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ПРИВОДЫ ПЕРЕМЕННОГО ТОКА НИЗКОВОЛЬТНЫЕ Техническое описание на электроприводы ACL30



Technical data

Contents of this chapter

This chapter contains the technical specifications of the drive, e.g. the ratings, sizes and technical requirements, and provisions for fulfilling the requirements for CE and other markings.

Drive specifications

Drive type ACL30-04...	Frame size	Typical motor power ¹ kW	Output ratings		Mains choke	EMC filter
			I_{2N} ² A	I_{2max} ³ A		
-06A0	B	2.2	6	11	CHK-02	JFI-02
-09A0	B	3	9	16	CHK-03	JFI-03
-013A	B	5.5	13	22	CHK-03	JFI-03
-017A	B	7.5	17	28	CHK-04	JFI-03
-023A	C	11	23	36	CHK-05 ⁴ /Internal	JFI-05
-030A	C	14	30	46	CHK-05 ⁴ /Internal	JFI-05
-050A	D	22	50	80	CHK-07 ⁴ /Internal	JFI-07
-070A	D	32	70	110	CHK-08 ⁴ /Internal	JFI-07

¹ To achieve the rated motor power as in the above table, the rated current of the drive must be higher than or equal to the rated motor current.

² I_{2N} Nominal output current at 40 °C (104 °F).

³ I_{2max} Maximum short-time output current. See [Cyclic loads](#) below.

⁴ Internal mains choke is an option for C and D frames.

Derating

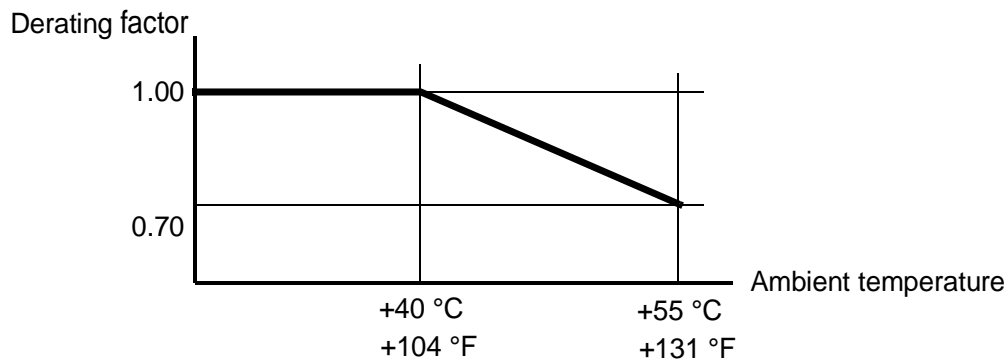
The continuous output currents stated above must be derated if any of the following conditions apply:

- the ambient temperature exceeds +40 °C (+104°F)
- the AC supply voltage is higher than 400 V
- the drive is installed higher than 1000 m above sea level.

Note: The final derating factor is a multiplication of all applicable derating factors.

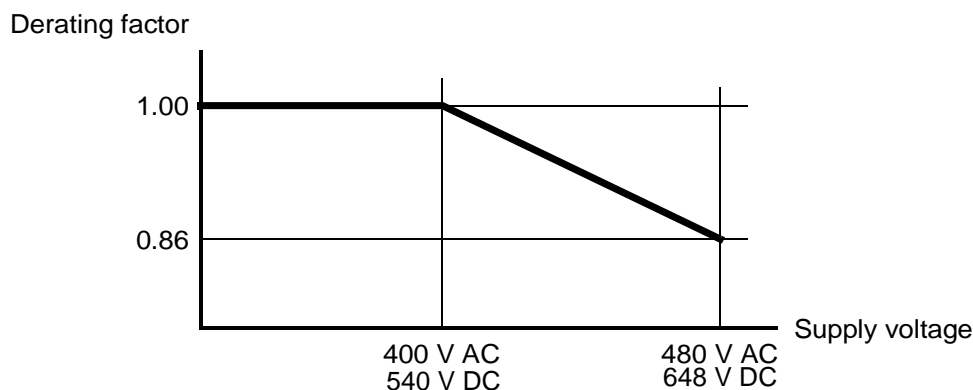
■ Ambient temperature derating

In the temperature range +40...55 °C (+104...131 °F), the rated output current is derated by 1% for every added 1 °C (1.8 °F) as follows:



