

CMT R1-3000



Betriebsanleitung



MADE IN GERMANY

ISO 9001
BUREAU VERITAS
Certification



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IMPORTANT:
Before usage of product
read with care and follow instructions.
Store for later look-up.

1. Introduction

a) Information for handling of instructions

This instruction manual is part of the product “**cmt Mini-Decade R1-3000**” (hereafter “*decade*”) and gives you important notice and instructions for the intended use, safety and appliance of your new resistor decade.

This instruction manual shall be kept in proximity of the decade. Every user must read it und apply its instructions, who is in charge of appliance and fault diagnostics. Store this manual thoroughly and forward it to the next user, respectively owner.

If this manual gets lost, you can reorder it from the manufacturer “COSINUS Messtechnik GmbH” by product type “**cmt Mini-Decade R1-3000**”.

b) Copyright

This instruction manual is copyright protected.

Every reproduction or duplication, as well extracts, even in altered state is only permitted by written approval from the manufacturer.

Content and formal design of this manual complies with current version of EN 82079-1:2013-6 „Preparation of instructions for use“.

c) Limited Liability

Every given information, data and notice refer to the latest state at date of print and refer to our best knowledge, expertise and experience.

No right for claims can be derived from the given data, figures or descriptions.

The manufacturer assumes no liability for damages due to inobservance of the given warnings and notices, misuse, inappropriate repair, unauthorised changes or use of non-approved spare parts.

d) Target Group

The target group for this product and manual consists of skilled personnel, who are able to evaluate their tasks and identify and avoid probable risks due to their technical education, electrotechnical knowledge and experience as well as acquirement of relevant electrotechnical regulations.

e) Intended Use

Persons of the target group shall use the resistor decade only after carefully reading and understanding of these instructions.

There is a wide range of appliances for this decade needing switchable, simply and quickly variable resistors.

You are out of the intended use **at the latest**, if you exceed the maximum values given in the appendix under “technical data”. This shall be avoided in any case !

Please note urgently, that **even with far lower values** you might leave the intended use and damage your decade.

All users must get thoroughly familiar with the given warnings, attentions and notices !

2. Safety

a) Basic Safety Instructions

For safe use of your decade consider the following basic safety instructions:

- Before every use check your decade for visible outer damage. Never use a damaged decade – there is a electric shock hazard, if you connect your damaged decade to voltages higher than 50 V AC rms or 120 V DC !
- Repairing of your decade shall only be undertaken by authorised enterprise or the manufacturer. Non-appropriate repair may result in severe dangers for the users. As well as your warranty gets invalid if you open the decade. (For changing the fuse refer to chapter 5 “change of fuse”.)
- Application of this resistor decade needs basic electrotechnical knowledge. Intended use comprises the user belonging to the target group.

b) Warning and Safety Instructions Used

The following warning symbols and levels of safety instructions are used in this manual:



A warning of this risk level indicates a possibly dangerous situation.

→ Follow the instructions to avoid risk of death or severe personal injury.

IMPORTANT

A warning of this risk level indicates a possibly dangerous situation.

→ Follow the instructions to avoid risk of personal injury.

ATTENTION



A warning of this risk level indicates a possible damage of your decade and / or your equipment and points to a particularly noticeable fact.

→ Follow the instructions to avoid damage of your equipment.

ATTENTION

A warning of this risk level indicates a possible damage of your decade and / or your equipment.

→ Follow the instruction to avoid damage of your equipment.

NOTICE

→ A notice gives additional information, which assists you in proper using your decade.

3. First Use

a) Scope of Delivery

- 1 Mini-Decade R1-3000
- 2 spare fuses
- 1 instruction manual

NOTICE

→ Check for the scope of delivery and possible visible damage.

→ If you detect missing parts or damage due to transportation please contact the manufacturer.

a) Packaging

Packaging protects the decade from transportation damage.

The packaging materials are selected from the point of view of their environmental friendliness and disposal technology and are therefore recyclable.

The recirculation of packaging saves raw material and reduces the amount of waste generated. Dispose your packaging that is no longer needed as per regionally established regulations.

NOTICE

→ If possible preserve the decade's original packaging during the warranty period so that, in the event of a warranty claim, you can reuse the packaging for returning the decade.

4. Appliance Description

a) Basic Functions

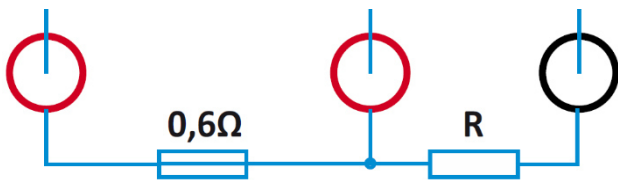
The "Mini-Decade R1-3000" is basically an arrangement of 28 switchable resistors, all connected in series, which can individually be activated by 28 slide switches.

