for example for thermal motor protection, are basically connected separately and not via the terminal strip.

Technical data for terminal strip with cage clamps

/KCC The KCC terminal strip replaces the conventional terminal board in the terminal box.

Terminal strip	KCC
For motor sizes	71 - 132
Number of terminals	6 + PE (motor) 10 + PE (brakemotor)
Contact connection	Cage clamp
Core cross section (max.)	4 mm^2 rigid 4 mm^2 flexible 2.5 mm^2 with conductor end sleeve
Connection	1 × star jumper or 3 × delta jumper in the middle of the terminal strip
Max. voltage / (CSA) [V]	AC 720 (600)
Max. contact rating [A_{eff}]	Terminal: 28 (20) Jumper: 24 (20)
Power range [kW]	Up to 9.2
Degree of protection	According to motor IP54 Optional IP55 – IP66
Ambient temperature [°C]	-40 to +60

C1 profile (VDI guideline 3643) compliant connection of the DR.80 overhead trolley system

Unit designation /KC1

Description VDI guideline 3643 contains a profile for overhead trolley systems, the so-called C1 profile.

The DR.80 motor meets this guideline with the additional feature /KC1 in terminal box positions R (0°), L (180°) and T (270°), all cable entries (X, 1, 2, 3).

Terminal box design for DRS71S and DRS71M is not necessary but can be mounted.

/KC1 The terminal box for the KC1 additional feature differs from the connection in the standard motor or brakemotor terminal box.

The 3 cable entries are integrated in the high cover of the KC1.

A terminal strip is used for connection.

- 3 terminals for the motor power
- 3 terminals for the brake
- 2 terminals for an electrical additional feature (e.g. for TF)

The maximum cross section that can be connected is 2.5 mm^2 per terminal.

Technical data for C1 profile (VDI guideline 3643) compliant connection of the DR.80 overhead trolley system

/KC1 The C1 profile compliant terminal box KC1 with terminal strip replaces the conventional terminal board in the terminal box of the standard DRS/DRE80 + BE, optionally also available for DRS71 + BE.

C1 profile	KC1
For motor sizes	80 (71)
Number of terminals	8 + PE (motor + brakemotor)
Contact connection	Cage clamp
Core cross section (max.)	2.5 mm^2 rigid 2.5 mm^2 flexible 1.5 mm^2 with conductor end sleeve
Connection	Delivery condition: Star The connection type can be changed by the customer
Max. voltage / (CSA) [V]	AC 500 (600/300)
Max. contact rating [A_{eff}]	Terminal: 24 (5/20)
Power range [kW]	Up to 1.1
Degree of protection	According to motor IP54 Optional IP55 – IP66
Ambient temperature [°C]	-40 °C to +60 °C

10.3 Ventilation

Forced cooling fan

Unit designation /V Standard design

Description A forced cooling fan is installed in order to ensure motor cooling independent of the motor speed. This means the motor can permanently deliver the full rated torque at small speeds without the risk that the motor will overheat.

With forced cooling, the PVC fan installed as standard on the motor shaft is removed.

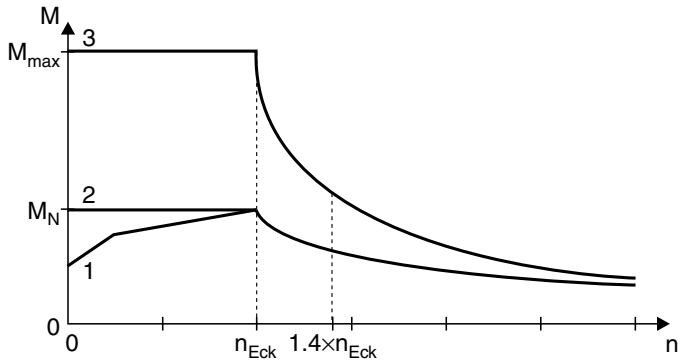
The cooling effect is at least equivalent with self-ventilation.

The metal cover of the forced cooling fan has the DR typical octagonal shape instead of the cylindrical shape. The length of the forced cooling fan guard varies depending on the motor options, such as brake or encoder. This also applies to the punched grooves, for example in the case of manual brake release.

/V The motors can be equipped with a forced cooling fan if required. A forced cooling fan is usually not required for motors operated on the supply system in continuous duty. SEW-EURODRIVE recommends a forced cooling fan for the following applications:

- Drives with high starting frequency
- Drives with additional flywheel mass Z (flywheel fan)
- Inverter drives with a setting range ≥ 1:20
- Inverter drives that have to produce the rated torque at low speeds or even at standstill.

