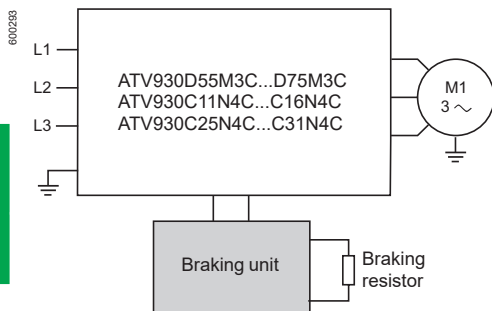


Presentation



Braking units allow Altivar Process drives to operate while braking to a standstill or during "generator" operation, by dissipating the energy in the braking resistor.

ATV930U07M3...D45M3, ATV930U07N4...D90N4, ATV930C22N4, ATV930U22Y6...D90Y6 and ATV950U07N4...D90N4 drives have a built-in dynamic brake transistor.

For ATV930D55M3C...D75M3C, ATV930C11N4C...C16N4C and ATV930C25N4C...C31N4C drives, a braking unit must be used.

Braking units provide IP 20 protection. Thermal protection is given by an integrated temperature probe.

Applications

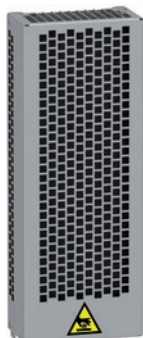
High-inertia machines, machines with slow and fast cycles, high-power machines performing vertical movements.

References

For drives	Power		Losses	Cable (drive-braking unit)		Cable (braking unit-resistors)		Percentage of conduction time	Minimum resistor value	Reference	Weight
	Continuous	Maximum	At continuous power	Cross-section	Maximum length	Cross-section	Maximum length				
	kW	kW	W	mm ²	m	mm ²	m	%	Ohms		kg/lb
Supply voltage: 200...240 V 50/60 Hz											
ATV930D55M3C...D75M3C	60	80	400	3 x 120	10	3 x 120	10	5% at 150 kW 15% at 120 kW 50% at 95 kW	1.4	VW3A7106	28.000/ 61.729
Supply voltage: 380...480 V 50/60 Hz											
ATV930C11N4C...C16N4C	100	160	400	2 x 120	5	2 x 120	5	5% at 320 kW 15% at 250 kW 50% at 200 kW	2.5	VW3A7105	28.000/ 61.729
ATV930C25N4C ATV930C31N4C	200	420	550	— (1)	— (1)	2 x 95	50	5% at 420 kW 15% at 320 kW 50% at 250 kW	1	VW3A7101	30.000/ 66.139

(1) For the ATV930C25N4C and ATV930C31N4C variable speed drives, the braking unit is connected to the drive with internal connections.

PF151255



VW3A7741

Presentation

Braking resistors allow Altivar Process drives to operate while braking to a standstill, by dissipating the braking energy. They enable maximum transient braking torque.

Braking resistors are designed to be located outside the enclosure, but should not inhibit natural cooling. Air inlets and outlets must not be obstructed in any way. The air must be free of dust, corrosive gas, and condensation.

Several resistor models are available, depending on the drive rating:

- With IP 20 and IP 23 casing and thermal protection provided by temperature-controlled switch or by the drive

The internal circuits of Altivar Process drives rated 90 kW or less have a built-in dynamic brake transistor.

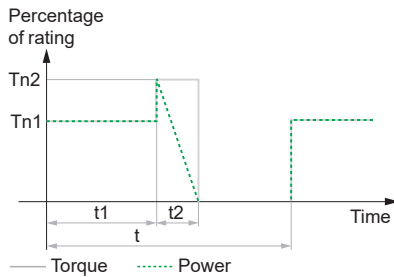
An external braking unit is necessary for wall-mounting Altivar Process drives between 110 kW and 315 kW at 400...480 V as well as 55 kW and 75 kW at 200...240 V.

Applications

Braking resistors are designed for a defined cycle (see the 3 cycle types defined below).

Depending on your own applications and cycles, you can use these resistors or define a new value.

