

13 Braking resistors

13.1 External braking resistors for MOVIPRO®

For regenerative operation, the MOVIPRO® is connected to an external braking resistor.



NOTICE

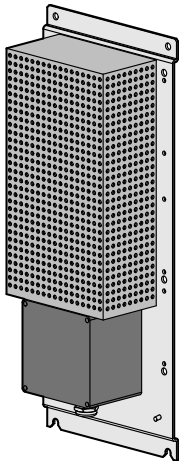
In case of incorrect assignment of the inverters, an overload may occur at the braking resistor and damage the braking resistor.

Damage to the braking resistor.

- Adhere the assignment of the braking resistor to the inverter.

Flat-type resistors have an internal thermal protection (fuse cannot be replaced) that interrupts the current circuit in the event of overload. Additional components for thermal monitoring are not required.

The following figure shows an example of a size 1 braking resistor:



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13.1.1 Braking resistors – assignment

The following table illustrates the assignment of external braking resistors to the respective MOVIPRO® units:

Braking resistor	Part number	Size	Terminal cross section	MOVIPRO®				
				up to 2.2 kW	up to 4.0 kW	up to 7.5 kW	up to 11.0 kW	up to 15.0 kW
BW100-004-00	17962188	Size 0	pre-assembled connection cable	•	•	•		
BW050-008-01	17962242	Size 1	6 mm ²		•	•	•	•
BW033-012-01	17962196	Size 1	6 mm ²		•	•	•	•
BW017-024-02	17962218	Size 2	6 mm ²				•	•

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13.1.2 Technical data according to IEC

The following tables list the technical data of the external braking resistors according to IEC:

		Braking resistor			
		BW100-004-00	BW050-008-01	BW033-012-01	BW017-024-02
Function		Carrying off of regenerative energy			
Degree of protection		IP65			
Mounting position		Flat-type resistor			
Resistance		100 Ω	50 Ω	33.3 Ω	16.7 Ω
Continuous braking power	100% cdf	0.4 kW	0.8 kW	1.2 kW	2.4 kW
	50% cdf	0.8 kW	1.6 kW	2.4 kW	4.8 kW
	25% cdf	1.5 kW	3.0 kW	4.5 kW	9.0 kW
	12% cdf	2.2 kW	4.4 kW	6.6 kW	13.2 kW
	6% cdf	3.6 kW	7.2 kW	10.8 kW	21.6 kW
Dimensions W × H × D		320 × 70 × 106 mm	550 × 105 × 230 mm		550 × 158 × 330 mm

13.1.3 Technical data according to UL

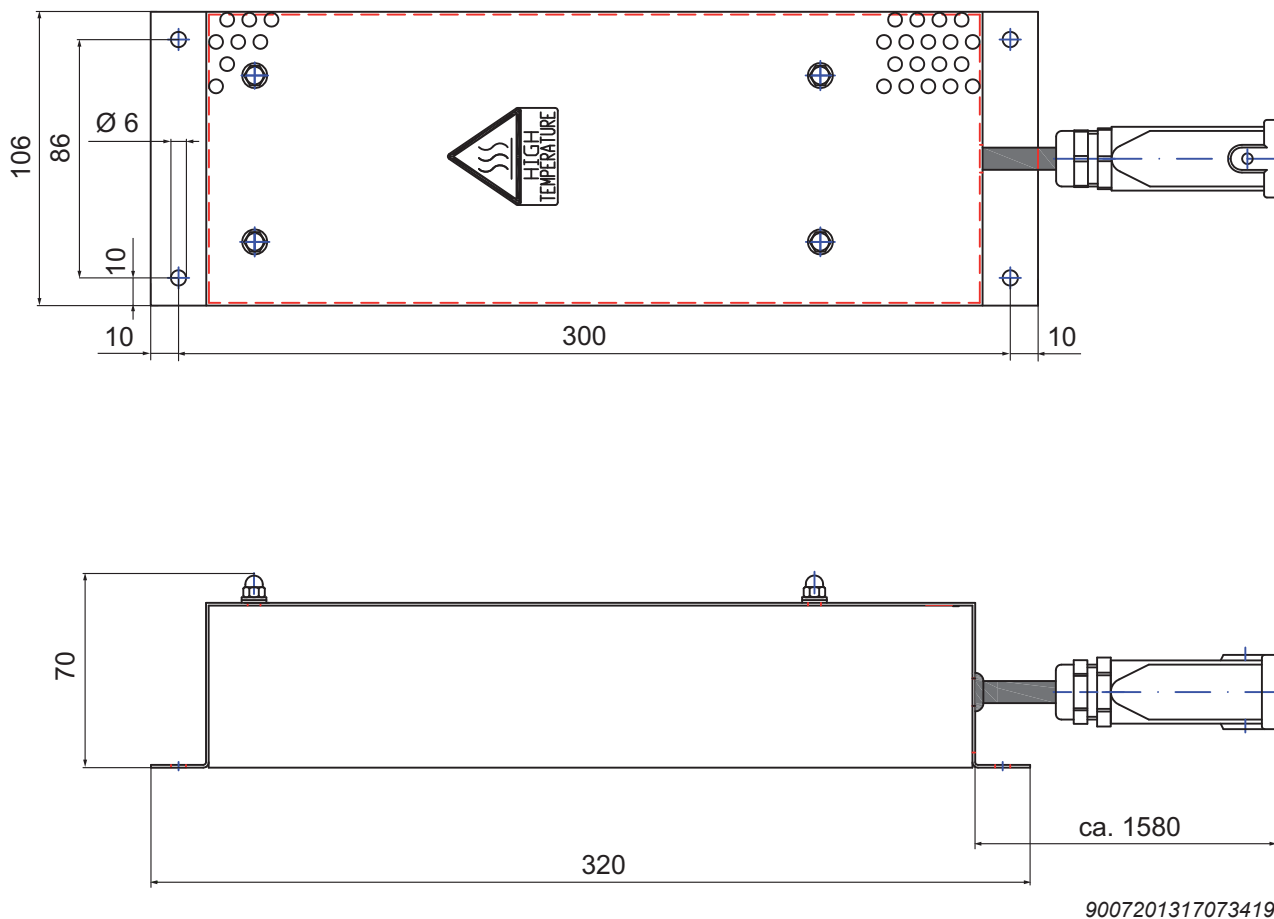
The following tables list the technical data of the external braking resistors according to UL:

		Braking resistor			
		BW100-004-00	BW050-008-01	BW033-012-01	BW017-024-02
Function		Carrying off of regenerative energy			
Degree of protection		IP65			
Mounting position		Flat-type resistor			
Resistance		100 Ω	50 Ω	33.3 Ω	16.7 Ω
Continuous braking power	100% cdf	0.24 kW	0.48 kW	0.72 kW	1.44 kW
	50% cdf	0.5 kW	1.0 kW	1.5 kW	3.0 kW
	25% cdf	1.0 kW	2.0 kW	3.0 kW	6.0 kW
	12% cdf	2.2 kW	4.4 kW	6.6 kW	13.2 kW
	6% cdf	3.6 kW	7.2 kW	10.8 kW	21.6 kW
Dimensions W × H × D		320 × 70 × 106 mm (12.6 × 2.8 × 4.17 in)	550 × 105 × 230 mm (21.7 × 4.13 × 9.06 in)		550 × 158 × 330 mm (21.7 × 6.22 × 13.0 in)

13.1.4 Braking resistors – dimension drawings

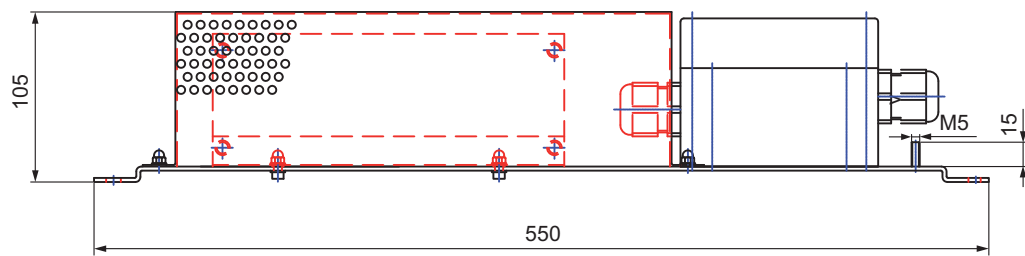
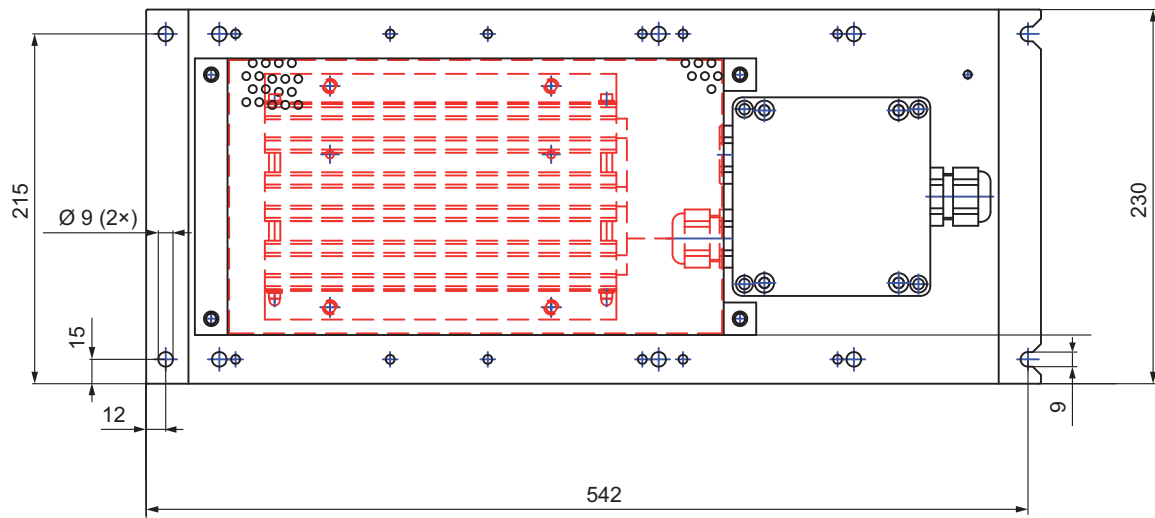
Size 0 braking resistor

