Validity information

These instructions are valid for brake resistors

- ERBS015R800W
- ERBS015R01K2
- ERBS015R02K4
- ERBS018R800W
- ERBS018R01K2
- ERBS018R01K4
- ERBS018R01K9
- ERBS018R02K8
- ERBS027R600W
- ERBS027R01K2
- ERBS027R01K4
- ERBS047R400W
- ERBS047R800W

Target group

This documentation is directed at qualified skilled personnel according to IEC 60364.

Qualified skilled personnel are persons who have the required qualifications to carry out all activities involved in installing, mounting, commissioning, and operating the product.

Tip!

Information and auxiliary devices around the Lenze products can be found in the download area at

http://www.Lenze.com

Document history

Material number	Version			Description
13314962	8.0	02/2011	TD29	Revision

Conventions used

Type of information	Identification	Examples/notes
Spelling of numbers		
Decimal separator	Point	In general, the decimal point is used. For instance: 1234.56
Warnings		
UL warnings		Are only given in English.
UR warnings		
Text		
Program name	» «	PC software For example: »Engineer«, »Global Drive Control« (GDC)
Icons		
Page reference	🕮	Reference to another page with additional information For instance: 🕮 16 = see page 16

Notes used

The following pictographs and signal words are used in this documentation to indicate dangers and important information:

Safety instructions

Structure of safety instructions:

Danger!

(characterises the type and severity of danger)

Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph and signal word	Meaning
 **Danger!**	**Danger of personal injury through dangerous electrical voltage.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 **Danger!**	**Danger of personal injury through a general source of danger.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 **Stop!**	**Danger of property damage.** Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

Application notes

Pictograph and signal word	Meaning
 **Note!**	Important note to ensure troublefree operation
 **Tip!**	Useful tip for simple handling
	Reference to another documentation

Special safety instructions and application notes for UL and UR

Pictograph and signal word	Meaning
 **Warnings!**	**Safety or application note for the operation of a UL-approved device in UL-approved systems.** Possibly the drive system is not operated in compliance with UL if the corresponding measures are not taken.
 **Warnings!**	**Safety or application note for the operation of a UR-approved device in UL-approved systems.** Possibly the drive system is not operated in compliance with UL if the corresponding measures are not taken.

General safety instructions

Danger!

Disregarding the following basic safety measures may lead to severe personal injury and damage to material assets!

- Lenze drive and automation components ...
  ... must only be used for the intended purpose.
  ... must never be operated if damaged.
  ... must never be subjected to technical modifications.
  ... must never be operated unless completely assembled.
  ... must never be operated without the covers/guards.
  ... can - depending on their degree of protection - have live, movable or rotating parts during or after operation. Surfaces can be hot.
- All specifications of the corresponding enclosed documentation must be observed.
  This is vital for a safe and trouble-free operation and for achieving the specified product features.
  The procedural notes and circuit details provided in this document are proposals which the user must check for suitability for his application. The manufacturer does not accept any liability for the suitability of the specified procedures and circuit proposals.
- Only qualified skilled personnel are permitted to work with or on Lenze drive and automation components.
  According to IEC 60364 or CENELEC HD 384, these are persons ...
  ... who are familiar with the installation, assembly, commissioning and operation of the product,
  ... possess the appropriate qualifications for their work,
  ... and are acquainted with and can apply all the accident prevent regulations, directives and laws applicable at the place of use.

Residual hazards

Danger!

Dangerous electrical voltage

The terminals of the brake resistor may carry dangerous voltages during operation of the basic device and **up to three minutes after mains disconnection**.

Possible consequences:

- ► Death or severe injuries when touching the terminals.

Protective measures:

- ► Before working on the brake resistor disconnect the basic device from the mains.
- ► Check all power terminals for safe isolation from supply.
- ► Select the mounting location so that the operating conditions mentioned in the technical data are always ensured.

Danger!

Hot surface during operation

During operation, the brake resistor becomes very hot. (For temperatures, see Technical data.)

Possible consequences:

- ► Severe burns when touching the brake resistor.
- ► Fire or smouldering fire if flammable materials or substances are placed near the brake resistor or may get to it.

Protective measures:

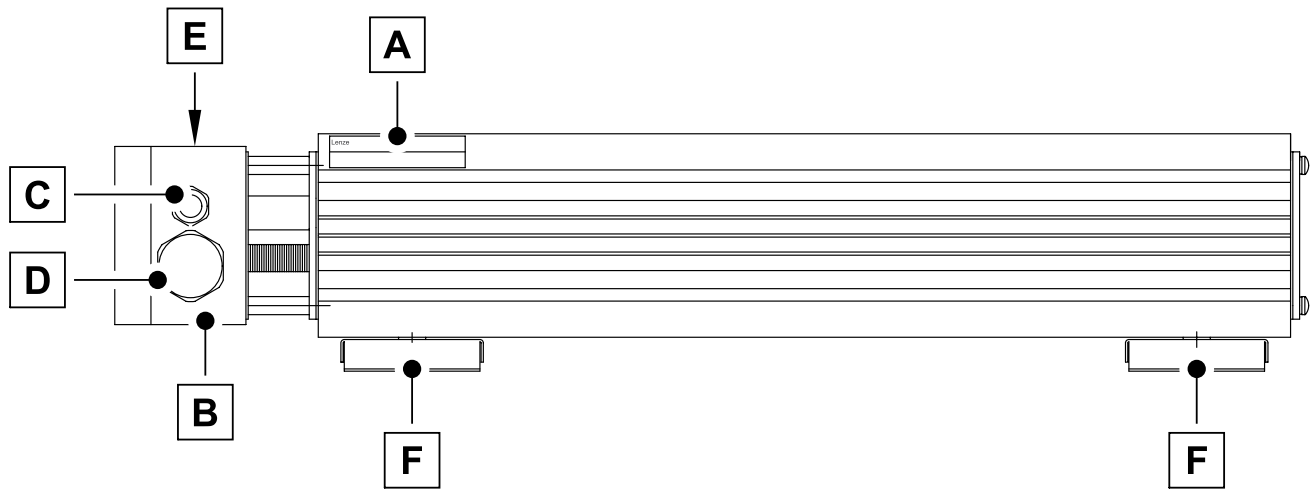
- ► Before working on the brake resistor, check its surface temperature.
- ► Select the mounting location so that the operating conditions mentioned in the technical data are always ensured.
- ► Protect the mounting location by suitable fire prevention and protection against contact.

Warnings!

Conditions of Acceptability:

- The products covered by this report are intended for use with Power Conversion Equipment (drives) only.
- The Temperature Switch must be connected to the drive, so that the drive switches off in case when the maximum operating temperature is exceeded.
- Temperature tests and abnormal operation tests have only been conducted for single resistive elements and for continuous duty as indicated under RATINGS. For any grouping of the resistor elements an additional temperature test must be conducted, depending on the evaluation of the mechanical construction and the expected temperature rise.
- For any duty cycle operation in the end-use application it must be guaranteed that the maximum Wattage rating will not be exceeded. This may be evaluated by calculation. If there will be any concern regarding to this, additional temperature tests have to be conducted under end-use conditions.

Overview



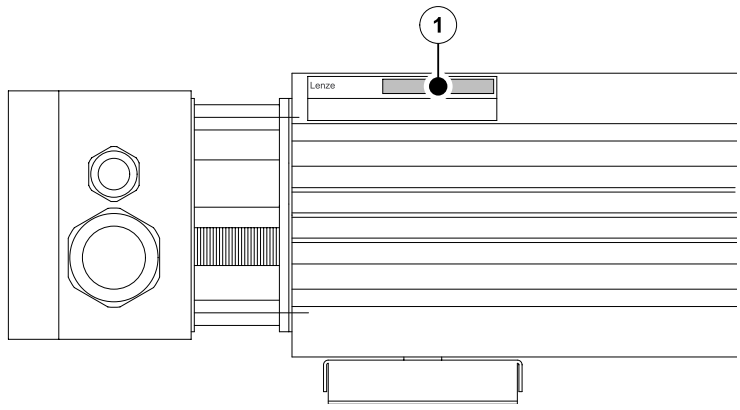
Scope of supply

Pos.	Description
	Brake resistor
	Mounting Instructions

Brake resistor elements

Pos.	Description
A	Nameplate
B	Terminal box
C	Cable gland for thermal contact cable
D	Cable gland for brake resistor cable
E	Warning note
F	Fixing bracket

Identification



ERBS104

	①		
Type code	**ERBx**	**xxxx**	**xxxx**

Product series

Resistance R_B [Ω]

e.g. 470R = 470 Ω
075D = 7.5 Ω

Permanent power P_d [W]

e.g. 120W = 120 W
01k2 = 1.2 kW

Application as directed

Brake resistors

- must only be actuated under the operating conditions specified in these operating instructions.
- are components
  - for mounting in a machine.
  - for assembly with other components to a machine.

  Commissioning of the brake resistor is prohibited until it has been determined that the machine into which the brake resistor is to be mounted complies with the regulations of the EC Machinery Directive.
- are electrical equipment for mounting in control cabinets or similar closed electrical operating areas.
- comply with the protective requirements of the ”Low voltage” EC Directive.
- are not machines as defined by the Machines EC Directive.
- are not household appliances, but are only designed as components for subsequent commercial use.

Drive systems with brake resistors

- The responsibility for compliance with the EC Directives in the machine application is that of the re-user.

Any other use shall be deemed inappropriate!

Dimensioning conditions

If brake resistors are used, observe the following:

- Mean value of regenerative power < permanent power P_d of the brake resistor.
- Regenerative power during braking time < heat quantity Q_B of the brake resistor.
- Braking time < 10 % of cycle time (braking time + dead time).
- Always connect the thermal contact and integrate it in a way into the system monitoring that the mains supply will be switched off when the standard device is overheated.