By using the slide switches any resistor value from **1 Ohm to 1,11111 MOhm** in 1 Ohm-steps can be applied. A single resistor value is activated, if the corresponding slide switch

is in the upper “1” position and “off”, if the corresponding slide switch is in the lower “0” position. The resulting total resistor value is calculated by the sum of all single activated resistors.

NOTICE

→ refer to the example at the back side of the decade:



Part from figure on the back side of the decade:

It displays the connections of the decade. Right in black is the common connection. If you additionally use the middle (red)

connection only the totally activated resistor value R is applied. If you use the left red and right black connections, there is an additional fuse (with around $0,6 \Omega$) in series to the resistor value R . The delay micro-fuse has an operational current of 400 mA.

ATTENTION

→ Fundamentally the decade is a purely passive appliance, which neither has a voltage monitoring nor shutdown due to overvoltage.

→ The user has to make sure NOT overloading the decade !

→ Do not apply any voltage to the decade if there is no activated resistor !

Even with low voltages (and possibly resulting high currents) damage or even destruction of the decade may occur.

NOTICE

Maximum operation values, which result from the maximum power rating of 3 W, are given in the chapter “maximum power rating”.

NOTICE

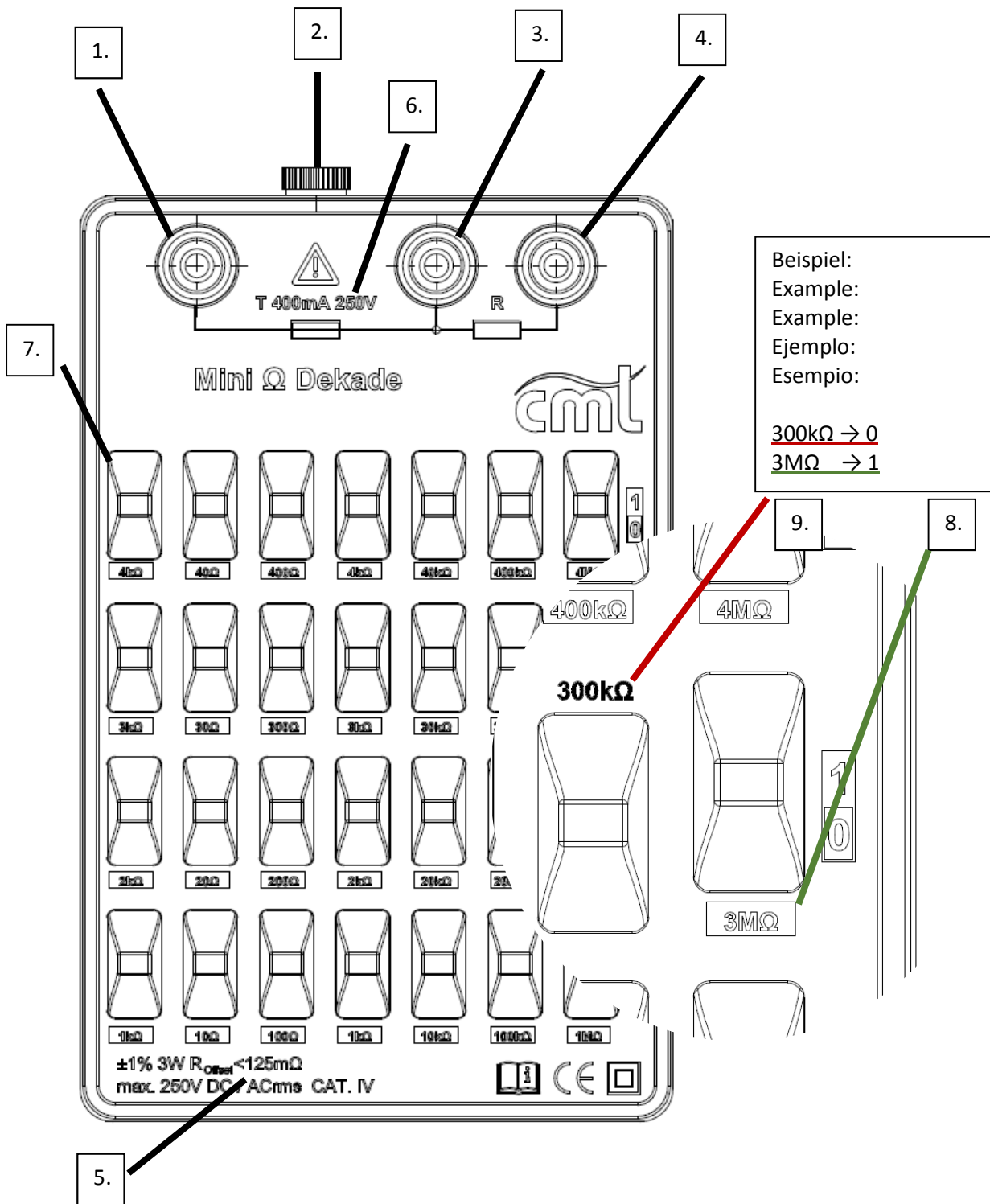
→ Ambient temperature range for use of the decade is from -20 to $+60^{\circ}\text{C}$ (-4 to 140°F).