- Braking resistors for light braking cycles for machines with cycles and inertia. The braking power is limited to 1.5 Tn for 0.8 s every 40 s.
- Braking resistors for medium braking cycles for machines with high inertia and conveyors. The braking power is limited to 1.35 Tn for 4 s every 40 s.
- Braking resistors for severe braking cycles for machines with very high inertia and vertical movements (hoisting). The braking power is limited to 1.65 Tn for 6 s and Tn for 54 s every 120 s.



Light Cycle

$t = 40 \text{ s}$	t : period
$t1 = 0 \text{ s}$	$Tn1$: braking torque
$t2 = 0.8 \text{ s}$	$Tn2$: braking torque
$Tn1 = 0$	Tn : nominal torque
$Tn2 = 1.5 \times Tn$	

References for a light braking cycle

For drives	Degree of protection of the resistor	Ohmic value at 20 °C/ 68 °F	Average power available at 50 °C/ 122 °F (1)	Quantity required per drive	Reference	Weight
		Ω	kW			kg/lb
Supply voltage: 200...240 V or 380...480 V 50/60 Hz						
ATV930U07M3	IP20	100	0.1	1	VW3A7730	1.500/ 3.307
ATV930U07N4...U40N4						
ATV950U07N4...U40N4						
ATV950U07N4E...U40N4E						
ATV930U15M3...U22M3	IP20	60	0.16	1	VW3A7731	2.000/ 4.409
ATV930U55N4...U75N4						
ATV950U55N4...U75N4						
ATV950U55N4E...U75N4E						
ATV930U30M3...U40M3	IP20	28	0.3	1	VW3A7732	3.000/ 6.614
ATV930D11N4...D15N4						
ATV950D11N4...D15N4						
ATV950D11N4E...D15N4E						
ATV930U55M3...U75M3	IP20	16	1.1	1	VW3A7733	4.000/ 8.818
ATV930D18N4...D30N4						
ATV950D18N4...D30N4						
ATV950D18N4E...D30N4E						
ATV930D11M3	IP20	10	1.1	1	VW3A7734	5.500/ 12.125
ATV930D37N4...D45N4						
ATV950D37N4...D45N4						
ATV950D37N4E...D45N4E						
ATV930D15M3	IP20	8	1.1	1	VW3A7735	5.500/ 12.125
ATV930D55N4						
ATV950D55N4						
ATV950D55N4E						
ATV930D18M3...D22M3	IP23	5	1.9	1	VW3A7736	18.000/ 39.683
ATV930D75N4...D90N4						
ATV950D75N4...D90N4						
ATV950D75N4E...D90N4E						
ATV930D30M3...D45M3	IP23	2.5	3.2	1	VW3A7737	21.000/ 46.297
ATV930C11N4C...C16N4C						
ATV930C31N4C	IP23	2.5	3.2	2		
ATV930D55M3C...D75M3C	IP23	1.4	1.5	1	VW3A7738	16.000/ 35.274
ATV930C22N4	IP23	1.4	5.1	1	VW3A7748	29.000/ 69.934
ATV930C25N4C						

(1) Load factor for resistors: The value of the average power that can be dissipated at 50 °C/122 °F from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications:

- Normal duty: 0.8 s braking with a 1.2 Tn braking torque for a 40 s cycle
- Heavy duty: 0.8 s braking with a 1.5 Tn braking torque for a 40 s cycle

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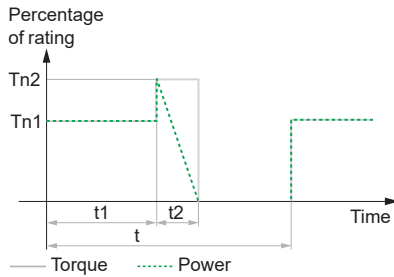