The dimension drawing shows the mechanical dimensions of the size 0 braking resistor in mm:



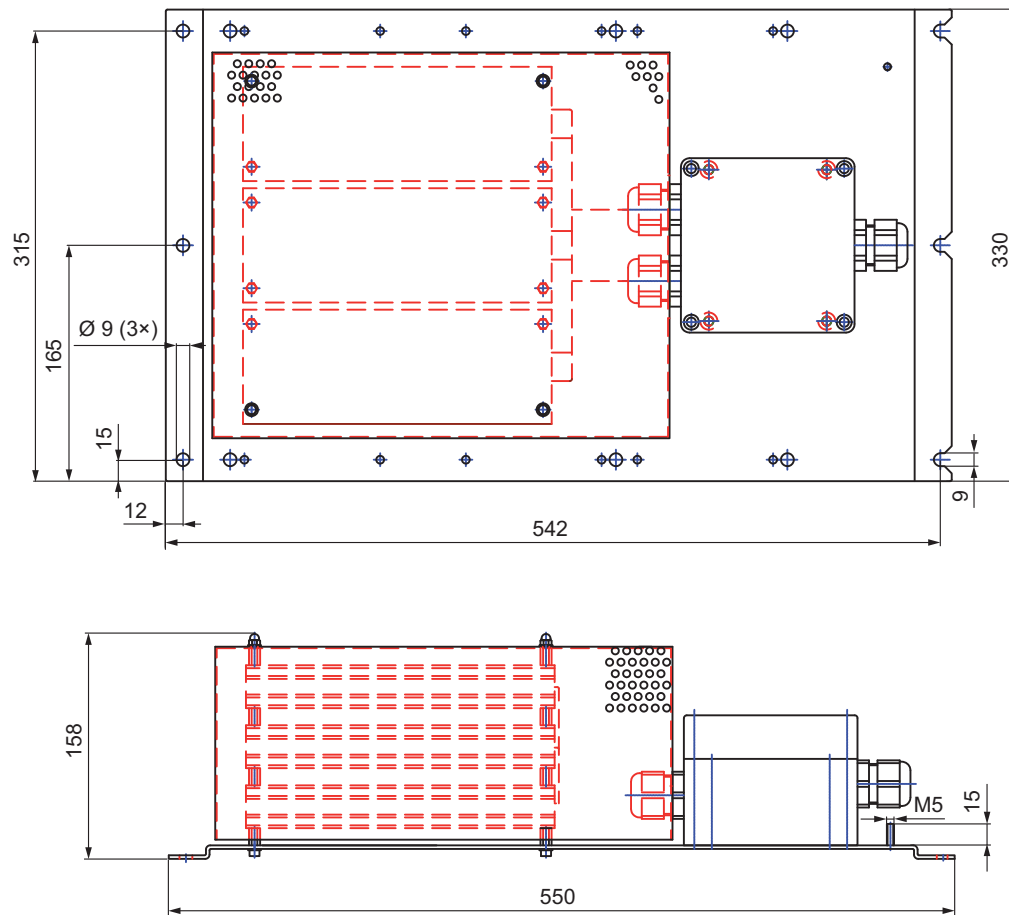
Size 1 braking resistors

The dimension drawing shows the mechanical dimensions of the size 1 braking resistors in mm:



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The dimension drawing shows the mechanical dimensions of the size 2 braking resistors in mm:



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13.2 Braking resistors for MOVIFIT® and MOVIMOT®

The following table shows the available integrated braking resistors:

MOVIFIT® FC/MOVIMOT®	Braking resistor	Part number
MTF11A003 – MTF11A015	BW1	18207057
MTF11A003 – MTF11A040	BW2	18207545
MM03D-503-00 – MM15D-503-00 MM03D-233-00 – MM07D-233-00	BW1	08228973 ¹⁾
MM22D-503-00 – MM40D-503-00 MM11D-233-00 – MM22D-233-00	BW2	08231362 ¹⁾

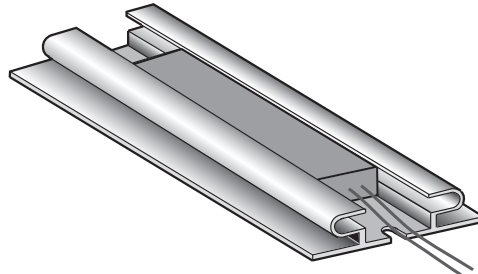
1) 2 screws M4 x 8 included in the delivery.

The following table shows the available external braking resistors:

MOVIFIT® FC/MOVIMOT®	Braking resistor	Part number	Protective grid
MTF11A003 – MTF11A015	BW200-003/K-1.5	08282919	0813152X
MM03D-503-00 – MM15D-503-00	BW200-005/K-1.5	08282838	–
MM03D-233-00 – MM07D-233-00	BW150-006/T	17969565	–
MTF11A022 – MTF11A040	BW100-003/K-1.5	08282935	0813152X
MM22D-503-00 – MM40D-503-00	BW100-005/K-1.5	08282862	–
MM11D-233-00 – MM22D-233-00	BW068-006/T	17970008	–
	BW068-012/T	17970016	–

13.2.1 4Q operation with integrated BW.. braking resistor

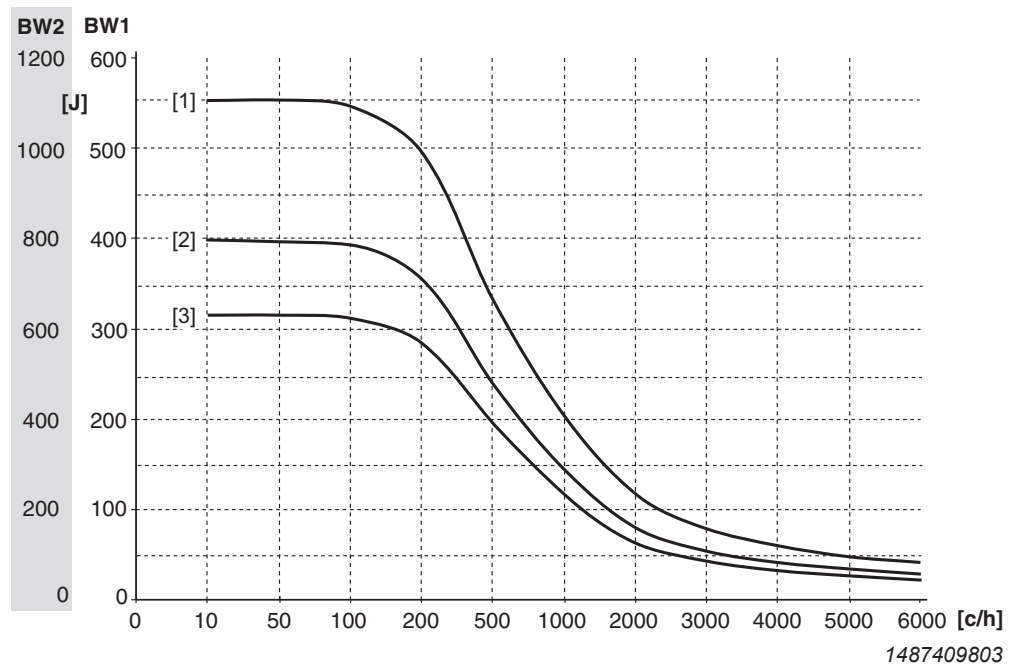
- 4Q operation with integrated braking resistor is recommended for applications in which the level of regenerative energy is low.
- The resistor protects itself (reversible) against regenerative overload by changing abruptly to high resistance and no longer consuming any more energy. The inverter then switches off and issues the error "overvoltage" (error code 07).