The following figure shows a typical speed-torque characteristic for a dynamic inverter drive, for example with MOVIDRIVE® MDX61B with DEH11B option in CFC operating mode.



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M_N	= Rated torque of the motor	1	= With self-cooling
M_{max}	= Maximum torque of the motor	2	= With forced cooling
n_{base}	= Rated speed (base speed) of the motor	3	= Maximum torque

A forced cooling fan must be used if the load torque in the range 0 – n_{base} is above curve 1. The motor becomes thermally overloaded without forced cooling.

Combination with encoders

The forced cooling fan V can be combined with all encoders described in section "Additional feature - Encoder" on page 285 ff .

Please take into account that the overall drive might become longer.

Combination with MOVIMOT®

Combining the forced cooling fan V with MOVIMOT® is a novelty. In this way, the full motor torque can be achieved across the entire speed setting range.

A special design of the forced cooling fan directs part of the cooling air flow to the heat sink of MOVIMOT® where it develops its effectiveness.

Technical data for forced cooling fan

/V

For 50 Hz supply system frequency, voltage range 230 V

Forced cooling fan type			**V**				
For motor size DR			71	80	90	100	112/132
Supply voltage	**[V_{AC}]**	1~ △ ⅄	1 × 230 - 277 3 × 200 - 290 3 × 346 - 500				
Frequency	**[Hz]**		50				
Current consumption	**[A_{AC}]**	1~ △ ⅄	0.099 0.095 0.046	0.104 0.09 0.045	0.3 0.34 0.19	0.31 0.35 0.19	0.31 0.33 0.18
Max. power consumption	**[W]**		30	29	97	100	95
Air discharge rate	**[m^3/h]**		60		170	210	295
Ambient temperature	**[°C]**		-20 to +60				
Degree of protection			IP66				
Electrical connection			Terminal block in terminal box with 6 M4 bolts Connection 1~ with included running capacitor C_B				
Max. cable cross section	[mm^2]		4 × 1.5				
Thread for cable gland			1 × M16 × 1.5				
Additional weight	**[kg]**		1.7	1.9	2.1	2.1	DR.112: 2.35 DR.132: 2.35

Forced cooling fan type			**V**			
For motor size DR			160	180	200 / 225	315
Supply voltage	**[V_{AC}]**	1~ △ ⅄	1 × 230-277 3 × 200-290 3 × 346-500	1 × 230 - 277 3 × 220 - 330 3 × 380 - 575		
Frequency	**[Hz]**		50			
Current consumption	**[A_{AC}]**	1~ △ ⅄	0.39 0.44 0.24	0.45 0.52 0.29	- 0.68 0.39	- 0.87 0.50
Max. power consumption	**[W]**		138	159	200	255
Air discharge rate	**[m^3/h]**		450	780	1350	2500
Ambient temperature	**[°C]**		-20 to +60			
Degree of protection			IP66			
Electrical connection			Terminal block in terminal box with 6 M4 bolts Connection 1~ with included running capacitor C_B			
Max. cable cross section	**[mm^2]**		4 × 1.5			
Thread for cable gland			1 × M16 × 1.5			
Additional weight	**[kg]**		3.75	6.65	DR.200: 8.5 DR.225: 8.5	9.65

Voltage range DC 24 V

Forced cooling fan type			V				
For motor size DR			71	80	90	100	112/132
Supply voltage	[V_{DC}]		DC 24 V				
Current consumption	[A]		0.35	0.5	0.75	0.75/1.1	1.64
Max. power consumption	[W]		10	12	14	14/19	29
Air discharge rate	[m^3/h]		60		170	210	295
Ambient temperature	[°C]		-20 to +60				
Degree of protection			IP66				
Electrical connection			Terminal strip				
Max. cable cross section	[mm^2]		3×1.5				
Thread for cable gland			$1 \times M16 \times 1.5$				
Additional weight	[kg]		1.7	1.9	2.1	2.1	DR.112: 2.35 DR.132: 2.35

Additional flywheel mass

/Z

The motor can be equipped with additional flywheel mass Z, the flywheel fan, to achieve smooth startup and braking behavior of motors operated on the supply system. The fan gives the motor an additional mass moment of inertia J_Z. The flywheel fan is replaced with the standard fan, the outer motor dimensions remain the same. It can be installed on motors with and without a brake.