■ Supply voltage derating

With supply voltages above 400 V AC or 540 V DC, the continuous output current is derated linearly as follows:



■ Altitude derating

At altitudes from 1000 to 4000 m (3300 to 13123 ft) above sea level, the derating is 1% for every 100 m (328 ft). For a more accurate derating, use the DriveSize PC tool.

Note: If the installation site is higher than 2000 m (6600 ft) above sea level, connection of the drive to an ungrounded (IT) or corner-grounded delta network is not allowed.

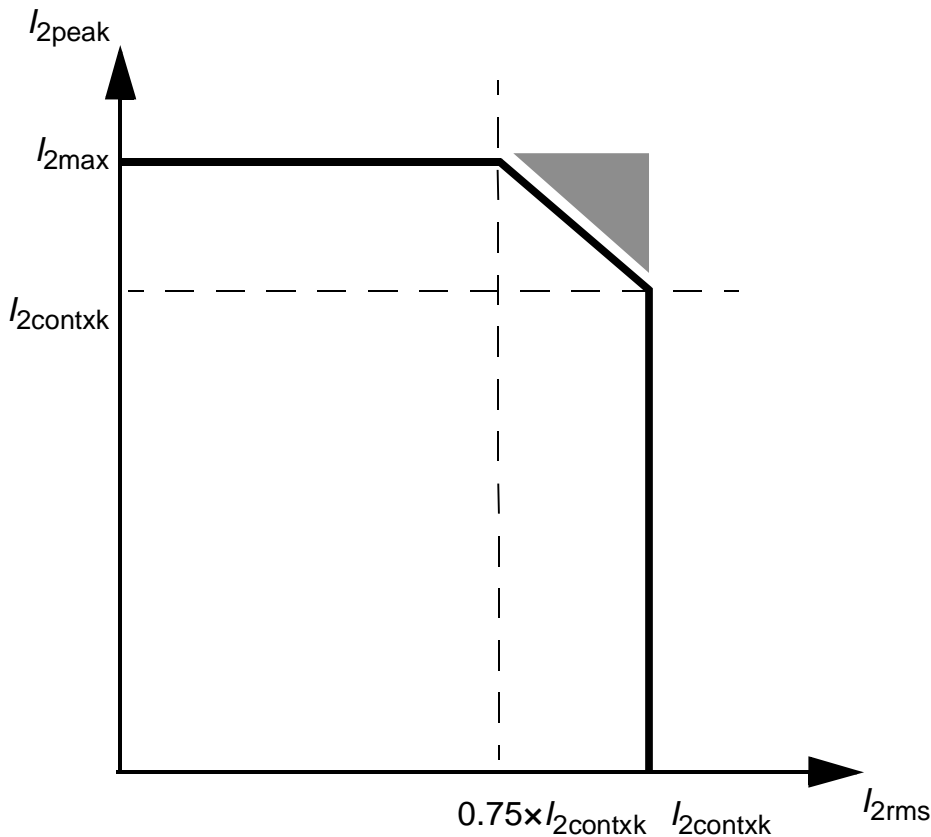
Cyclic loads

If the load cycle is shorter than 10 seconds, the thermal time constant of the heatsink (approximately 80 seconds) can be ignored, and the following procedure can be applied to find out whether the drive can handle the cycle.

1. Determine the rms value (I_{2rms}) of the output current over the whole load cycle.
2. Determine the maximum instantaneous rms value (I_{2peak}) of the output current during the load cycle.
3. Determine the point (I_{2rms} , I_{2peak}) on the graph below.

If the point falls within the region bordered by a solid line, the load cycle is safe. For $I_{2contxk}$ and I_{2max} , use the ratings stated for the drive type and switching frequency used.

If the point falls within the shaded area, a more detailed study is required.