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Regenerative current-carrying capacity of internal braking resistors

The following figure shows the regenerative current-carrying capacity of the internal braking resistors:

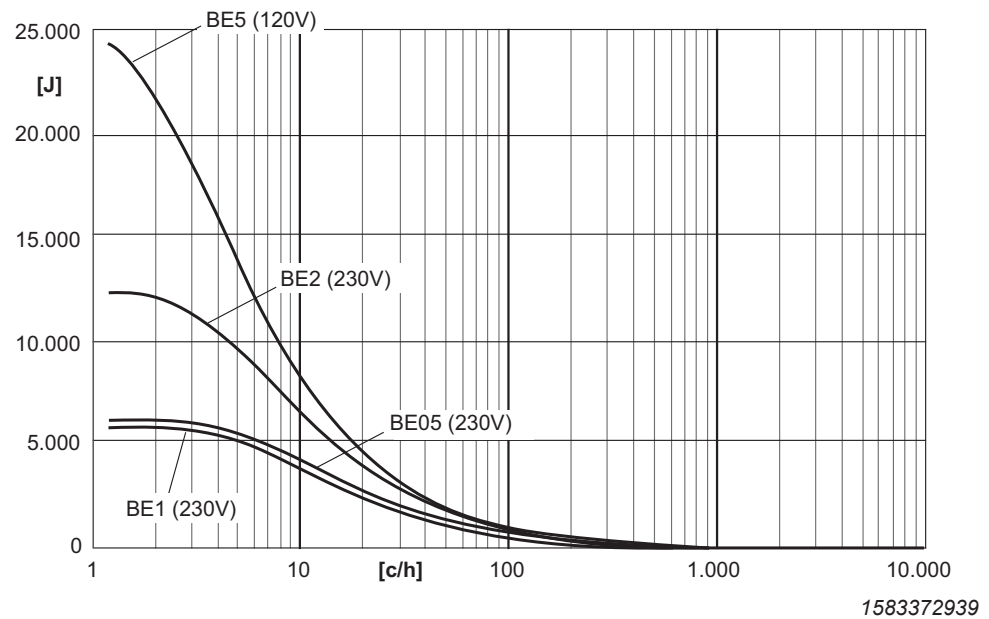


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[c/h] Cycles/hour
 [1] Brake ramp 10 s
 [2] Brake ramp 4 s
 [3] Brake ramp 0.2 s

13.2.2 4Q operation for motors with mechanical brake

- The brake coil can be used as a braking resistor in 4Q operation.
- Brake voltage is generated internally within the unit, which means it is mains-independent.
- Should the regenerative current-carrying capacity not be sufficient for the application, refer to chapter "4Q operation with integrated brake and external brake resistor" (→ 360):
- The following figure shows the current-carrying capacity of the DR.. motor brake coils:



13.2.3 4Q operation with integrated brake and external braking resistor

4Q operation with external braking resistor is necessary for applications with a large amount of regenerative energy.

NOTICE



In case of incorrect assignment of the inverters, an overload may occur at the braking resistor and damage the braking resistor.

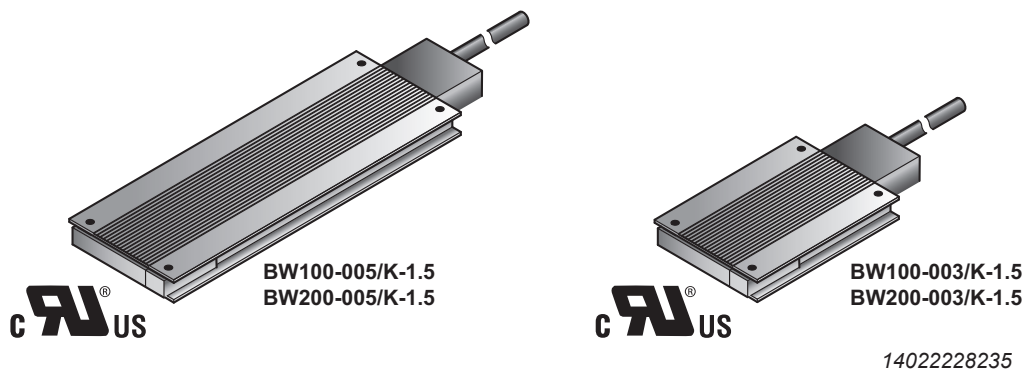
Damage to the braking resistor.

- Adhere the assignment of the braking resistor to the inverter.

Flat-type resistors have an internal thermal protection (fuse cannot be replaced) that interrupts the current circuit in the event of overload. Additional components for thermal monitoring are not required.

