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ПРИВОДЫ ПЕРЕМЕННОГО ТОКА НИЗКОВОЛЬТНЫЕ Техническое описание на преобразователи ACS350



Ratings

Current and power

The current and power ratings are given below. The symbols are described below the table.

Type ACS350- x = E/U ¹⁾	Input	Output				P_N		Frame size
	I_{1N}	I_{2N}	$I_{2,1min/10min}$	I_{2max}	kW			
	A	A	A	A				
1-phase $U_N = 200...240$ V (200, 208, 220, 230, 240 V)								
01x-02A4-2	6.1	2.4	3.6	4.2	0.37	0.5	R0	
01x-04A7-2	11.4	4.7	7.1	8.2	0.75	1	R1	
01x-06A7-2	16.1	6.7	10.1	11.7	1.1	1.5	R1	
01x-07A5-2	16.8	7.5	11.3	13.1	1.5	2	R2	
01x-09A8-2	21.0	9.8	14.7	17.2	2.2	3	R2	
3-phase $U_N = 200...240$ V (200, 208, 220, 230, 240 V)								
03x-02A4-2	4.3	2.4	3.6	4.2	0.37	0.5	R0	
03x-03A5-2	6.1	3.5	5.3	6.1	0.55	0.75	R0	
03x-04A7-2	7.6	4.7	7.1	8.2	0.75	1	R1	
03x-06A7-2	11.8	6.7	10.1	11.7	1.1	1.5	R1	
03x-07A5-2	12.0	7.5	11.3	13.1	1.5	2	R1	
03x-09A8-2	14.3	9.8	14.7	17.2	2.2	3	R2	
03x-13A3-2	21.7	13.3	20.0	23.3	3	3	R2	
03x-17A6-2	24.8	17.6	26.4	30.8	4	5	R2	
03x-24A4-2	41	24.4	36.6	42.7	5.5	7.5	R3	
03x-31A0-2	50	31	46.5	54.3	7.5	10	R4	
03x-46A2-2	69	46.2	69.3 ²⁾	80.9	11.0	15	R4	
3-phase $U_N = 380...480$ V (380, 400, 415, 440, 460, 480 V)								
03x-01A2-4	2.2	1.2	1.8	2.1	0.37	0.5	R0	
03x-01A9-4	3.6	1.9	2.9	3.3	0.55	0.75	R0	
03x-02A4-4	4.1	2.4	3.6	4.2	0.75	1	R1	
03x-03A3-4	6.0	3.3	5.0	5.8	1.1	1.5	R1	
03x-04A1-4	6.9	4.1	6.2	7.2	1.5	2	R1	
03x-05A6-4	9.6	5.6	8.4	9.8	2.2	3	R1	
03x-07A3-4	11.6	7.3	11.0	12.8	3	3	R1	
03x-08A8-4	13.6	8.8	13.2	15.4	4	5	R1	
03x-12A5-4	18.8	12.5	18.8	21.9	5.5	7.5	R3	
03x-15A6-4	22.1	15.6	23.4	27.3	7.5	10	R3	
03x-23A1-4	30.9	23.1	34.7	40.4	11	15	R3	
03x-31A0-4	52	31	46.5	54.3	15	20	R4	
03x-38A0-4	61	38	57	66.5	18.5	25	R4	
03x-44A0-4	67	44	66 ²⁾	77.0	22.0	30	R4	

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¹⁾ E = EMC filter connected, U = EMC filter disconnected. Metal EMC filter screw is installed in "E" versions and plastic screw in "U" versions.

²⁾ Preliminary value

Symbols

Input

I_{1N} continuous rms input current (for dimensioning cables and fuses)

Output

I_{2N} continuous rms current. 50% overload is allowed for one minute every ten minutes.

$I_{2,1min/10min}$ maximum (50% overload) current allowed for one minute every ten minutes

I_{2max} maximum output current. Available for two seconds at start, otherwise as long as allowed by the drive temperature.

P_N typical motor power. The kilowatt ratings apply to most IEC 4-pole motors. The horsepower ratings apply to most NEMA 4-pole motors.

Sizing

The current ratings are the same regardless of the supply voltage within one voltage range. To achieve the rated motor power given in the table, the rated current of the drive must be higher than or equal to the rated motor current.

Note 1: The maximum allowed motor shaft power is limited to $1.5 \cdot P_N$. If the limit is exceeded, motor torque and current are automatically restricted. The function protects the input bridge of the drive against overload.

Note 2: The ratings apply at ambient temperature of 40°C (104°F).

Derating

The load capacity decreases if the installation site ambient temperature exceeds 40°C (104°F) or if the altitude exceeds 1000 meters (3300 ft).