The above procedure can also be applied to longer load cycles by dividing the cycle into subcycles no longer than 10 seconds. If any of the subcycles fail the test, a more detailed study is required.

Dimensions and weights

Frame size	Height (without cable clamp plates)	Height (with cable clamp plates)	Width	Depth (without options installed on JCU)	Depth (with options installed on JCU)	Weight
	mm (in.)	mm (in.)		mm (in.)	mm (in.)	
B	380 (14.96)	476 (18.74)	100 (3.94)	223 (8.78)	246 (9.69)	4.8 (10.6)
C	467 (18.39)	558 (21.97)	165 (6.50)	225 (8.85)	248 (9.76)	10 (22.0)
D	467 (18.39)	644 (25.34)	220 (8.66)	225 (8.85)	248 (9.76)	17 (37.5)

Note: The wiring to the I/O options requires some 50 mm (2") of additional depth.

Noise levels

Frame size	Noise level dBA
B	39
C	40
D	40

Supply cable fuses

Fuses for short circuit protection of the supply cable are listed below. The fuses also protect the adjoining equipment of the drive in case of a short circuit. Check that the operating time of the fuse is below 0.5 seconds. The operating time depends on the supply network impedance and the cross-sectional area and length of the supply cable. See also chapter [Planning the electrical installation](#).

Note: Fuses with a higher current rating must not be used.

Drive type ACL30-04...	Input current (A)	IEC fuse			UL fuse			Cross-sectional area of cable	
		Rated current (A)	Voltage (V)	Class	Rated current (A)	Voltage (V)	UL Class	mm ²	AWG
-06A0	7.0*	10	500	gG	10	600	T	1.5 ... 4	16...12
-09A0	10.5*	16	500	gG	15	600	T	1.5 ... 10	16...8
-013A	15.2*	20	500	gG	20	600	T	1.5 ... 10	16...8
-017A	19.8*	25	500	gG	25	600	T	1.5 ... 10	16...8
-023A	17.7	25	500	gG	25	600	T	6 ... 35	9...2
-030A	23.0	32	500	gG	35	600	T	6 ... 35	9...2
-050A	41.8	50	500	gG	50	600	T	10 ... 70	6...2/0
-070A	58.4	80	500	gG	80	600	T	10 ... 70	6...2/0

*Without mains choke

AC input (supply) connection

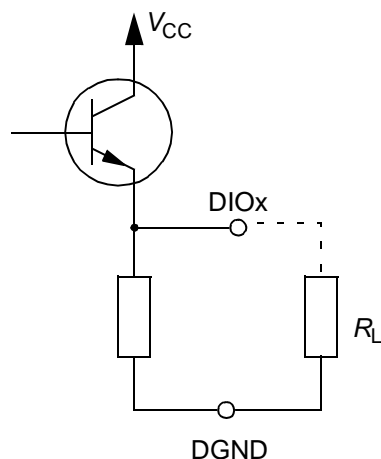
Voltage (U_1)	180...480 V AC 3-phase
Frequency	50...60 Hz $\pm 5\%$
Network type	Grounded (TN, TT) or ungrounded (IT). Note: If the installation site is higher than 2000 m (6600 ft) above sea level, connection of the drive to an ungrounded (IT) or corner-grounded delta network is not allowed.
Imbalance	Max. $\pm 3\%$ of nominal phase to phase input voltage
Fundamental power factor (cos ϕ_1)	0.98 (at nominal load)
Terminals	Frame B: Detachable screw terminal block for 0.5...6 mm ² wire. Frames C and D: Screw lugs for 6...70 mm ² wire included. Suitable crimp lugs can be used instead.

Motor connection

Motor types	Asynchronous induction motors, synchronous permanent magnet motors
Frequency	0...500 Hz
Current	See section Drive specifications .
Switching frequency	Selectable between 4 ... 12 kHz.
Maximum motor cable length	50 m (164 ft) with screened cable 75 m (246 ft) with unscreened cable
Terminals	Frame B: Detachable screw terminal block for 0.5...6 mm ² wire. Frames C and D: Screw lugs for 6...70 mm ² wire included. Suitable crimp lugs can be used instead.