At all times, the following must apply: In the time interval $t_{cyc,RB}$ (brake resistor cycle) the cumulative braking times t_{brk} must always be $\leq$ of the maximum total braking time $t_{brk,max}$.

Calculation

Brake resistor cycle $t_{cyc,RB}$:

$$t_{cyc,RB} = \frac{Q_B}{P_d}$$ with

Q_B	Heat quantity in Ws
P_d	Permanent power in W

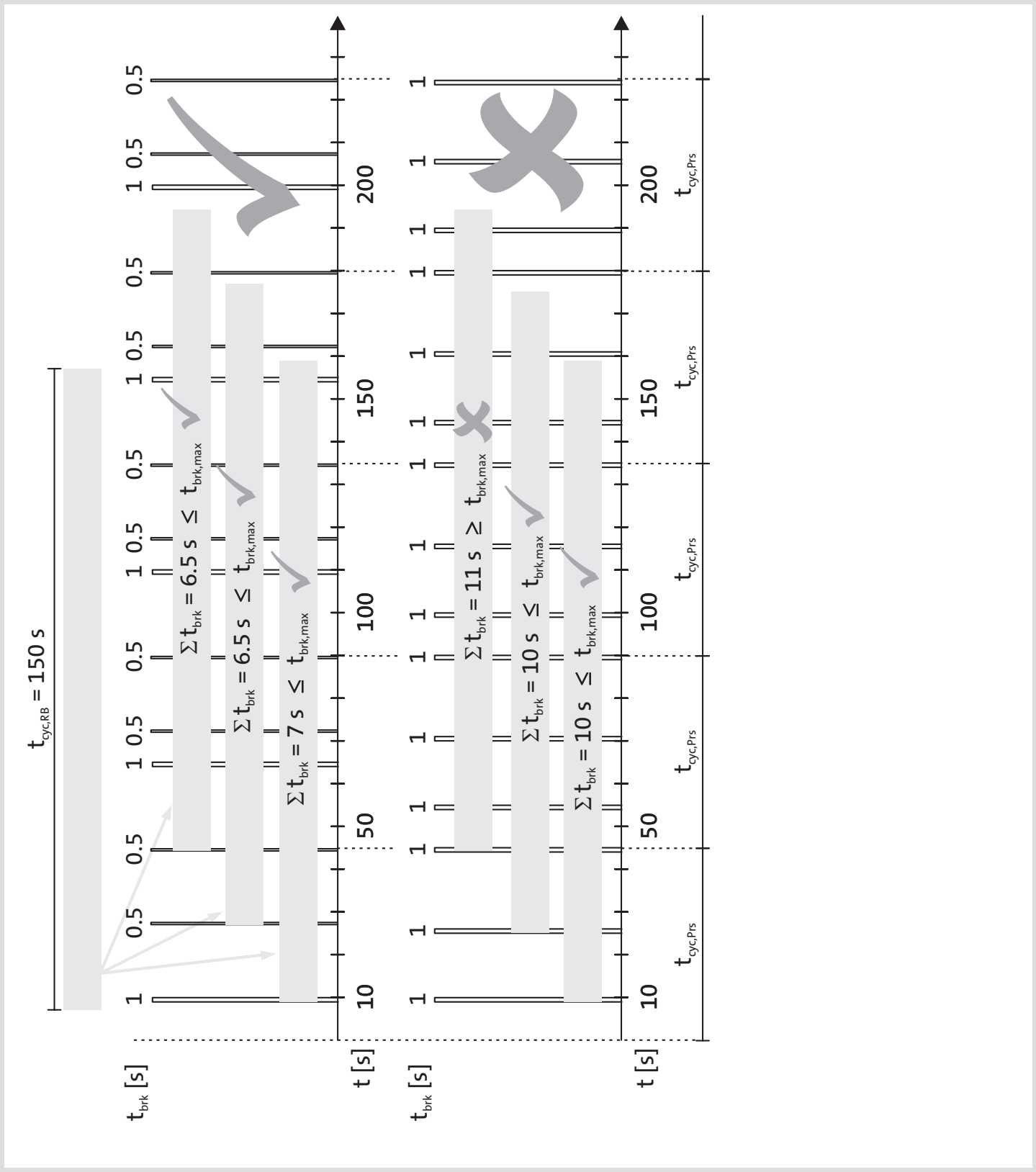
Max. total braking time $t_{brk,max}$ within the time interval $t_{cyc,RB}$:

$$t_{brk,max} = \frac{Q_B \cdot R_B}{U_{max}^2}$$ with

Q_B	Heat quantity in Ws
R_B	Resistance in Ω
U_{max}	Max. operating voltage in V

Examples of the evaluation of the condition

The brake resistor cycle **$t_{cyc,RB}$ = 150 s** and the max. total braking time **$t_{brk,max}$ = 10 s** are given. The braking times **t_{brk}** and the process cycle **$t_{cyc,Prc}$** are exemplary.



