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Cable specification

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Cable cross section and current carrying capacity

The cable cross section of the biggest core defines the cross section type of the cable.

Cable cross section and current carrying capacity

Cross section type code	Cable design	Inner cable type			Ø IEC / DIN EN 60228		Current carrying capacity	
		Power	Encoder	Hybrid	mm^2	AWG	A_{eff}	Reference
A	Basic	–	REG0012	–	0.5	20	–	Not relevant for encoder cables
			REG0013					
	Torsion		REG0748					
			REG0712					
B	Basic	INK0670	–	REH0811	0.75	18	10.4	Rexroth Standard
C	Basic	REL0105	–	–	1.0	17	13.0	DIN VDE 0298-4 (table 11) T_{amb} = 40 °C TL = 90 °C
	Torsion	REL0753						
D	Basic	REL0106	–	REH0809	1.5	16	15.6	
E	Basic	REL0107	–	REH0810	2.5	14	22.6	
F	Basic	REL0108	–	–	4.0	12	29.5	
G	Basic	REL0109	–	–	6.0	10	38.2	
H	Basic	REL0110	–	–	10.0	8	53.0	
J	Basic	REL0111	–	–	16.0	6	71.3	

Cross section type code	Cable design	Inner cable type			Ø IEC / DIN EN 60228		Current carrying capacity	
		Power	Encoder	Hybrid	mm	AWG	A	Reference
K	Basic	REL0112	–	–	25.0	4	93.9	
L	Basic	REL0113	–	–	35.0	2	116	IEC 60364-5-52 T_{amb} = 40 °C, TL = 90 °C Installation type B
M	Basic	REL0114	–	–	(53.0)	AWG1/0	140	

For type codes of ready-made cables refer to ↘ “Type codes”

Cable dimension

The cable sizes given in this document are only basic information for the selection of motor power cables. Select each power cable and the size of each cable segment according to the respective technical standards.

Observe the standards:

- DIN VDE 0298-4
- HD 60364-5-52 (harmonized EC standard)
- IEC 60364-5-52

Current carrying capacity and cross-section refer to an ambient temperature of + 40°C at the place of use. For higher or lower ambient temperatures, there are correction factors for the current carrying capacity of cables that either derate (higher ambient temperature) or increase (lower ambient temperature) the current carrying capacity. Corresponding correction factors can be found in the specified standards.

Observe technical standards and guidelines for installation and sizing that apply in the respective country and place of use, as well as the specific local conditions for installation and environment.

Transport and storage

Observe the following ambient conditions for transport, handling and storage of all cable types.

General conditions	Transport and handling	Storage
Technical standard	DIN EN IEC 60721-3-2	DIN EN IEC 60721-3-1
Classification	2K11, 2B1, 2C1, 2S5, 2M4	1K21, 1B1, 1C1, 1S10, 1M11
Deviations to classification groups		

General conditions	Transport and handling	Storage
Ambient temperature	-25 ... +70 °C	-25 ... +55 °C
Relative humidity	5 ... 75 %	5 ... 75 %
Absolute humidity	-	1 ... 29 g/m³
Direct sunlight exposure	Not allowed	Not allowed

General installation directives

All cable installations must comply with the standards and requirements applicable at the place of use as well as the specified guidelines of the machine manufacturer and its equipment. Incorrect or inadequate installation can lead to increased wear, damage or unsafe operation.

Observe the following handling instructions:

- Consult the product manual of the machine equipment or the manufacturer for information on the appropriate use and installation of cables, e. g. the suitable arrangement of cables within movable cable guides or rigid cable supports.
- Lay out the cables without any twisting before installation.
- Always install the cables twist-free
- Keep the specified allowed bending radius. Do not bend the cable.
- Install proper cables only.
- Avoid any kind of tensile load or excessive torsion load onto the cables (for torsion load limit refer to data sheet)
- Check that there is no voltage before disconnecting electrical connections. Disconnect electrical connections non-violently. Always pull the connector, never the cable.
- Observe the installation directives of the device manufacturers during installation of energy chains.
- Do not pack too many cables into movable or rigid cable carriers. Do not cross cables in moving or rigid cable trays.
- Maintain the minimum distances between power and encoder cables to maintain EMC immunity. Observe the installation directives for drive controllers specified in the respective documents.
- Only trained personnel may work on electrical equipment.
- Observe the safety instructions.