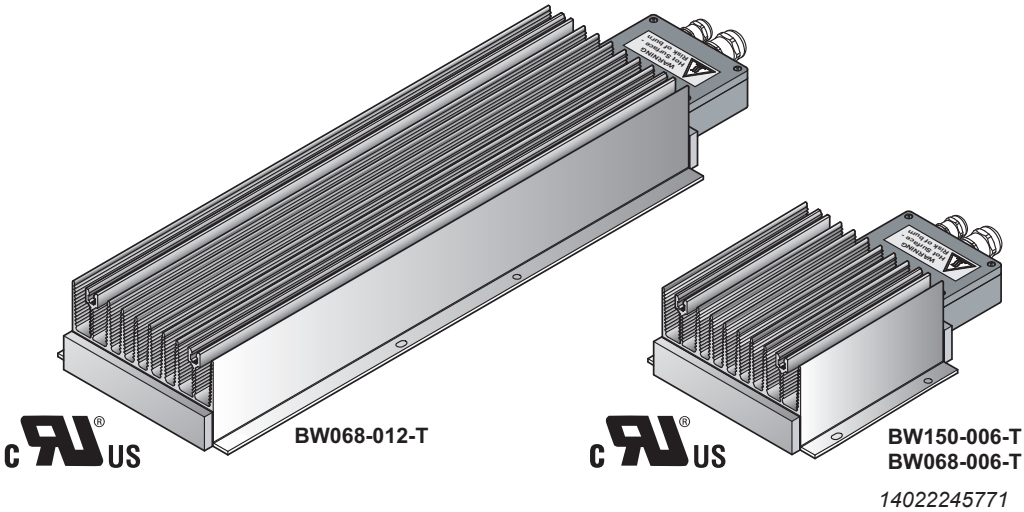
Braking resistors with IP65 degree of protection

The following figure shows the external braking resistors with IP65 degree of protection:



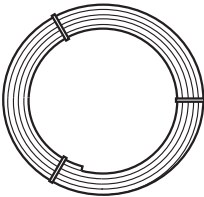
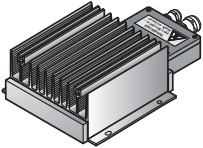
Braking resistors with IP66 degree of protection

The following figure shows the external braking resistors with IP66 degree of protection:



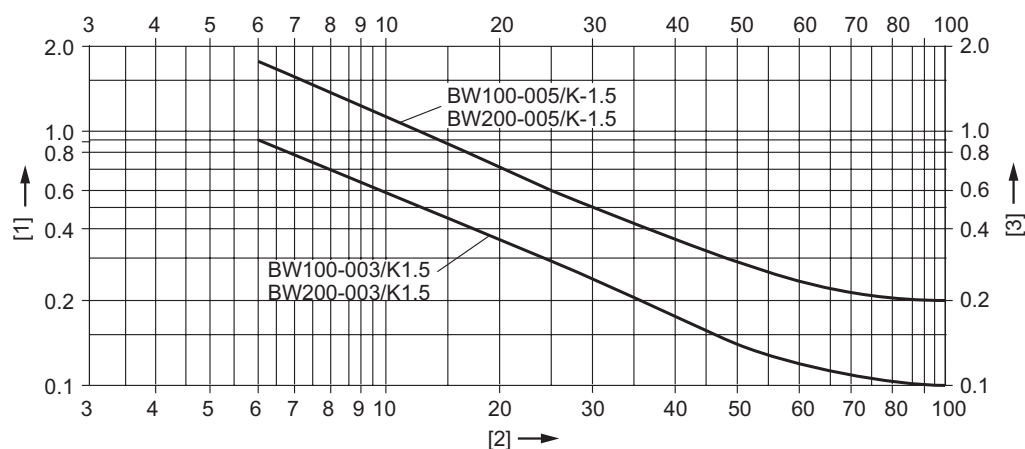
Connection cable

The following cable is available for connecting the external braking resistors:

Inverters	Connection cable	Length	Braking resistor
MOVIFIT® FC MOVIMOT®	Part number: 13230409 (cable roll) 	30 m	BW068-012-T BW068-006-T BW150-006-T 