In the above example, the dimensioning condition is observed at all times. In the example below, the dimensioning condition is once not observed, which means that the brake resistor selected is not suitable for the process specified. Use a brake resistor with a greater power (shorter brake resistor cycle $t_{cyc,RB}$).

General data and operating conditions

Conformity and approval		
Conformity		
CE	2006/95/EC	Low-Voltage Directive
Approval		
UR	UL508	Industrial Control Equipment, Underwriter Laboratories (File-No. E232497) for USA and Canada

Protection of persons and equipment		
Enclosure	EN 60529	IP65
	NEMA 250	Protection against contact to type 4
Thermal contact		
Design		NC contact, 230 °C
Switching capacity		250 V AC / 5 A

Environmental conditions		
Climate		
Storage	IEC/EN 60721-3-1	1K3 (-25 ... +60 °C)
Transport	IEC/EN 60721-3-2	2K3 (-25 ... +70 °C)
Operation	IEC/EN 60721-3-3	3K3 (-10 ... +55 °C) Current derating from +45 ... +55 °C: 2.5 %/°C
Site altitude		0 ... 4000 m amsl 1000 ... 4000 m amsl: Current derating 5 %/1000 m
Vibration resistance (9.81 m/s² = 1 g)	EN 50178, IEC 61800-5-1, Germanischer Loyd, general conditions	Acceleration resistant up to 1 g

Mounting conditions		
Mounting location		• The mounting location must comply with the device features mentioned in the chapter ”General data”. • Flammable materials or substances may not be placed in the vicinity of the brake resistor. • The heat generated by the brake resistor must be dissipated freely.
Mounting position		
Standard		Vertically suspended with connections at the bottom
Variant		Horizontally standing with fixing bracket at the bottom
Free spaces		
Standard		📖 48
Variant		📖 49

Rated data

Electrical data

	R_B	P_d	Q_B	U_{max}
	[Ω]	[W]	[kWs]	[V_{DC}]
ERBS015R800W	15	800	120	800
ERBS015R01K2		1200	180	
ERBS015R02K4		2400	420	
ERBS018R800W	18	800	120	
ERBS018R01K2		1200	180	
ERBS018R01K4		1400	210	
ERBS018R01K9		1900	285	
ERBS018R02K8		2800	420	
ERBS027R600W	27	600	90	
ERBS027R01K2		1200	180	
ERBS027R01K4		1400	210	
ERBS047R400W	47	400	60	
ERBS047R800W		800	120	

R_B Resistance
P_d Permanent power
Q_B Heat quantity
U_{max} Max. operating voltage

Temperatures			
	T_{nom}	T_{TK}	T_{max}
	[°C]		
On the surface	250	400	1000
On the clearance edge *)	120	200	300

T_{nom} Maximum temperature for rated data

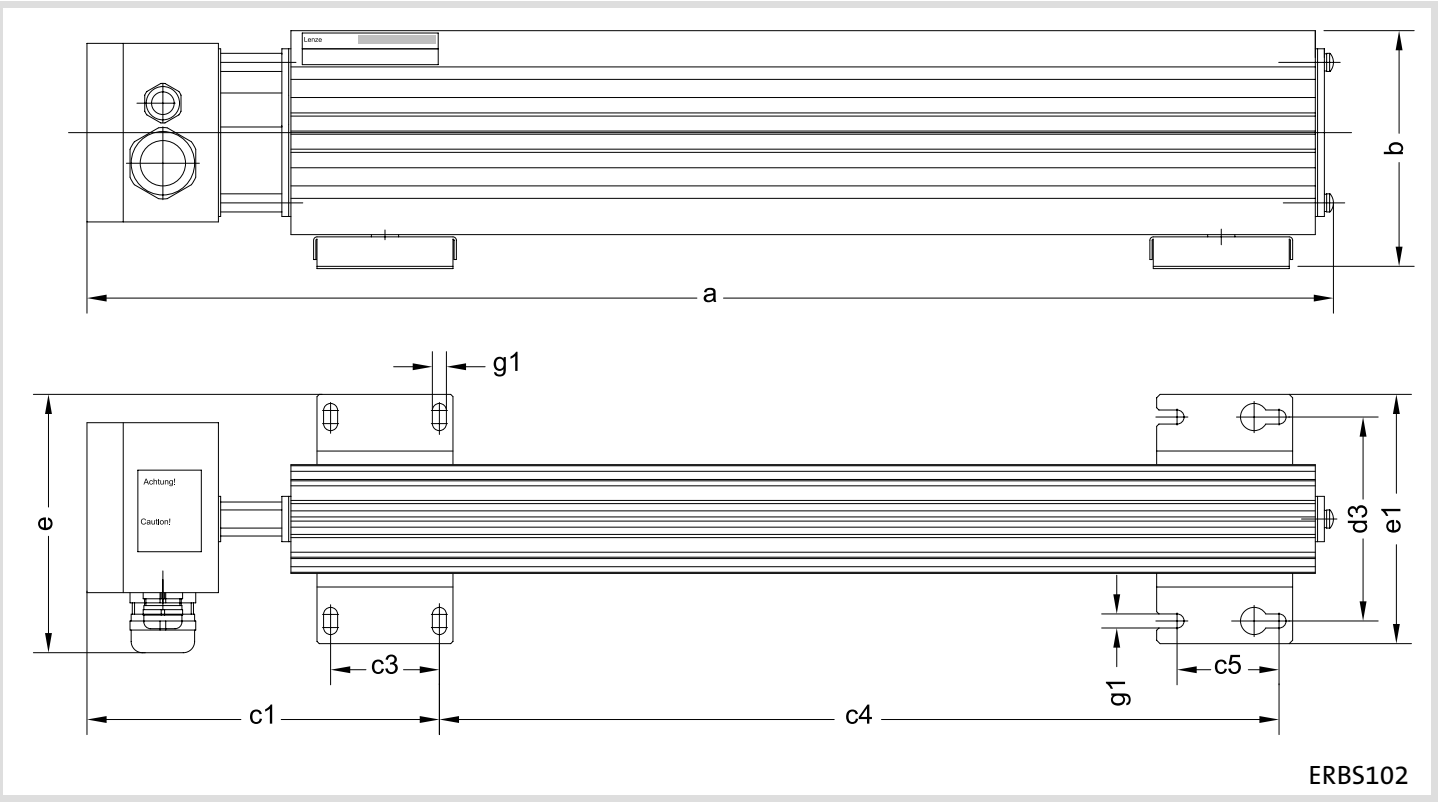
T_{TK} Temperature at which the thermal contact is activated