Temperature derating

In the temperature range +40°C...+50°C (+104°F...+122°F), the rated output current is decreased by 1% for every additional 1°C (1.8°F). The output current is calculated by multiplying the current given in the rating table by the derating factor.

Example If the ambient temperature is 50°C (+122°F), the derating factor is $100\% - 1 \frac{\%}{^\circ\text{C}} \cdot 10^\circ\text{C} = 90\%$ or 0.90. The output current is then $0.90 \cdot I_{2N}$.

Altitude derating

In altitudes 1000...2000 m (3300...6600 ft) above sea level, the derating is 1% for every 100 m (330 ft).

Switching frequency derating

Derate according to the switching frequency used as follows:

Switching frequency	Drive voltage rating	
	$U_N = 200...240 \text{ V}$	$U_N = 380...480 \text{ V}$
4 kHz	No derating	No derating
8 kHz	Derate I_{2N} to 90%.	Derate I_{2N} to 75% for R0 or to 80% for R1...R4.
12 kHz	Derate I_{2N} to 80%.	Derate I_{2N} to 50% for R0 or to 65% for R1...R4 and derate maximum ambient temperature to 30°C (86°F).
16 kHz	Derate I_{2N} to 75%.	Derate I_{2N} to 50% and derate maximum ambient temperature to 30°C (86°F).

Ensure that parameter 2607 SWITCH FREQ CTRL = 1 (ON), which reduces the switching frequency if the drive's internal temperature is too high. See parameter 2607 for details.

Cooling air flow requirements

The table below specifies the heat dissipation in the main circuit at nominal load and in the control circuit with minimum load (I/O and panel not in use) and maximum load (all digital inputs in the on state and the panel, fieldbus and fan in use). The total heat dissipation is the sum of the heat dissipation in the main and control circuits.

Type	Heat dissipation						Air flow	
	Main circuit		Control circuit					
	Rated I_{1N} and I_{2N}		Min		Max		m ³ /h	ft ³ /min
W	BTU/Hr	W	BTU/Hr	W	BTU/Hr			
1-phase $U_N = 200$								
240 V (200, 208, 220, 230, 240 V)								
01x-02A4-2	85	6.1	21	22.7	78	-	-	
01x-04A7-2	46	157	9.5	32	26.4	90	24	14
01x-06A7-2	71	242	9.5	32	26.4	90	24	14
01x-07A5-2	73	249	10.5	36	27.5	94	21	12
01x-09A8-2	96	328	10.5	36	27.5	94	21	12
3-phase $U_N = 200$								
240 V (200, 208, 220, 230, 240 V)								
03x-02A4-2	65	6.1	21	22.7	78	-	-	
03x-03A5-2	31	106	6.1	21	22.7	78	-	-
03x-04A7-2	38	130	9.5	32	26.4	90	24	14
03x-06A7-2	60	205	9.5	32	26.4	90	24	14
03x-07A5-2	62	212	9.5	32	26.4	90	21	12
03x-09A8-2	83	283	10.5	36	27.5	94	21	12
03x-13A3-2	112	383	10.5	36	27.5	94	52	31
03x-17A6-2	152	519	10.5	36	27.5	94	52	31
03x-24A4-2	250	854	16.6	57	35.4	121	71	42
03x-31A0-2	270	922	33.4	114	57.8	197	96	57
03x-46A2-2	430	1469	33.4	114	57.8	197	96	57
3-phase $U_N = 380$								
480 V (380, 400, 415, 440, 460, 480 V)								
03x-01A2-4	11	6.6	23	24.4	83	-	-	
03x-01A9-4	16	55	6.6	23	24.4	83	-	-
03x-02A4-4	21	72	9.8	33	28.7	98	13	8
03x-03A3-4	31	106	9.8	33	28.7	98	13	8
03x-04A1-4	40	137	9.8	33	28.7	98	13	8
03x-05A6-4	61	208	9.8	33	28.7	98	19	11
03x-07A3-4	74	253	14.1	48	32.7	112	24	14
03x-08A8-4	94	321	14.1	48	32.7	112	24	14
03x-12A5-4	130	444	12.0	41	31.2	107	52	31
03x-15A6-4	173	591	12.0	41	31.2	107	52	31
03x-23A1-4	266	908	16.6	57	35.4	121	71	42
03x-31A0-4	350	1195	33.4	114	57.8	197	96	57
03x-38A0-4	440	1503	33.4	114	57.8	197	96	57
03x-44A0-4	530	1810	33.4	114	57.8	197	96	57

Note: Larger fuses must not be used.