JCU Control Unit

Power supply	24 V (±10%) DC, 1.6 A Supplied from the power unit of the drive, or from external power supply through connector X1 (pitch 3.5 mm, wire size 1.5 mm ²).
Relay output (X2)	Connector pitch 5 mm, wire size 2.5 mm ² 250 V AC / 30 V DC, 2 A Protected by varistors
Digital inputs DI1...DI6 (X3)	Connector pitch 3.5 mm, wire size 1.5 mm ² Logic levels: "0" < 5 V, "1" > 15 V R_{in} : 2.0 kohm Filtering: Adjustable, 0.25 ms min. (see also <i>Firmware Manual</i>)
Digital inputs/outputs DIO1...DIO3 (X3). Input/output mode selection by parameters. DIO2 can be configured as a frequency input (0...32 kHz). DIO3 can be configured as a frequency output. See parameter group 12.	Connector pitch 3.5 mm, wire size 1.5 mm ² <u>As inputs:</u> Logic levels: "0" < 5 V, "1" > 15 V R_{in} : 2.0 kohm Filtering: Adjustable, 0.25 ms min. (see also <i>Firmware Manual</i>) <u>As outputs:</u> Total output current limited by auxiliary voltage outputs to 200 mA Output type: Open emitter



Analogue inputs AI1 and AI2 (X4). Current/voltage input mode selection by jumpers. See page 71 .	Connector pitch 3.5 mm, wire size 1.5 mm ² Current input: -20...20 mA, R_{in} : 100 ohm Voltage input: -10...10 V, R_{in} : 200 kohm Differential inputs, common mode ± 20 V Sampling interval per channel: 0.25 ms Filtering: Adjustable, 0.25 ms min. Resolution: 11 bit + sign bit Inaccuracy: 1% of full scale range
Thermistor input (X4)	Connector pitch 3.5 mm, wire size 1.5 mm ² Input devices: PTC or KTY84 thermistor Up to three PTCs can be connected in series KTY84 thermistor: Inaccuracy 5 °C No safety insulation (see page 72)
Analogue outputs AO1 and AO2 (X4)	Connector pitch 3.5 mm, wire size 1.5 mm ² AO1 (current): 0...20 mA, $R_{load} < 500$ ohm AO2 (voltage): -10...10 V, $R_{load} > 1$ kohm Frequency range: 0...800 Hz Resolution: 11 bit + sign bit Inaccuracy: 2% of full scale range
Reference voltage (VREF) for analogue inputs	Connector pitch 3.5 mm, wire size 1.5 mm ² 10 V $\pm 1\%$ and -10 V $\pm 1\%$, $R_{load} > 1$ kohm
Drive to drive link (X5)	Connector pitch 3.5 mm, wire size 1.5 mm ² Physical layer: RS-485 Termination by jumper
Safe Torque Off connection (X6)	Connector pitch 3.5 mm, wire size 1.5 mm ² For the drive to start, both connections (OUT1 to IN1, and OUT2 to IN2) must be closed
Control panel / PC connection (X7)	Connector: RJ-45 Cable length < 3 m

Efficiency

Approximately 98% at nominal power level

Ambient conditions

Environmental limits for the drive are given below. The drive is to be used in a heated, indoor, controlled environment.