T_{max} Maximum temperature in the case of improper use

*) Measured for air as the ambient medium (small coefficient of thermal conductivity); if materials which heat up are located at the clearance edge (greater coefficient of thermal conductivity), the temperature continues to rise.

Mechanical data

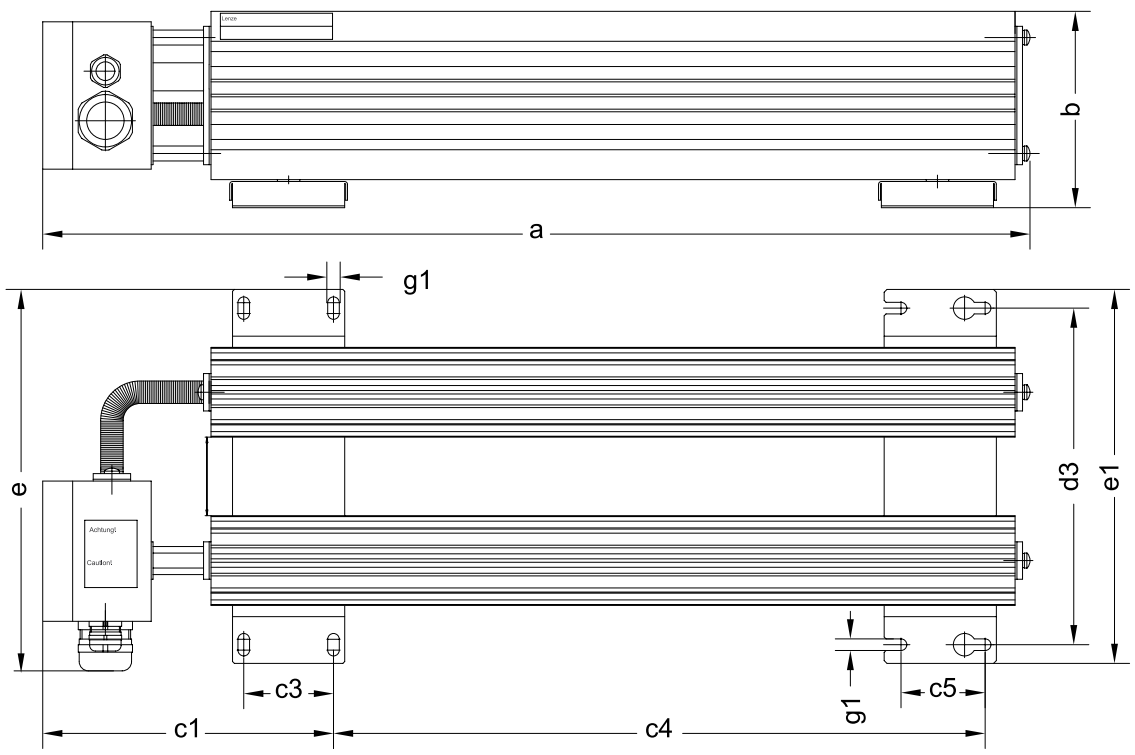
Design 1



ERBS102

	a	b	c1	c3	c4	c5	d3	e	e1	g1	
	[mm]										[kg]
ERBS015R800W	710	105	155.5	48	531	45	90	114	110	6.2	4.0
ERBS015R01K2	1020				841						5.6
ERBS018R800W	710				531						4.0
ERBS018R01K2	1020				841						5.6
ERBS018R01K4	1110				931						6.3
ERBS027R600W	550				371						3.1
ERBS027R01K2	1020				841						5.6
ERBS027R01K4	1110				931						6.3
ERBS047R400W	400				221						2.3
ERBS047R800W	710				531						4.0