Type ACS350- x = E/U	Fuses		Size of CU conductor in cablings							
	gG	UL Class T (600 V)	Supply (U1, V1, W1)		Motor (U2, V2, W2)		PE		Brake (BRK+ and BRK-)	
	A	A	mm ²	AWG	mm ²	AWG	mm ²	AWG	mm ²	AWG
1-phase $U_N = 200...240$ V (200, 208, 220, 230, 240 V)										
01x-02A4-2	10	10	2.5	14	0.75	18	2.5	14	2.5	14
01x-04A7-2	16	20	2.5	14	0.75	18	2.5	14	2.5	14
01x-06A7-2	16/20 ¹⁾	25	2.5	10	1.5	14	2.5	10	2.5	12
01x-07A5-2	20/25 ¹⁾	30	2.5	10	1.5	14	2.5	10	2.5	12
01x-09A8-2	25/35 ¹⁾	35	6	10	2.5	12	6	10	6	12
3-phase $U_N = 200...240$ V (200, 208, 220, 230, 240 V)										
03x-02A4-2	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-03A5-2	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-04A7-2	10	15	2.5	14	0.75	18	2.5	14	2.5	14
03x-06A7-2	16	15	2.5	12	1.5	14	2.5	12	2.5	12
03x-07A5-2	16	15	2.5	12	1.5	14	2.5	12	2.5	12
03x-09A8-2	16	20	2.5	12	2.5	12	2.5	12	2.5	12
03x-13A3-2	25	30	6	10	6	10	6	10	2.5	12
03x-17A6-2	25	35	6	10	6	10	6	10	2.5	12
03x-24A4-2	63	60	10	8	10	8	10	8	6	10
03x-31A0-2	80	80	16	6	16	6	16	6	10	8
03x-46A2-2	100	100	25	2	25	2	16	4	10	8
3-phase $U_N = 380...480$ V (380, 400, 415, 440, 460, 480 V)										
03x-01A2-4	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-01A9-4	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-02A4-4	10	10	2.5	14	0.75	18	2.5	14	2.5	14
03x-03A3-4	10	10	2.5	12	0.75	18	2.5	12	2.5	12
03x-04A1-4	16	15	2.5	12	0.75	18	2.5	12	2.5	12
03x-05A6-4	16	15	2.5	12	1.5	14	2.5	12	2.5	12
03x-07A3-4	16	20	2.5	12	1.5	14	2.5	12	2.5	12
03x-08A8-4	20	25	2.5	12	2.5	12	2.5	12	2.5	12
03x-12A5-4	25	30	6	10	6	10	6	10	2.5	12
03x-15A6-4	35	35	6	8	6	8	6	8	2.5	12
03x-23A1-4	50	50	10	8	10	8	10	8	6	10
03x-31A0-4	80	80	16	6	16	6	16	6	10	8
03x-38A0-4	100	100	16	4	16	4	16	4	10	8
03x-44A0-4	100	100	25	4	25	4	16	4	10	8

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¹⁾ If 50% overload capacity is needed, use the bigger fuse alternative.

Power cables: terminal sizes, maximum cable diameters and tightening torques

Frame size	Max cable diameter for NEMA 1				U1, V1, W1, U2, V2, W2, BRK+ and BRK-				PE			
	U1, V1, W1, U2, V2, W2		BRK+ and BRK-		Terminal size		Tightening torque		Clamp size		Tightening torque	
	mm	in.	mm	in.	mm ²	AWG	N·m	lbf in.	mm ²	AWG	N·m	lbf in.
R0	16	0.63	16	0.63	4.0/6.0	10	0.8	7	25	3	1.2	11
R1	16	0.63	16	0.63	4.0/6.0	10	0.8	7	25	3	1.2	11
R2	16	0.63	16	0.63	4.0/6.0	10	0.8	7	25	3	1.2	11
R3	29	1.14	16	0.63	10.0/16.0	6	1.7	15	25	3	1.2	11
R4	35	1.38	29	1.14	25.0/35.0	2	2.5	22	25	3	1.2	11

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Dimensions, weights and noise

Frame size	Dimensions and weights												Noise
	IP20 (cabinet) / UL open												
	H1		H2		H3		W		D		Weight		Noise level
mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	kg	lb	dBA	
R0	169	6.65	202	7.95	239	9.41	70	2.76	161	6.34	1.2	2.6	<30
R1	169	6.65	202	7.95	239	9.41	70	2.76	161	6.34	1.2	2.6	50...62
R2	169	6.65	202	7.95	239	9.41	105	4.13	165	6.50	1.5	3.3	50...62
R3	169	6.65	202	7.95	236	9.29	169	6.65	169	6.65	2.5	5.5	50...62
R4	181	7.13	202	7.95	244	9.61	260	10.24	169	6.65	4.4	9.7	<62