VW3A7736

References for a light braking cycle (continued)						
For drives	Degree of protection of the resistor	Ohmic value at 20 °C/ 68 °F	Average power available at 50 °C/ 122 °F (1)	Quantity required per drive	Reference	Weight
		Ω	kW			kg/ lb
Supply voltage: 500...690 V 50/ 60 Hz						
ATV930U22Y6	IP20	100	0.1	1	VW3A7730	1.500/ 3.306
ATV930U30Y6	IP20	100	0.1	1	VW3A7730	1.500/ 3.306
ATV930U40Y6	IP20	100	0.1	1	VW3A7730	1.500/ 3.306
ATV930U55Y6	IP20	100	0.1	1	VW3A7730	1.500/ 3.306
ATV930U75Y6	IP20	60	0.16	1	VW3A7731	1.800/ 3.968
ATV930D11Y6	IP20	28	0.3	1	VW3A7732	2.700/ 5.952
ATV930D15Y6	IP20	28	0.3	1	VW3A7732	2.700/ 5.952
ATV930D18Y6	IP20	28	0.3	1	VW3A7732	2.700/ 5.952
ATV930D22Y6	IP20	16	0.96	1	VW3A7733	3.800/ 8.377
ATV930D30Y6	IP20	16	0.96	1	VW3A7733	3.800/ 8.377
ATV930D37Y6	IP20	10	0.96	1	VW3A7734	4.300/ 9.479
ATV930D45Y6	IP20	10	0.96	1	VW3A7734	4.300/ 9.479
ATV930D55Y6	IP20	10	0.96	1	VW3A7734	4.300/ 9.479
ATV930D75Y6	IP23	5	1.9	1	VW3A7736	18.000/ 39.683
ATV930D90Y6	IP23	5	1.9	1	VW3A7736	18.000/ 39.683

(1) Load factor for resistors: The value of the average power that can be dissipated at 50 °C/ 122 °F from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications:

- Normal duty: 0.8 s braking with a 1.2 T_n braking torque for a 40 s cycle
- Heavy duty: 0.8 s braking with a 1.5 T_n braking torque for a 40 s cycle



Medium Cycle

t = 40 s

t1 = 0 s

t2 = 4 s

Tn1 = 0

Tn2 = 1.35 x Tn

t: period

Tn1: braking torque

Tn2: braking torque

Tn: nominal torque

References for a medium braking cycle

For drives	Degree of protection of the resistor	Ohmic value at 20 °C/ 68 °F	Average power available at 50 °C/ 122 °F (1)	Quantity required per drive	Reference	Weight
		Ω	kW			kg/lb
Supply voltage: 200...240 V or 380...480 V 50/60 Hz						
ATV930U07M3 ATV930U07N4...U15N4 ATV950U07N4...U15N4 ATV950U07N4E...U15N4E	IP20	100	0.1	1	VW3A7730	1.500/ 3.307
ATV930U15M3...U22M3	IP20	60	0.16	1	VW3A7731	2.000/ 4.409
ATV930U30M3...U40M3	IP20	28	0.3	1	VW3A7732	3.000/ 6.614
ATV930U55M3...U75M3	IP20	16	1.1	1	VW3A7733	4.000/ 8.818
ATV930D11M3	IP20	10	1.1	1	VW3A7734	5.500/ 12.125
ATV930D15M3	IP20	8	1.1	1	VW3A7735	5.500/ 12.125
ATV930D18M3...D22M3	IP23	5	1.9	1	VW3A7736	18.000/ 39.684
ATV930D30M3...D45M3	IP23	2.5	3.2	1	VW3A7737	20.000/ 44.092
ATV930U22N4...U40N4 ATV950U22N4...U40N4 ATV950U22N4E...U40N4E	IP20	100	0.26	1	VW3A7740	2.500/ 5.512
ATV930U55N4...U75N4 ATV950U55N4...U75N4 ATV950U55N4E...U75N4E	IP20	60	0.5	1	VW3A7741	4.500/ 9.921
ATV930D11N4...D15N4 ATV950D11N4...D15N4 ATV950D11N4E...D15N4E	IP20	28	1.1	1	VW3A7742	4.000/ 8.818
ATV930D18N4...D30N4 ATV950D18N4...D30N4 ATV950D18N4E...D30N4E	IP20	16	2.2	1	VW3A7743	7.000/ 15.432
ATV930D37N4...D45N4 ATV950D37N4...D45N4 ATV950D37N4E...D45N4E	IP20	10	3.4	1	VW3A7744	11.500/ 25.353
ATV930D55N4 ATV950D55N4 ATV950D55N4E	IP23	8	3.8	1	VW3A7745	23.000/ 50.706
ATV930D75N4...D90N4 ATV950D75N4...D90N4 ATV950D75N4E...D90N4E	IP23	5	6.9	1	VW3A7746	27.000/ 59.525
ATV930C11N4C...C16N4C	IP23	2.5	11	1	VW3A7747	43.000/ 94.799
ATV930D55M3C...D75M3C	IP23	1.4	5.1	1	VW3A7748	25.000/ 55.116
ATV930C22N4 ATV930C25N4C...C31N4C	IP23	1.4	29	1	VW3A7757	121.000/ 69.934