Power diagrams BW100-003/K1.5, BW200-003/K1.5, BW100-005/K1.5 and BW200-005/K1.5

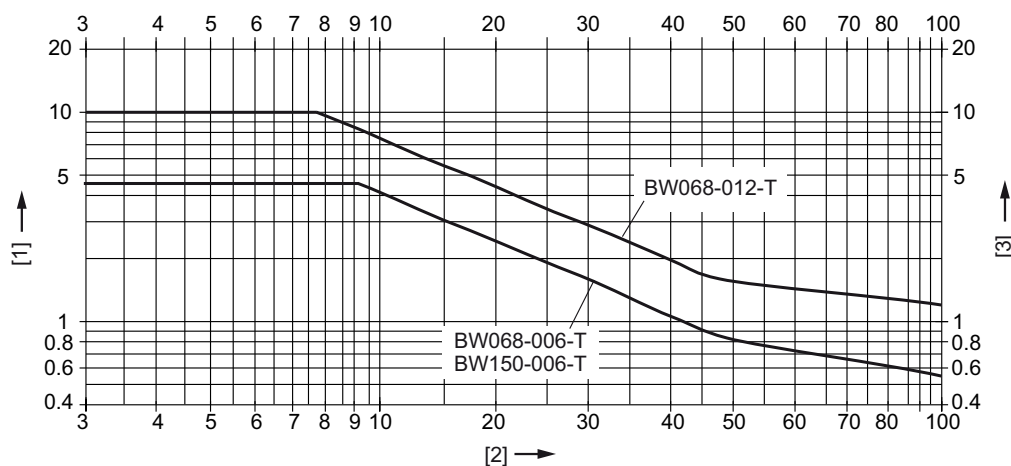
The following figure shows the power diagrams of braking resistors BW100-003/K1.5, BW200-003/K1.5, BW100-005/K1.5 and BW200-005/K1.5:



- [1] Short-term power in kW
- [2] Cyclic duration factor cdf in %
- [3] Continuous power 100% cdf in kW

Rating diagrams for BW150-006-T, BW068-006-T and BW068-012-T according to UL approval

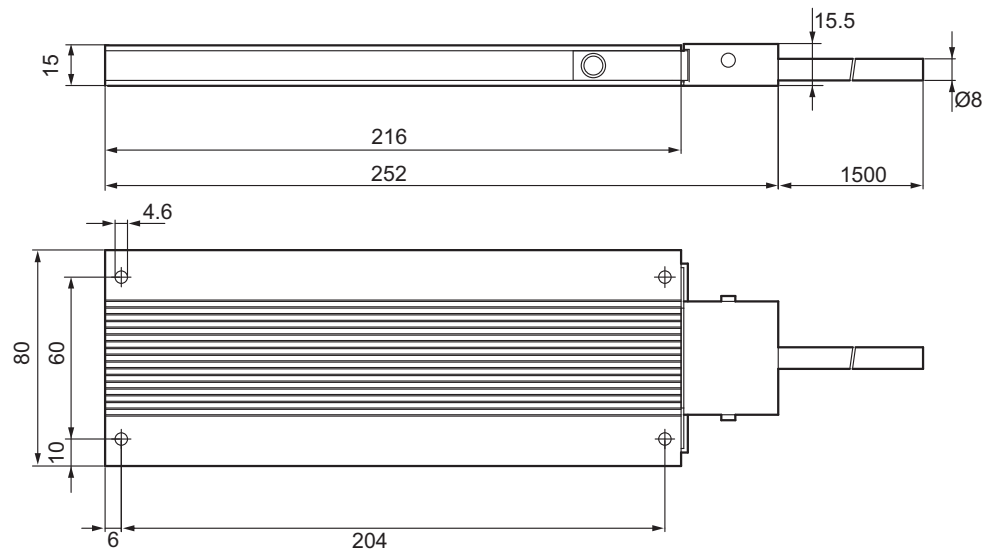
The following figure shows the rating diagrams of braking resistors BW150-006-T, BW068-006-T and BW068-012-T according to UL approval:



- [1] Short-term braking power in kW
 - [2] Cyclic duration factor cdf in %
 - [3] Continuous power 100% cdf in kW
- cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration $T_D \leq 120$ s.