	Operation installed for stationary use	Storage in the protective package	Transportation in the protective package
Installation site altitude	0 to 4000 m (6600 ft) above sea level.	-	-
Air temperature	-10 to +55°C (14 to 131°F). No frost allowed.	-40 to +70°C (-40 to +158°F)	-40 to +70°C (-40 to +158°F)
Relative humidity	0 to 95%	Max. 95%	Max. 95%
	No condensation allowed. Maximum allowed relative humidity is 60% in the presence of corrosive gases.		
Contamination levels (IEC 60721-3-3, IEC 60721-3-2, IEC 60721-3-1)	No conductive dust allowed.		
	According to IEC 60721-3-3: Chemical gases: Class 3C2 Solid particles: Class 3S2 The drive must be installed in clean air according to enclosure classification. Cooling air must be clean, free from corrosive materials and electrically conductive dust.	According to IEC 60721-3-1: Chemical cases: Class 1C2 Solid particles: Class 1S2	According to IEC 60721-3-2: Chemical cases: Class 2C2 Solid particles: Class 2S2
Sinusoidal vibration (IEC 60721-3-3)	Tested according to IEC 60721-3-3, mechanical conditions: Class 3M4 2...9 Hz: 3.0 mm (0.12") 9...200 Hz: 10 m/s ² (33 ft/s ²)	-	-
Shock (IEC 60068-2-27, ISTA 1A)	-	According to ISTA 1A. Max. 100 m/s ² (330 ft/s ²), 11 ms	According to ISTA 1A. Max. 100 m/s ² (330 ft/s ²), 11 ms
Free fall	Not allowed	76 cm (30")	76 cm (30")

Materials

Drive enclosure	<ul style="list-style-type: none">• PC/ABS, colour NCS 1502-Y (RAL 9002 / PMS 420 C)• hot-dip zinc coated steel sheet• extruded aluminium AlSi.
Packaging	Corrugated cardboard, PP bands.
Disposal	<p>The drive contains raw materials that should be recycled to preserve energy and natural resources. The package materials are environmentally compatible and recyclable. All metal parts can be recycled. The plastic parts can either be recycled or burned under controlled circumstances, according to local regulations. Most recyclable parts are marked with recycling marks.</p> <p>If recycling is not feasible, all parts excluding electrolytic capacitors and printed circuit boards can be landfilled. The DC capacitors contain electrolyte, which is classified as hazardous waste within the EU. They must be removed and handled according to local regulations.</p> <p>For further information on environmental aspects and more detailed recycling instructions, please contact your local ABB distributor.</p>

Applicable standards

	The drive complies with the following standards. The compliance with the European Low Voltage Directive is verified according to standards EN 50178 and EN 60204-1.
EN 50178 (1997)	Electronic equipment for use in power installations
IEC 60204-1 (2005), modified	Safety of machinery. Electrical equipment of machines. Part 1: General requirements. <i>Provisions for compliance:</i> The final assembler of the machine is responsible for installing <ul style="list-style-type: none">- an emergency-stop device- a supply disconnecting device- the ACL30 into a cabinet.
EN 60529: 1991 (IEC 60529)	Degrees of protection provided by enclosures (IP code)
IEC 60664-1 (2007), Edition 2.0	Insulation coordination for equipment within low-voltage systems. Part 1: Principles, requirements and tests.
IEC 61800-3 (2004)	Adjustable speed electrical power drive systems. Part 3: EMC requirements and specific test methods.
EN 61800-5-1 (2003)	Adjustable speed electrical power drive systems. Part 5-1: Safety requirements. Electrical, thermal and energy <i>Provisions for compliance:</i> The final assembler of the machine is responsible for installing the ACL30 in a cabinet that is protected to IP2X (IP3X for top surfaces for vertical access).
prEN 61800-5-2	Adjustable speed electrical power drive systems. Part 5-2: Safety requirements. Functional

Compliance with EN 61800-3:2004

■ Definitions

EMC stands for **E**lectromagnetic **C**ompatibility. It is the ability of electrical/electronic equipment to operate without problems within an electromagnetic environment. Likewise, the equipment must not disturb or interfere with any other product or system within its locality.

First environment includes domestic premises. It also includes establishments directly connected without intermediate transformers to a low-voltage network which supplies buildings used for domestic purposes.

Second environment includes all establishments other than those directly connected to a low-voltage network which supplies buildings used for domestic purposes.

Drive of category C2. Power drive system with rated voltage less than 1000 V which is neither a plug-in device nor a movable device and, when used in the first environment, is intended to be installed and commissioned only by a professional.

Drive of category C3. Power drive system with rated voltage less than 1000 V, intended for use in the second environment and not intended for use in the first environment.

Drive of category C4. Power drive system with rated voltage equal to or above 1000 V, or rated current equal to or above 400 A, or intended for use in complex systems in the second environment.