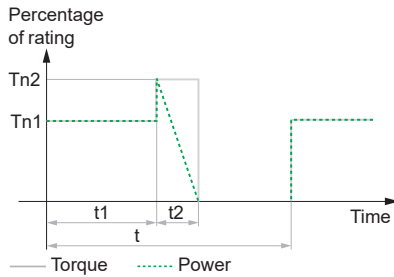
(1) Load factor for resistors: The value of the average power that can be dissipated at 50 °C/122 °F from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications:

- Normal duty: 4 s braking with a 1.35 Tn braking torque for a 40 s cycle
- Heavy duty: 4 s braking with a 1.65 Tn braking torque for a 40 s cycle

References for a medium braking cycle (continued)						
For drives	Degree of protection of the resistor	Ohmic value at 20 °C/ 68 °F	Average power available at 50 °C/ 122 °F (1)	Quantity required per drive	Reference	Weight
		Ω	kW			kg/lb
Supply voltage: 500...690 V 50/ 60 Hz						
ATV930U22Y6	IP20	100	0.26	1	VW3A7740	2.500/ 5.511
ATV930U30Y6	IP20	100	0.26	1	VW3A7740	2.500/ 5.511
ATV930U40Y6	IP20	100	0.26	1	VW3A7740	2.500/ 5.511
ATV930U55Y6	IP20	60	0.5	1	VW3A7741	3.800/ 8.377
ATV930U75Y6	IP20	60	0.5	1	VW3A7741	3.800/ 8.377
ATV930D11Y6	IP20	28	0.96	1	VW3A7742	4.200/ 9.259
ATV930D15Y6	IP20	28	0.96	1	VW3A7742	4.200/ 9.259
ATV930D18Y6	IP20	16	1.9	1	VW3A7743	6.400/ 14.109
ATV930D22Y6	IP20	16	1.9	1	VW3A7743	6.400/ 14.109
ATV930D30Y6	IP20	16	1.9	1	VW3A7743	6.400/ 14.109
ATV930D37Y6	IP20	10	2.9	1	VW3A7744	9.000/ 19.841
ATV930D45Y6	IP20	10	2.9	1	VW3A7744	9.000/ 19.841
ATV930D55Y6	IP23	8	3.8	1	VW3A7745	25.500/ 56.217
ATV930D75Y6	IP23	5	6.9	1	VW3A7746	30.500/ 67.240
ATV930D90Y6	IP23	5	6.9	1	VW3A7746	30.500/ 67.240

(1) Load factor for resistors: The value of the average power that can be dissipated at 50 °C/122 °F from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications:

- Normal duty: 4 s braking with a 1.35 T_n braking torque for a 40 s cycle
- Heavy duty: 4 s braking with a 1.65 T_n braking torque for a 40 s cycle



Severe Cycle

$t = 120\text{ s}$
 $t_1 = 54\text{ s}$
 $t_2 = 6\text{ s}$
 $Tn_1 = T_n$
 $Tn_2 = 1.65 \times T_n$

t : period
 Tn_1 : braking torque
 Tn_2 : braking torque
 T_n : nominal torque

References for a severe braking cycle (hoisting applications)