Dimension drawing of BW100-005/K-1.5 and BW200-005/K-1.5

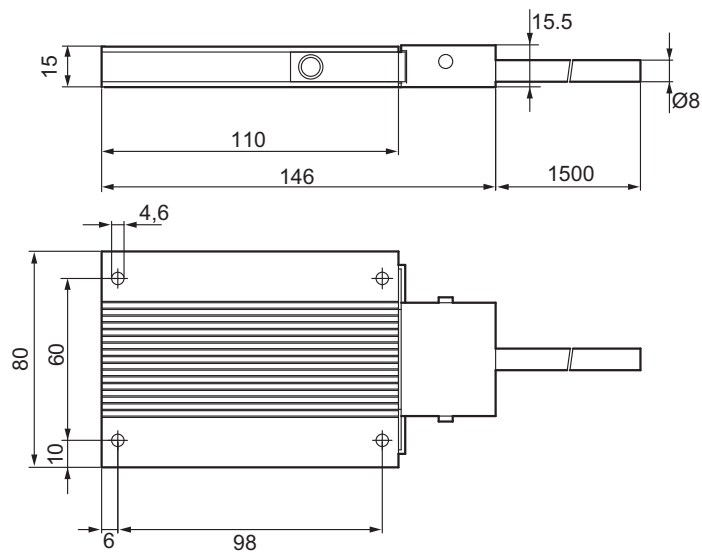
The following figure shows the dimensions of the external braking resistors BW100-005/K-1.5 and BW200-005/K-1.5:



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Dimension drawing of BW100-003/K-1.5 and BW200-003/K-1.5

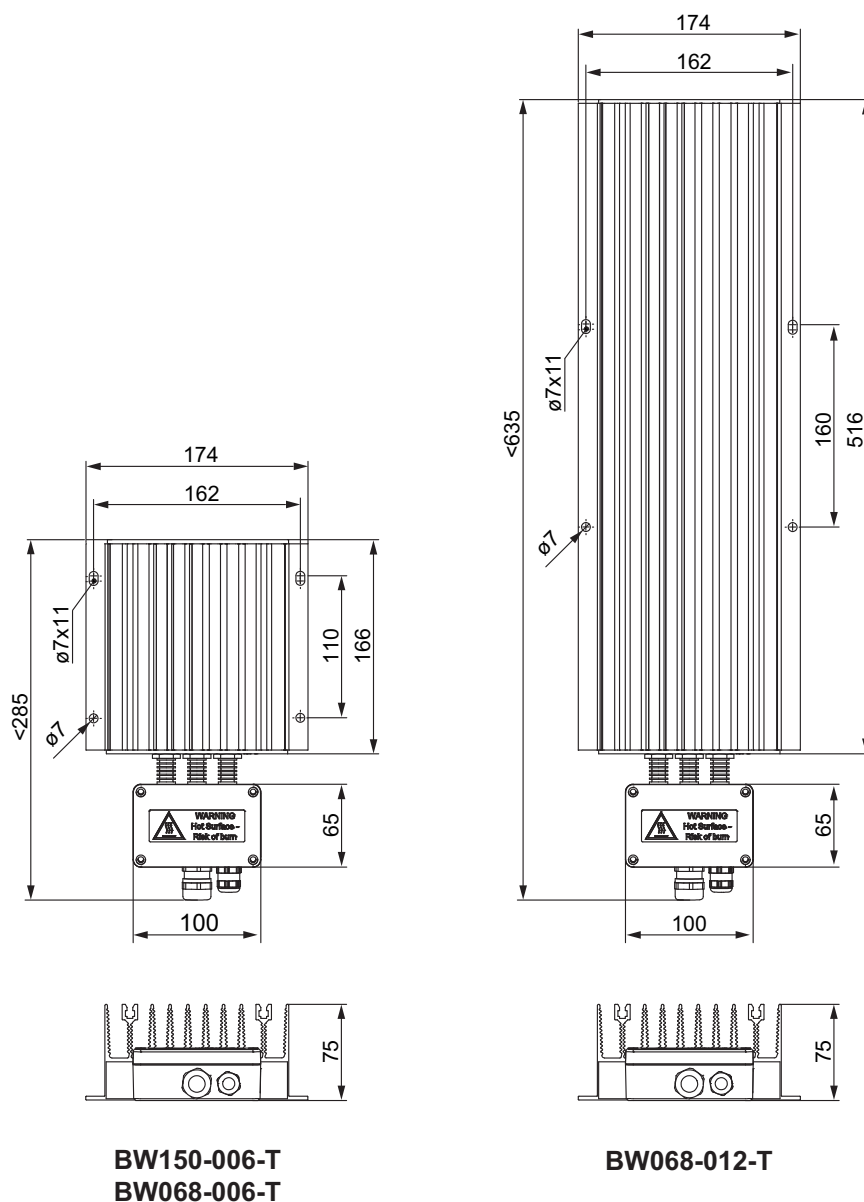
The following figure shows the dimensions of the external braking resistors BW100-003/K-1.5 and BW200-003/K-1.5:



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Dimension drawing of BW150-006-T, BW068-006-T and BW068-012-T

The following figure shows the dimensions of the external braking resistors BW150-006-T, BW068-006-T and BW068-012-T¹⁾:



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1) The braking resistor is equipped with a temperature sensor.