Note the following points:

- Check the switching frequency. Multiply the permitted no-load switching frequency Z_0 with the factor 0.8 or use a forced cooling fan.
- Use the total mass moment of inertia $J_{ges} = J_{mot} + J_Z$ at the motor end.
- Countercurrent braking and movement against end stop are not permitted.
- Not available in vibration grade B.

Technical data for additional flywheel mass

Unit designation */Z*

Description The flywheel fan is used instead of the PVC or aluminum fan. It increases the mass moment of inertia of the rotor so that the motor responds smoother to acceleration or braking torques.

/Z

For motor	J_Z [10^{-4} kgm^2]	J_{Mot} [10^{-4} kgm^2]	$J_{Mot} + J_Z$ [10^{-4} kgm^2]	Mass m_Z [kg]
DR.71S4	21.3	4.9	26.2	1.3
DR.71M4		7.1	28.4	
DR.80S4	37.9	14.9	52.8	1.8
DR.80M4		21.5	59.4	
DR.90M4	100	35.5	135.5	3.4
DR.90L4		43.5	143.5	
DR.100M4	135	56	191	3.5
DR.100L4	150	68	218	3.8
DR.100LC4		90	240	
DR.112M4	200	146	346	4.5
DR.132S4		190	390	
DR.132M4	300	255	555	6.4
DR.132MC4		340	640	
DR.160S4	500	370	870	7.3
DR.160M4		450	950	
DR.160MC4		590	1090	

/EI7. The magnet ring in the fan of the built-in encoder increases the mass moment of inertia.

Take into account the mass moment of inertia of the magnet ring fan when determining the permitted switching frequency, see page 314.

For motor	J_{EI7} [10^{-4} kgm^2]	J_{Mot} [10^{-4} kgm^2]	J_{PA} [10^{-4} kgm^2]	$J_{Mot} + J_{EI7}$ [10^{-4} kgm^2]	Ratio [%]	Mass m_{EI7} [kg]
DR.71S4	2.68	4.9	0.34	7.2	148	0.17
DR.71M4		7.1		9.4	133	
DR.80S4	3.31	14.9	0.97	17.2	116	0.21
DR.80M4		21.5		23.8	111	
DR.90M4	11.44	35.5	1.32	45.6	129	0.43
DR.90L4		43.5		53.6	123	
DR.100M4		56		66.1	118	
DR.100L4		68		78.4	115	
DR.100LC4		90		100	111	
DR.112M4	15.66	146	1.28	160	110	0.51
DR.132S4		190		204	108	
DR.132M4		255		269	106	
DR.132MC4		340		354	104	

Metal fan

Unit designation /AL

Description The metal fan is used instead of the PVC fan if the expected ambient temperature exceeds +60 °C or drops below -20 °C.

It will be set as standard for ATEX motors category 2 and 3 (/2GD and /3GD) as soon as ATEX certification has been obtained for the DR motors.

/AL The metal fan is used instead of the PVC fan if the expected ambient temperature exceeds +60 °C or drops below -20 °C.

It will be set as standard for ATEX motors category 2 and 3 (/2GD and /3GD) as soon as ATEX certification has been obtained for the DR motors.

Temperature: -40 °C to +100 °C

Using the metal fan is mandatory if the upper or lower limit of the permitted temperature range of the PVC fan of -20 °C to +60 °C is exceeded.

Ambient Temperature [°C]	**-40**	**-20**	**0**	**20**	**40**	**60**	**80**	**100**

Take into account the mass moment of inertia of the metal fan when determining the permitted switching frequency, see the following table.

Technical data for metal fan

/AL Mass moments of inertia of the metal fan:

Motor	J_{AL} [10^{-4} kgm·]	J_{Mot} [10^{-4} kgm·]	J_{PA} [10^{-4} kgm·]	$J_{Mot} + J_{AL}$ [10^{-4} kgm·]	Ratio [%]	Mass m_{AL} [kg]
DR.71S	2.69	4.9	0.33	7.26	148	0.18
DR.71M		7.1		9.46	133	
DR.80S	4.50	14.9	0.97	18.4	124	0.25
DR.80M		21.4		24.9	117	
DR.90M	6.97	35.4	1.32	41	116	0.32
DR.90L		43.7		49.3	113	
DR.100M		56		61.6	110	
DR.100L		68.3		73.9	108	
DR.100LC		89.8		95.4	106	
DR.112M	15.5	146	5.55	161.5	110	0.48
DR.132S		190		205.5	108	
DR.132M		255		270.5	106	
DR.132MC		340		355.5	105	
DR.160M	61.2	450	5.97	511.2	114	0.96
DR.160MC		590		651	110	
DR.180M	117	1110	16.27	1227	111	1.5
DR.180LC		1680		1797	107	
DR.200L	121	2360	16.85	2481	105	1.56
DR.225S		2930		3051	104	
DR.225M		3430		3551	104	
DR.225MC		4330		4451	103	
DR.315K	370	18400	86.47	18770	102	3.48
DR.315S		22500		22870	102	
DR.315M		27900		28270	101	
DR.315L		31900		32270	101	

The bigger the motor size, the less influencing the aluminum fan becomes.