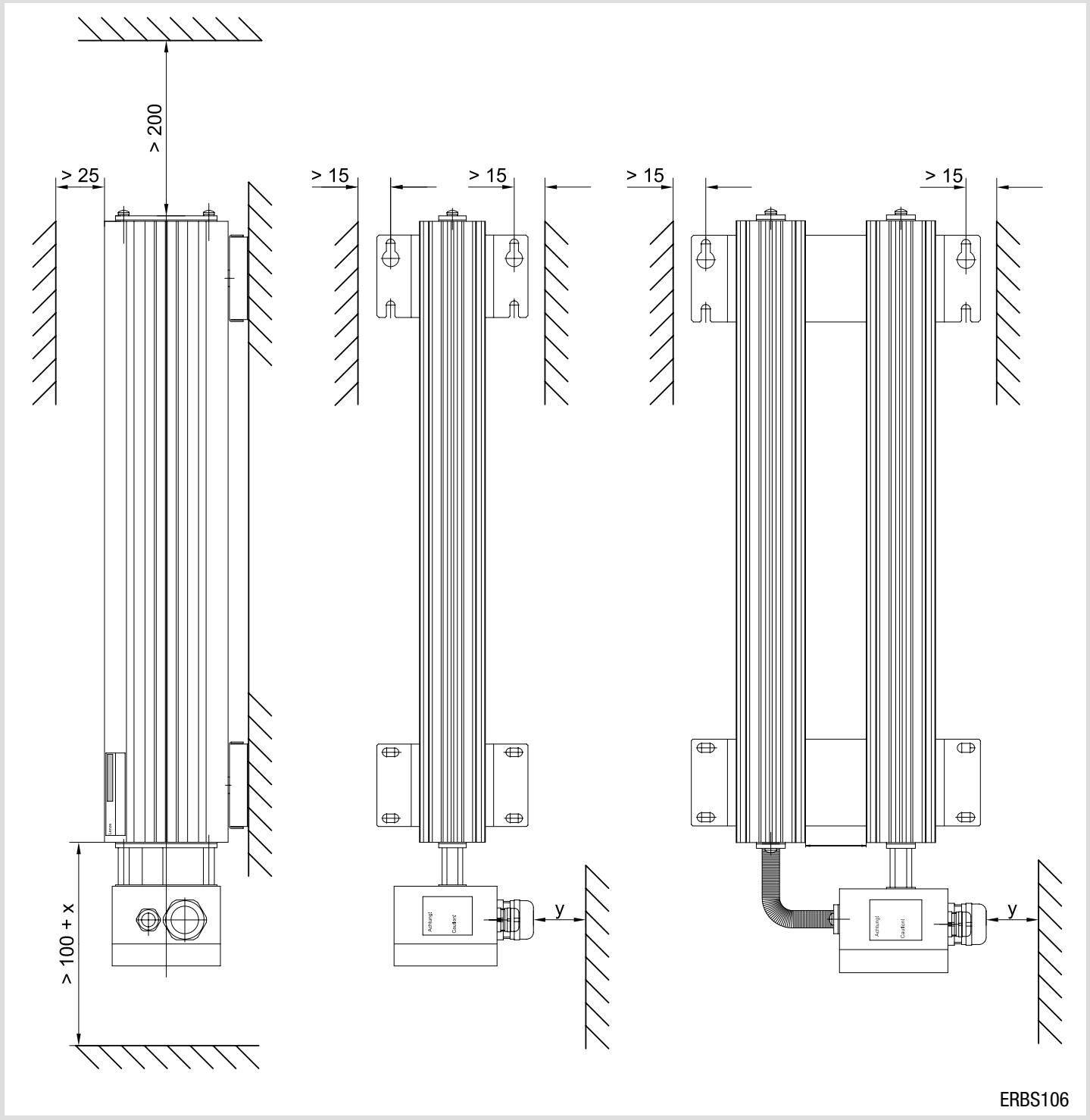
Design 2



	a	b	c1	c3	c4	c5	d3	e	e1	g1	
	[mm]					[mm]					[kg]
ERBS015R02K4	1020	105	155.5	48	841	45	180	204	200	6.2	10.0
ERBS018R01K9	825				646						8.7
ERBS018R02K8	1110				931						12.0