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Frame size	Dimensions and weights										Noise
	IP20 / NEMA 1										
	H4		H5		W		D		Weight		Noise level
mm	in.	mm	in.	mm	in.	mm	in.	kg	lb	dBA	
R0	257	10.12	280	11.02	70	2.76	169	6.65	1.6	3.5	<30
R1	257	10.12	280	11.02	70	2.76	169	6.65	1.6	3.5	50...62
R2	257	10.12	282	11.10	105	4.13	169	6.65	1.9	4.2	50...62
R3	260	10.24	299	11.77	169	6.65	177	6.97	3.1	6.8	50...62
R4	270	10.63	320	12.60	260	10.24	177	6.97	5.0	11.0	<62

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Symbols

IP20 (cabinet) / UL open

H1 height without fastenings and clamping plate

H2 height with fastenings, without clamping plate

H3 height with fastenings and clamping plate

IP20 / NEMA 1

H4 height with fastenings and connection box

H5 height with fastenings, connection box and hood

Control connections

Analog inputs X1A: 2 and 5	Voltage signal, unipolar bipolar	0 (2)...10 V, $R_{in} > 312 \text{ kohm}$ -10...10 V, $R_{in} > 312 \text{ kohm}$
	Current signal, unipolar bipolar	0 (4)...20 mA, $R_{in} = 100 \text{ ohm}$ -20...20 mA, $R_{in} = 100 \text{ ohm}$
	Potentiometer reference value (X1A: 4)	10 V \pm 1%, max. 10 mA, $R < 10 \text{ kohm}$
	Resolution	0.1%
	Accuracy	\pm 1%
Analog output X1A: 7		0 (4)...20 mA, load $< 500 \text{ ohm}$
Auxiliary voltage X1A: 9		24 VDC \pm 10%, max. 200 mA
Digital inputs X1A: 12...16 (frequency input X1A: 16)	Voltage	12...24 VDC with internal or external supply
	Type	PNP and NPN
	Frequency input	Pulse train 0...16 kHz (X1A: 16 only)
	Input impedance	2.4 kohm
Relay output X1B: 17...19	Type	NO + NC
	Max. switching voltage	250 VAC / 30 VDC
	Max. switching current	0.5 A / 30 VDC; 5 A / 230 VAC
	Max. continuous current	2 A rms
Digital output X1B: 20...21	Type	Transistor output PNP
	Max. switching voltage	30 VDC
	Max. switching current	100 mA / 30 VDC, short-circuit protected
	Frequency	10 Hz ...16 kHz
	Resolution	1 Hz
	Accuracy	0.2%
Wire size		1.5...0.25 mm ² 16...24 AWG
Torque		0.5 N·m / 4.4 lbf in.

Brake resistor connection

Short-circuit protection (IEC 61800-5-1, IEC 60439-1, UL 508C)	The brake resistor output is conditionally short-circuit proof by IEC/EN 61800-5-1 and UL 508C. For correct fuse selection, contact your local ABB representative. Rated conditional short-circuit current as defined in IEC 60439-1 and the Short-circuit test current by UL 508C is 100 kA.
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Efficiency

Approximately 95 to 98% at nominal power level, depending on the drive size and options

Cooling

Method	R0: Natural convection cooling. R1...R4: Internal fan, flow direction from bottom to top.
Free space around the drive	

Degrees of protection

IP20 (cabinet installation) / UL open: Standard enclosure. The drive must be installed in a cabinet to fulfil the requirements for shielding from contact.
IP20 / NEMA 1: Achieved with an option kit including a hood and a connection box.

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 2000 m (6600 ft) above sea level [above 1000 m (3300 ft), s	-	-
Air temperature	-10 to +50°C (14 to 122°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 ACS350 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 gases: Class 1C2 solid particles: Class 1S2	According to IEC 60721-3-2, chemical gases: 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 in.) 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 in.)	76 cm (30 in.)

Materials

Drive enclosure

- PC/ABS 2 mm, PC+10%GF 2.5...3 mm and PA66+25%GF 1.5 mm, all in color NCS 1502-Y (RAL 9002 / PMS 420 C)
- hot-dip zinc coated steel sheet 1.5 mm, thickness of coating 20 micrometers
- extruded aluminium AlSi.

Package

Corrugated cardboard.

Disposal

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.

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.

For further information on environmental aspects and more detailed recycling instructions, please contact your local ABB distributor.

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