■ First environment (drive of category C2)



WARNING! The drive may cause radio interference if used in a residential or domestic environment. The user is required to take measures to prevent interference, in addition to the requirements for CE compliance listed above.

The drive complies with the standard with the following provisions:

1. The drive is equipped with external EMC filter JFI-0x (optional accessory to be ordered separately, see chapter [EMC filters](#)).
2. The motor and control cables are selected as specified in chapter [Planning the electrical installation](#).
3. The drive is installed according to the instructions given in this manual.
4. Motor cable length does not exceed 50 metres (164 feet).

Note: It is not allowed to use the optional EMC filter in these conditions:

- on IT (ungrounded) systems, because the supply network gets connected to the ground potential through EMC filter capacitors which may cause danger or damage the drive.
- on a corner-grounded TN system as this would damage the drive.

■ Second environment (drive of category C3)

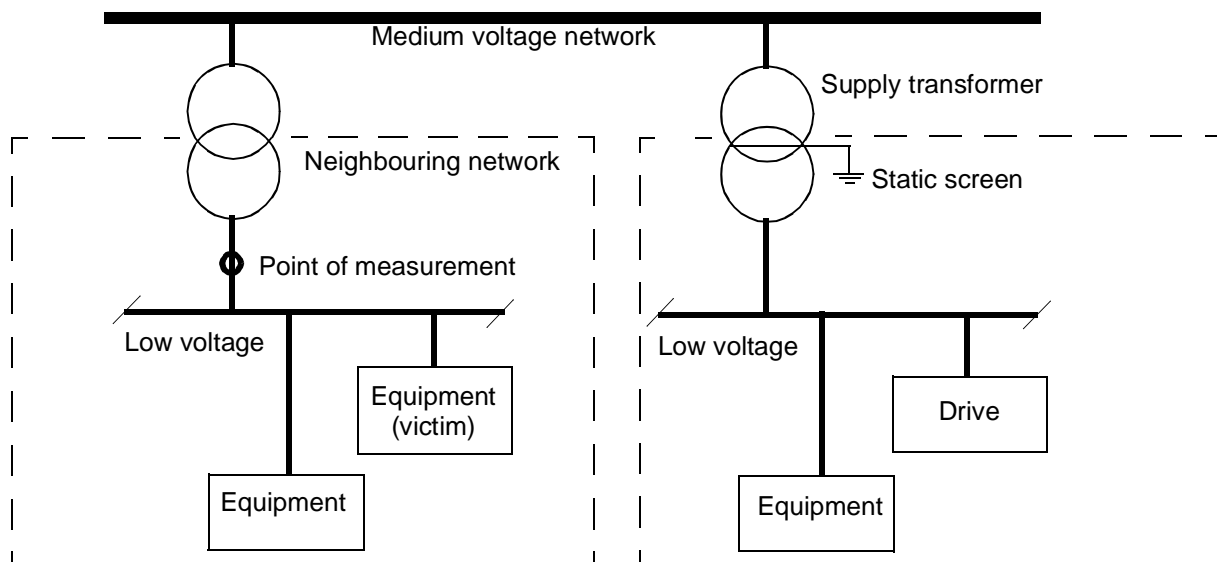
The drive complies with the standard with the following provisions:

1. The drive is equipped with optional mains filter JFI-xx.
2. The motor and control cables are selected as specified in chapter [Planning the electrical installation](#).
3. The drive is installed according to the instructions given in this manual.
4. Motor cable length does not exceed 50 metres (164 ft).

■ Second environment (drive of category C4)

The drive complies with the standard with the following provisions:

1. It is ensured that no excessive emission is propagated to neighbouring low-voltage networks. In some cases, the natural suppression in transformers and cables is sufficient. If in doubt, a supply transformer with static screening between the primary and secondary windings can be used.



2. An EMC plan for preventing disturbances is drawn up for the installation. A template is available from the local ABB representative.
3. The motor and control cables are selected as specified in chapter [Planning the electrical installation](#).
4. The drive is installed according to the instructions given in this manual.

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