Mounting clearance

Free spaces for standard mounting

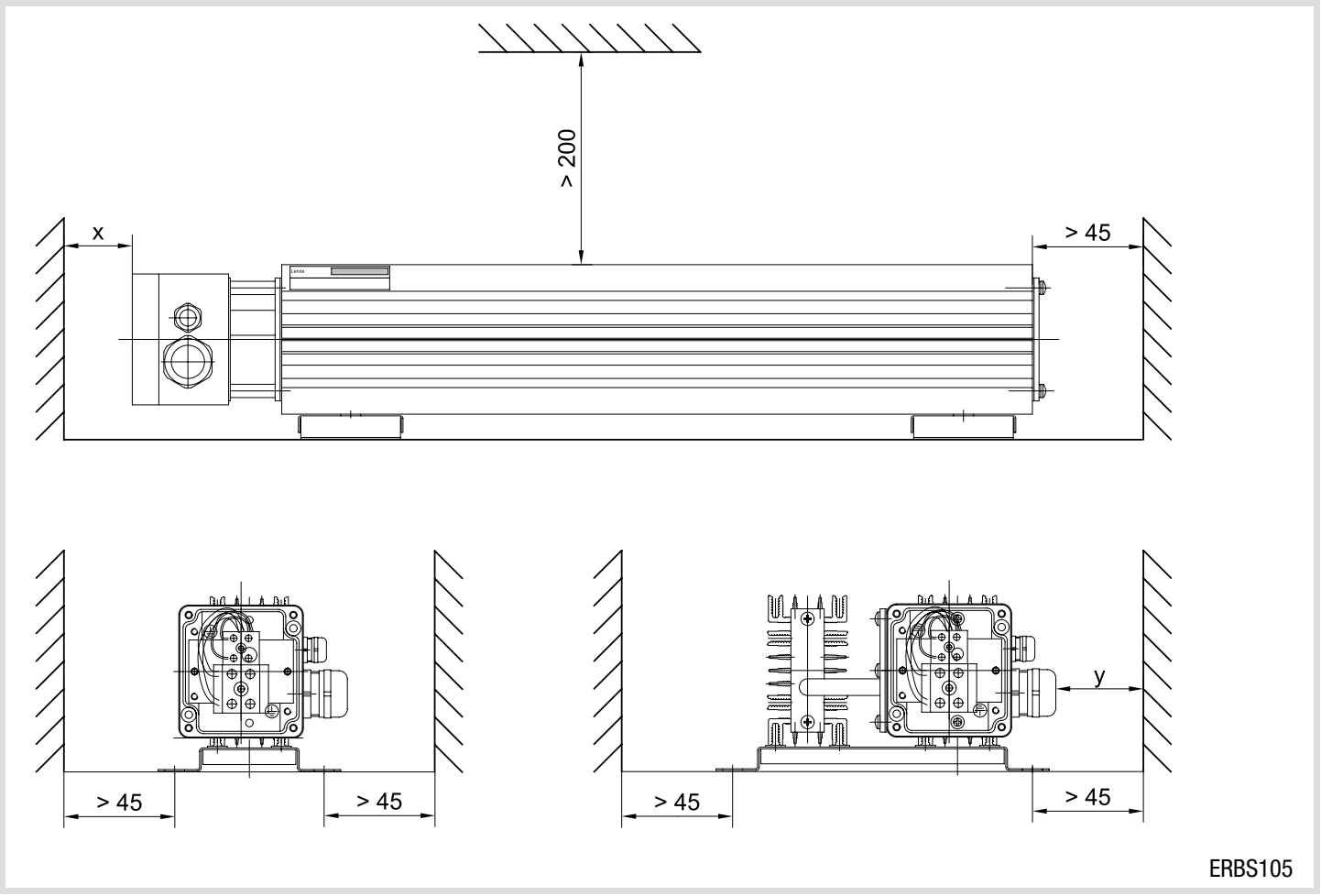


x Wiring clearance

y Cable bending radius

All dimensions in millimetres

Free spaces for mounting variant



x Wiring clearance

y Cable bending radius

All dimensions in millimetres

Mounting steps

How to mount the brake resistor:

1. Select a suitable mounting location.
   – The mounting location must always ensure the operating conditions mentioned in the technical data; if required, additional measures must be taken.
   – Ensure unimpeded air circulation for heat dissipation.
2. Screw down the brake resistor at the mounting location.
   – The mounting location and the mounting material must ensure the permanent mechanical connection.

Important notes

Stop!

Possible overheating of the brake resistor during operation

Inadequate heat dissipation during operation can cause the brake resistor to overheat.

Possible consequences:

- ► The brake resistor is destroyed.
- ► The drive is not braked but coasts to a standstill.