Cable carriers and drag chains

For cables and installations in moving energy chains or rigid cable trays, some additional guidelines must be followed.

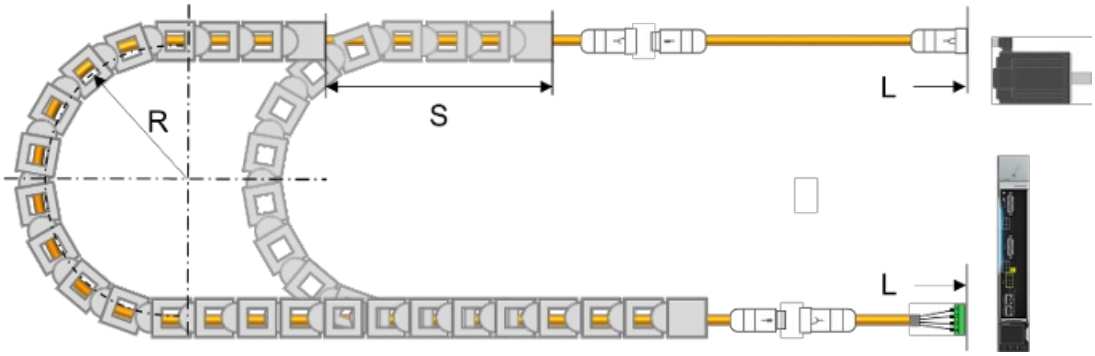

Fig. 3: Cables and cable carriers

Total cable lengths “L”

The cables between a motor and the drive controller are constructed from just one or more cable segments, combining motor cables with appropriate extension cables. The **total cable length "L"** comprises all cable segments from the drive controller to the motor.

The individual maximum cable length for a given motor-controller combination must not be exceeded. Refer to the particular documentation about drive-controllers for information about the maximum cable lengths.

Reducing the number of cable segments and keeping cable lengths as short as possible maintains noise immunity, operational reliability and helps reduce costs.

Travel length "S"

The cable parameters for dynamic movement (cable acceleration, traverse speed, traverse path and bending cycles) may only be applied over the **traverse path "S"** and may not be exceeded.

Bending radius “R”

The effective bending radius always refers to the inner radius of the bent cable and must never fall below the specific minimum radius, see corresponding cable data sheet. This applies to movable or rigid installations as well as to transport and storage.

If several cables with different bending radius are installed in the same cable carrier, the cable with the largest outer diameter defines the minimum bending radius for all cables in this carrier.

Bending cycles

A bending cycle is a complete movement cycle over the travel distance "S" or a shorter distance with one cable movement forward and one cable movement backward.

Parameter of movable cables

In moving installations, individual parameters for acceleration, travel speed and travel distance apply and influence each other. Exceeding one or more of these parameter limitations may result in permanent wear, damage and unsafe operation. Observe the following parameter limitations:

Parameter of movable cables

Cable type			Travel length distance (S)	Travel velocity	Acceleration	Bending cycles
Power cables	BASIC	Cross section ≤ 16 mm²	50 m	5 m/s	50 m/s²	see data sheet
		Cross section ≥ 25 mm²	20 m			
Encoder cables	BASIC		50 m	5 m/s	50 m/s²	
Power cable	TORSION		5 m	3 m/s	20 m/s²	
Encoder cables	TORSION		5 m	3 m/s	20 m/s²	
Hybrid cables	BASIC		20 m	4 m/s	30 m/s²	

The acceleration limits and the reference to the travel distance are given in the following diagram:

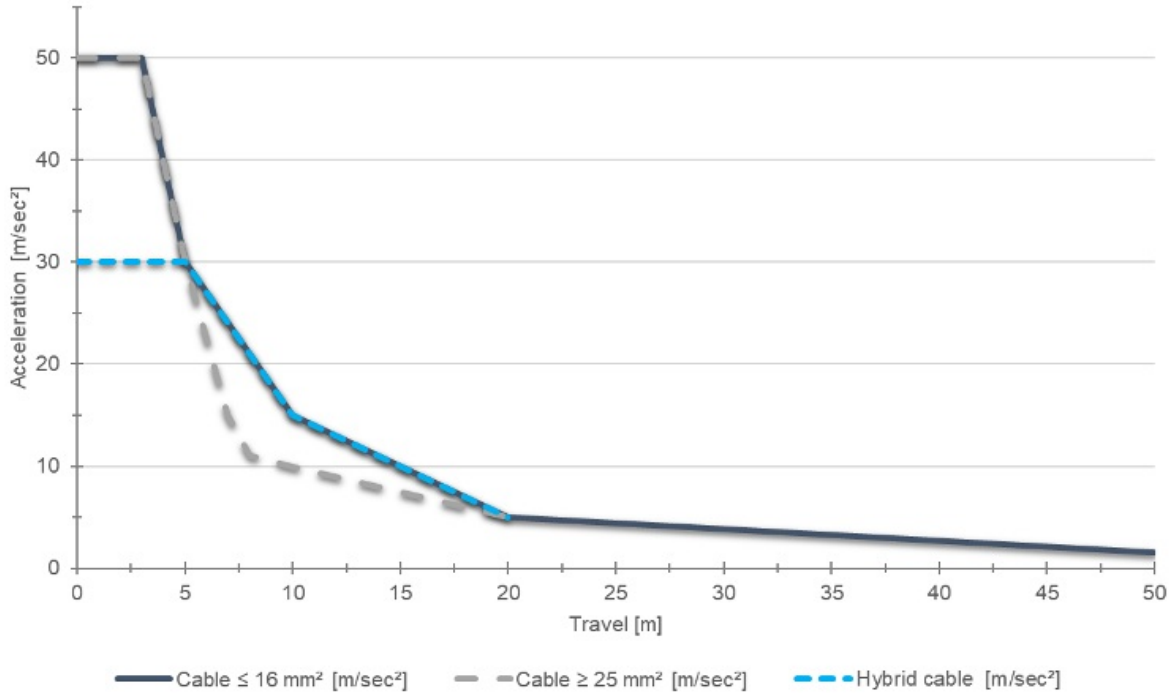

Fig. 4: Cable acceleration vs. Path

See single cable data sheets for complete specification.

Cable wear and lifetime

Cables are wear parts and suffer from mechanical, electrical, thermal and chemical stress. Lifetime is reduced when cables with different parameters than specified are used or subjected to conditions beyond the cable's individual specification, but may also improve under favorable conditions. There is no established method for predicting or calculating the effective useful life; it may vary in each individual case.

The standard lifetime parameters for cables are

- 30,000 operating hours
- 5 Mio bending cycles

These are only standard guideline values which vary depending on effective operating and environmental conditions and are therefore not valid for every possible application.

Cable length

Motor and encoder cable can be up to 75 m long. The effectively used cable length may vary depending on the individual combination of drive equipment, operating parameters, additional components and local installation conditions. For information about possible lenghts limitations refer to the documentation of the drive controller.

- The maximum cable length allowed for a specific motor-controller combination applies to the total length of all cable segments of this axis. Additional cable extensions must not exceed the permitted maximum length of the total cable run.
- Observe the guidelines in the drive controller documentation and do not exceed specified limitation values. ↘ “Further documentation”

Exceeding the allowed cable length for the specified equipment may cause an unsafe operating condition. If you are in doubt about the permissible length for your individual configuration, contact your Bosch Rexroth sales partner.