For drives	Degree of protection of the resistor	Ohmic value at 20 °C/ 68 °F	Average power available at 50 °C/ 122 °F (1)	Quantity required per drive	Reference	Weight
		Ω	kW			kg/lb
Supply voltage: 200...240 V or 380...480 V 50/60 Hz						
ATV930U07M3	IP20	100	0.26	1	VW3A7740	2.500/ 5.512
ATV930U15M3	IP20	60	0.5	1	VW3A7741	4.500/ 9.921
ATV930U22M3	IP20	60	3.4	1	VW3A7751	10.000/ 22.046
ATV930U30M3	IP20	28	1.1	1	VW3A7742	4.000/ 8.818
ATV930U55M3	IP20	16	2.2	1	VW3A7743	7.000/ 15.432
ATV930D11M3	IP20	10	3.4	1	VW3A7744	11.500/ 25.353
ATV930D18M3	IP23	5	6.9	1	VW3A7746	27.000/ 59.524
ATV930U07N4...U40N4 ATV950U07N4...U40N4 ATV950U07N4E...U40N4E	IP20	100	1.7	1	VW3A7750	5.500/ 12.125
ATV930U55N4...U75N4 ATV950U55N4...U75N4 ATV950U55N4E...U75N4E	IP20	60	3.4	1	VW3A7751	10.000/ 22.046
ATV930U40M3 ATV930D11N4...D15N4 ATV950D11N4...D15N4 ATV950D11N4E...D15N4E	IP23	28	5.1	1	VW3A7752	25.000/ 55.116
ATV930U75M3 ATV930D18N4...D30N4 ATV950D18N4...D30N4 ATV950D18N4E...D30N4E	IP23	16	14	1	VW3A7753	47.000/ 103.617
ATV930D37N4...D45N4 ATV950D37N4...D45N4 ATV950D37N4E...D45N4E	IP23	10	19	1	VW3A7754	67.000/ 147.710
ATV930D90N4 ATV950D90N4 ATV950D90N4E	IP23	10	19	2		
ATV930D15M3 ATV930D55N4 ATV950D55N4 ATV950D55N4E	IP23	8	25	1	VW3A7755	86.000/ 189.597
ATV930D22M3 ATV930D75N4 ATV950D75N4 ATV950D75N4E	IP23	5	32	1	VW3A7756	126.000/ 277.782
ATV930D30M3...D45M3 ATV930C11N4C...C16N4C	IP23	5	32	2		
ATV930C22N4 ATV930C25N4C	IP23	5	32	3		
ATV930C31N4C	IP23	5	32	4		
ATV930D55M3C...D75M3C	IP23	1.4	29	1	VW3A7757	114.000/ 251.327

(1) Load factor for resistors: The value of the average power that can be dissipated at 50 °C/122 °C from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications:

- Heavy duty: 54 s braking with a 1 Tn braking torque and 6 s braking with a 1.65 Tn braking torque for a 120 s cycle

PF 15 269A



VW3A7755

References for a severe braking cycle (hoisting applications) (continued)

For drives	Degree of protection of the resistor	Ohmic value at 20 °C/ 68 °F	Average power available at 50 °C/ 122 °F (1)	Quantity required per drive	Reference	Weight
		Ω	kW			kg/lb
Supply voltage: 500...690 V 50/ 60 Hz						
ATV930U22Y6	IP20	100	1.4	1	VW3A7750	5.000/ 11.023
ATV930U30Y6	IP20	100	1.4	1	VW3A7750	5.000/ 11.023
ATV930U40Y6	IP20	100	1.4	1	VW3A7750	5.000/ 11.023
ATV930U55Y6	IP20	60	2.9	1	VW3A7751	8.300/ 18.298
ATV930U75Y6	IP20	60	2.9	1	VW3A7751	8.300/ 18.298
ATV930D11Y6	IP23	28	5.1	1	VW3A7752	27.000/ 59.524
ATV930D15Y6	IP23	28	5.1	1	VW3A7752	27.000/ 59.524
ATV930D18Y6	IP23	16	14	1	VW3A7753	48.500/ 106.924
ATV930D22Y6	IP23	16	14	1	VW3A7753	48.500/ 106.924
ATV930D30Y6	IP23	16	14	1	VW3A7753	48.500/ 106.924
ATV930D37Y6	IP23	10	19	1	VW3A7754	71.000/ 156.528
ATV930D45Y6	IP23	10	19	1	VW3A7754	71.000/ 156.528
ATV930D55Y6	IP23	8	25	1	VW3A7755	87.500/ 192.904
ATV930D75Y6	IP23	5	32	1	VW3A7756	126.000/ 277.782
ATV930D90Y6	IP23	10	19	2	VW3A7754	71.000/ 156.528

(1) Load factor for resistors: The value of the average power that can be dissipated at 50 °C/122 °C from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications:

- Heavy duty: 54 s braking with a 1 Tn braking torque and 6 s braking with a 1.65 Tn braking torque for a 120 s cycle