Protective measures:

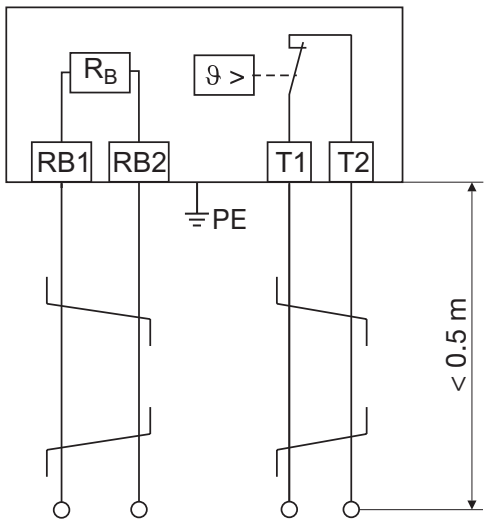
- ► Always connect the thermal contact of the brake resistor.
- ► Integrate the thermal contact into the overall equipment monitoring apparatus in such a way that the supply of power to the standard device is switched off if the brake resistor overheats (e.g. switch-off by means of mains contactor control).

Connection data

	Cable gland	Type of connection	Size of connection	Tightening torque
RB1, RB2 (brake resistor)	M25	Screw terminal	0.5 ... 10 mm² 20 ... 6 AWG	1.5 ... 1.8 Nm 13.3 ... 15.9 lb-in
PE (PE conductor)		Screw	M4	2.2 ... 2.7 Nm 19.5 ... 23.9 lb-in
T1, T2 (thermal contact)	M12	Screw terminal	0.25 ... 4 mm² 24 ... 12 AWG	0.6 ... 0.8 Nm 5.3 ... 7.1 lb-in

Connection plan

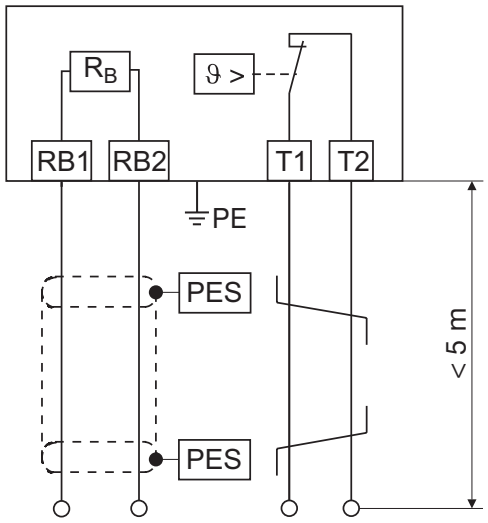
Version 1 (short cables)



ERBG008

Twisted cables

Version 2 (long cables)

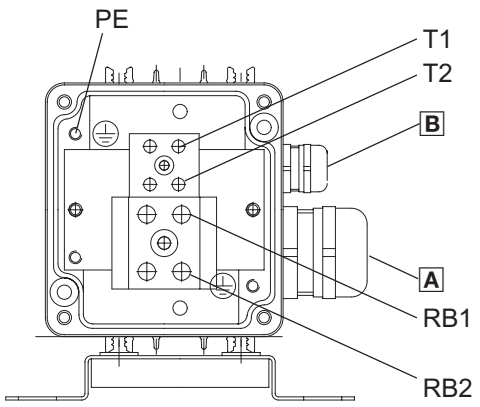


ERBG007

PES HF-shield termination by extensive PE connection

Twisted cables

Mounting steps



ERBS103

How to connect the brake resistor:

1. Disconnect the basic device from the mains and check that no voltage is applied to the power terminals.
2. Remove the terminal cover.
3. Connect the brake resistor cable:
   - Use a twisted cable for cables up to 0.5 m (connection plan variant 1).
   - Use a shielded cable for cables up to 5 m (connection plan variant 2).
   - Pass the cable through the cable gland A.
   - Connect the cores to connections RB1, RB2 and PE of the brake resistor observing the tightening torque. PE connection to EN 61800-5-1.
   - Tighten the cable gland A.
     For shielded cables: Securely connect the shield to the cable gland with a surface as large as possible.
   - Connect cores and shield to the basic device observing the documentation for the basic device.
4. Connect the thermal contact cables:
   - Use a twisted cable.
   - Pass the cable through the cable gland B.
   - Connect the cores to connections T1 and T2 of the brake resistor observing the tightening torque.
   - Tighten the cable gland B.
   - When integrating the thermal contact into the system monitoring ensure that the mains supply will be switched off when the brake resistor is overheated.
5. Mount the terminal cover.

Maintenance intervals

The brake resistor is maintenance-free. Nevertheless, a visual inspection must be executed in short and regular intervals considering the ambient conditions.

Ensure that:

- ► the environment of the brake resistor still corresponds to the operating conditions included in the technical data.
- ► no dust or dirt impedes the heat dissipation of the brake resistor.
- ► the mechanical and electrical connections are correct.

Maintenance operations

Cleaning the brake resistor

1. Disconnect the standard device from the mains and wait at least three minutes.
2. Check temperature of the brake resistor and allow it to cool, if required.
3. Check the brake resistor for safe isolation from supply.
4. Clean brake resistor without using cleaning agents.