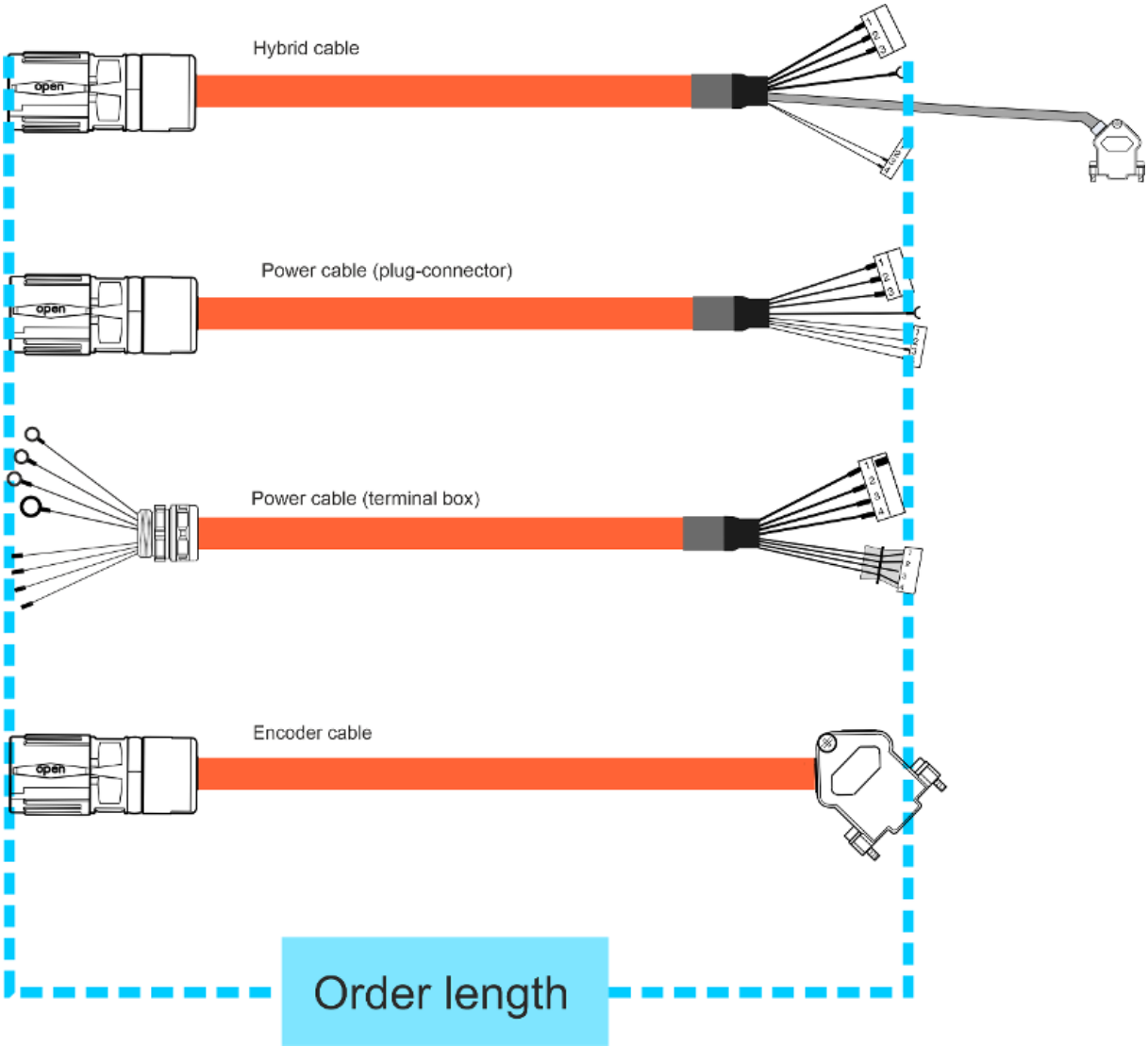

Fig. 5: Ordering length cable

Ordering length

Example:

RLB2-xxxxxx-NN-
(ordering length 60.5 m)

RLB2-xxxxxx-NN-060.5

The minimum orderable length is 0.5 m , the minimum length increment is 0.1 m. The effective order length of the cables is measured from end to end.

Tolerances

The cable length tolerance is only specified as a positive value.

Cable length ≤ 5 m	+ 0.05 m
Cable length > 5 m	+ 1% of the ordered length

Identification

Fig. 6: Example of cable type plate

Maintenance

To maintain operational safety and the service life, observe the following cable maintenance procedures

- Regularly check all electrical cable connections and terminals for suitable, tight and secure connection, corrosion, breakages, proper installation, etc. in accordance with technical standards and safety regulations.
- Regularly check all electrical cables for signs of wear, e.g. abrasion of the cable sheath or corkscrew deformation in the cable carrier, etc.
- Immediately replace cables and connectors that show signs of wear or damage. They cannot be operated safely under certain circumstances.
- During operation, cables dissipate heat along the entire length of the cable. Keep the cables clean of dirt and dust to help dissipate heat and avoid temperature-related derating effects or overheating.
- For all maintenance instructions and intervals, refer to the machine manufacturer's maintenance schedule.