Protection canopy

Unit designation /C

Description The canopy is used to prevent the ingress of foreign particles into the fan guard. It is particularly used for vertical mounting positions.

The protection canopy can be retrofitted to the fan guards.

The PVC elements are made of conductive PVC. This means they are also permitted for use in explosion-proof drives because they do not cause static charge in the protection canopy.

/C Liquids and/or solid foreign objects can penetrate the air outlet openings of motors in a vertical mounting position with their input shaft pointing downwards. SEW-EURODRIVE offers the motor option protection canopy C for this purpose.

AC brakemotors in a vertical mounting position with the output shaft pointing downwards must be ordered with protection canopy C. The same applies to motors in a vertical mounting position installed in the open.

Technical data for protection canopy

/C For additional lengths due to the protection canopy, refer to the motor dimension sheets on page 107 ff.

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Non-ventilated design

Unit designation	/U or /OL
Description	*Design /U:* This non-ventilated type is implemented by leaving out the fan (empty fan guard, protruding shaft end). *Design /OL:* In this type, the B endshield is closed and there is no fan and fan guard. This design prevents the ingress of dirt, water, etc. into the motor. Dust cannot be dispersed either. Own rotors are provided due to the design. In combination with the brake, the input shaft is not separated directly behind the bearing but behind the seat of the carrier. The closing cap is inserted in the magnets of the brake.
/U, /OL	In both additional variants, the motor/brakemotor is no longer self-cooled. With the remaining convection cooling, the motor/brakemotor must only be operated with a reduced load or in an intermittent periodic duty mode. The non-ventilated motor usually has half the rated power of the self-cooled motor. For questions, please contact your contact partner for drives at SEW-EURODRIVE.

Air filter

Unit designation	/LF
Description	The air filter, a kind of fleece mat, is mounted in front of the fan guard. It can be easily removed and mounted again for cleaning purposes. The attached air filter avoids that dust and other particles drawn in by the air are distributed. It also prevents that the ducts between the cooling fins become clogged with dust.
/LF	The air filter protects the cooling fins from dirt or from becoming clogged in environments subject to dust. The air filter must be cleaned or replaced depending on the amount of dust in the environment. No maintenance intervals can be specified due to the individuality of each drive and the environment where it is installed.

Low-noise fan guard

Unit designation	/LN
Description	The noise of the motor/gearmotor is reduced by a special plate in the fan guard. The LN guards (Low Noise) are available for motor sizes DR.71 – DR.132 with and without BE brake. The noise is reduced by 5 – 8 dB(A).
/LN	Replacing a standard fan guard with a "Low Noise" variant does not affect project planning.

10.4 Vibration monitoring diagnostic unit

Diagnostic unit

Unit designation	/DUV
Description	DUV10A: Vibration diagnostics by means of vibration sensor The DUV10A diagnostic unit monitors roller bearings, gearings for imbalance, and possible damages. Vibration analysis is used to detect possible damages at an early stage. This device allows for permanent vibration monitoring. The condition and development of the damage can be directly read on the device, or can be visualized externally using switch outputs.
/DUV	The DUV measures the structure-borne noise and uses this value to calculate the frequency spectrum. The structure-born noise sensor and evaluation electronics are fully integrated in the diagnostic unit. The diagnostic unit is attached to the gearmotor or motor using a fastening element. The position where the diagnostic unit is installed depends on the objects to be monitored, gear unit/motor type and mounting position. The diagnostic unit can be used to monitor up to 5 different objects or 20 individual frequencies. The diagnostic unit can be used with both constant and variable speeds. When using variable speeds, a 0 - 20 mA current loop or a pulse signal must be supplied. The voltage supply is DC 24 V. As the unit requires a certain measuring time at constant speed depending on the setting and number of objects to be monitored, you should consult SEW-EURODRIVE for applications where this time is < 16 seconds.

Technical data for diagnostic units

/DUV10A

11860axx

Technical data	Value
Measuring range [g]	± 20
Frequency range [Hz]	0.125 - 500
Spectral resolution [Hz]	0.125 Hz
Diagnostic processes	FFT, envelope-FFT, trend analysis
Minimum measuring time [s]	8.0
Speed range [rpm]	12 - 3500
Operating voltage [V]	10 - 32
Current consumption at DC 24 V [mA]	100
Protection class	III
EMW	IEC 1000-4-2/3/4/6
Overload capacity [g]	100
Temperature range [°C]	-30 to +60
Degree of protection	IP67
Table continued on next page	
Housing materials	• Zinc die casting • Coating based on epoxy finish • Polyester membrane keypad
Electrical connection for supply and switching output	M12 plug connector Pin assignment: • Pin1 supply (+), brown • Pin2 switching output 2 (main alarm), white • Pin3 supply (-), blue • Pin4 switching output 2 (early warning), black • Pin5 speed input (0 - 20 mA or pulse), gray
Electrical connection for RS-323 communication	M8 plug connection
Certificates and standards	CE, UL

Part number of the basic unit

DUV10A diagnostic unit: 1406 6297

Options for DUV10A

Designation	Meaning	Part number
DUV10A-S	Configuration software	1406 6300
DUV10A-K-RS-232-M8	Cable (for software)	1406 6319
DUV10A-N24DC	Power supply unit	1406 6327
DUV10A-I	Pulse tester	1406 6335
DUV10A-K-M12-2m PUR	Cable with 1 connector, length 2 m	1406 6343
DUV10A-K-M12-5m PUR	Cable with 1 connector, length 5 m	1406 6351
DUV10A-K-M12-2m PVC	Cable with 1 connector, length 2 m	1326 6209
DUV10A-K-M12-5m PVC	Cable with 1 connector, length 5 m	1326 6217

Mounted on motor

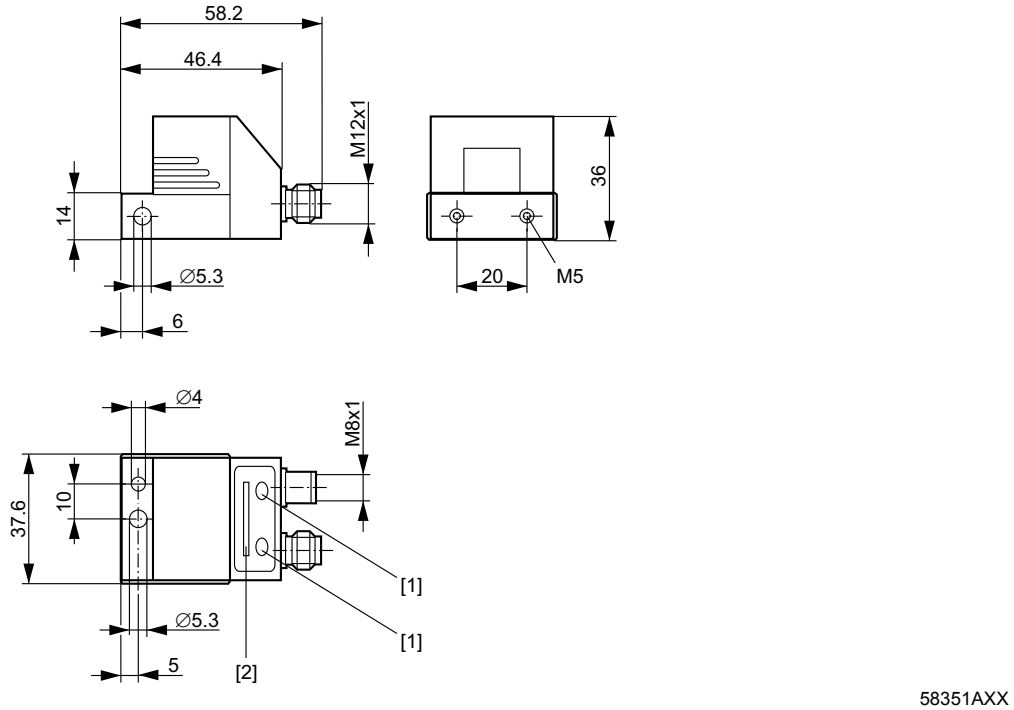
Fastening element for mounting the diagnostic unit to the motor.

The fastening element is mounted in the tapped hole for the eyebolt.

Fastening element	Assignment to the motor	Part number
M12	DR.160 - 180	1343 8425
M16	DR.200 - 225	1343 8441

10

Dimension drawing



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[1] Programming keys [2] LEDs

10.5 Other additional features

Second shaft end

Unit designation /2W

Description The 2nd shaft end allows to mount or couple elements to the B-side of the motor

The dimensions of the 2nd shaft end of the DR motor do not correspond to the market standard but are usually smaller.

/2W Motors / brakemotors of the DR series can optionally be equipped with a second shaft end.

In this case it is important that the total loads occurring at the first and second shaft end do not exceed the rated power values.

The axial load at the second shaft end is limited to 20 % of the overhung load like at the first shaft end but both loads may occur at the same time up to the limit value.

For overhung and axial load diagrams, refer to page 82 ff.

For motor dimension sheets, refer to page 107 ff.

Condensation drain hole

Unit designation /DH

Description The location of the condensation drain hole varies depending on the mounting position. The drain hole is located on the motor at the position nearest the center of the earth, at a point where the physical properties are favorable.

The position of the hole(s) depending on the mounting position is described in an appendix to the assembly instructions.

Up to degree of protection IP66, the condensation drain hole is sealed with a sealing element with labyrinth. It is always activated. Degree of protection IP66 is ensured.

/DH Motors / brakemotors of the DR series can optionally be equipped with a condensation drain hole.

Activation is not required due to the design of the locking piece. Removing the locking piece is not permitted, else the degree of protection cannot be ensured.

Motors / brakemotors in IP56 and IP66 already come equipped with condensation drain hole.

Reinforced insulation

Unit designation /RI

Description For motors operated on frequency inverters at voltages > 500 V, SEW-EURODRIVE recommends to use a reinforced winding.

The motor is dimensioned for star connection only.

/RI The additional feature reinforced insulation is recommended when motors are operated with frequency inverter at voltages exceeding AC 500 V.

These motors permit star connection only.

For permitted pulse voltages, refer to section "DR series AC motor on frequency inverter" on page 106.

Backstop

Unit designation /RS

Description The backstop is used to block a direction of rotation of the motor. The blocking direction is defined as seen onto the fan guard.

Specification of blocking direction:

CW (Clockwise)

CCW (Counterclockwise)

The backstop is installed instead of the brake.

The locking torque reaches at least double the maximum motor torque,

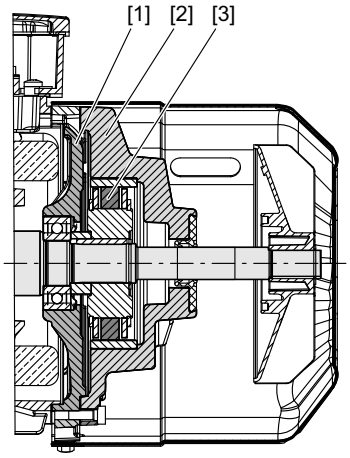
(Exception: DRS132MC4 only reaches 160 %).

Similar to the installation principle of the brake (integrated or premounted on a friction disk), the backstop can also be installed in different ways:

RS

The mechanical backstop is used for protecting equipment against reverse movement when the motor is switched off.

The figure below shows the design of the RS backstop.



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1 Brake endshield
2 RS housing
3 Sprag ring

Note: Specify the direction of rotation for the motor or gearmotor in your order.

Technical data for backstop

/RS

The RS backstop operates maintenance-free above the lift-off speed. Please consult SEW-EURODRIVE for operation below lift-off speed.

Motor sizes	Rated locking torque [Nm]	Lift-off speed of sprags [rpm]	Maximum speed	Ambient temperature
71	95	890	5000	-40 °C to +60 °C
80	130	860		
90 / 100	370	750		
112 / 132	490	730		
160	700	700		
180	1400	610		
200 / 225	2500	400	4500	
315	6300	320	4000	

Current-insulated rolling bearings

Unit designation /NIB

Description For motor size 315, the B-side bearings 6319-J-C3 or 6322-J-C3 are available in current-insulated design. SEW-EURODRIVE recommends these bearings for operation of the motor on a frequency inverter.

Motors with relubrication device

Unit designation /NS

Description Motors of size 315 and with reinforced A-side bearing (/ERF) are supplied with relubrication device as standard.

The relubrication device is recommended for motors in vertical mounting positions or for continuous operation at speeds above 1800 rpm or increased ambient temperatures above 60°C.

For gearmotors, reinforced A-side bearings are only available for a few gear ratios. These gear ratios are marked in the speed-performance overview. The relubrication device is incorporated in the price.