→ At high temperatures there may deviations in resistor accuracy of the decade.



This decade is an electrotechnical appliance of protection class II.

b) Design



Legend:

- 1. Measuring connection with fuse
- 2. Fuse holder
- 3. Measuring connection without fuse
- 4. Common measuring connection
- 5. Nominal type values
- 6. Fuse information
- 7. Slide switch
- 8. Activated ("on") resistor value
- 9. Not activated ("off") resistor value

c) Maximum Power Rating

The decade has a total maximum power rating of **3 Watt**.

ATTENTION

→ The maximum power rating shall not be exceeded, as damage or even destruction of the decade may occur.

→ Limit applied voltage in relation to maximum activated resistor according to **table 1**.

IMPORTANT

→ DO NOT APPLY ANY voltage to the decade without activated resistor !

→ This may lead to immediate destruction of the decade and in combination with high voltages even to personal injury !

NOTICE

The maximum operational voltage V_{\max} , which is allowed to be applied according to maximum power rating of 3 W is calculated in the following way with the maximum activated resistor R_{on} :

$$V_{\max} = (3 \text{ W})^2 / R_{\text{on}}$$

Table 1 shows maximum operational voltage V_{\max} in relation to maximum activated resistor R_{on} at maximum power rating of 3 W:

R_{on}	V_{\max}	I
Maximum activated resistor	Maximum operational voltage	Maximum resulting current
1 Ω	1,7 V	1,7 A
2 Ω	2,4 V	1,2 A
3 Ω	3 V	1 A
4 Ω	3,4 V	866 mA
10 Ω	5,4 V	547 mA
20 Ω	7,7 V	387 mA
30 Ω	9,4 V	316 mA
40 Ω	10,9 V	273 mA
100 Ω	17,3 V	173 mA
200 Ω	24,4 V	122 mA
300 Ω	30 V	100 mA
400 Ω	34,6 V	< 100 mA
1 k Ω	54,7 V	< 100 mA
2 k Ω	77,4 V	< 100 mA

3 k Ω	94,8 V	< 100 mA
4 k Ω	109,5 V	< 100 mA
10 k Ω	173,2 V	< 100 mA
20 k Ω	244,9 V	< 100 mA
30 k Ω	250 V	< 10 mA
40 k Ω	250 V	< 10 mA
100 k Ω	250 V	< 10 mA
200 k Ω	250 V	< 10 mA
300 k Ω	250 V	< 1 mA
400 k Ω	250 V	< 1 mA
1 M Ω	250 V	< 1 mA
2 M Ω	250 V	< 1 mA
3 M Ω	250 V	< 1 mA
4 M Ω	250 V	< 1 mA

Table 1.

NOTICE

→ 3rd column of table 1 gives maximum resulting current at maximum power rating of 3 W.

With use of fuse connections (far left and right connections):

→ Limit resulting current by activating appropriately high resistor values and / or appropriately low applied voltage to limit resulting current below nominal fuse rating of 400 mA .

→ At higher currents the micro-fuse may trigger and has to be changed for further use of the decade. In this refer to chapter 5. “change of fuse”.

d) Maximum Operational Voltage

This decade is approved for a **maximum voltage of 250 V AC rms / DC**.

IMPORTANT

→ DO NOT APPLY any higher voltage than **250 V AC rms / DC** to the connections of the decade !

→ DO NOT APPLY ANY voltage to the connections of the decade without any activated resistor ! This may lead to damages and even total destruction of the decade as well as to personal injury particularly in the case of “no activated resistor” or “use of connections without fuse”, i.e. right black and middle red connections.

ATTENTION

- In relation to the activated resistor value the **maximum allowed operational voltage** V_{\max} may possibly be **significantly lower** than the maximum voltage of 250 VAC rms / DC due to the **maximum power rating of 3 W !**
- Up to a maximum activated resistor value of **20k Ω** the applied voltage must be lower than the maximum voltage of 250 V to avoid overloading of the resistors.
- Limit voltage to be applied according values given in **table 1**.

NOTICE

- Reversely concluded all activated resistors from 30k Ω upwards are protected from overloading up to the maximum decade voltage of 250 VAC rms / DC.

e) Fuse

The micro-fuse is approved for a nominal current of 400mA. If using the two fuse connections (far left and right socket), the fuse may trigger at higher currents.

NOTICE

- If using the two fuse connections activated resistor values only up to a **maximum of 20 Ω** are protected from overloading !



ATTENTION

- Main function of the fuse comprises protection of the decade and equipment from destruction in case of no or low activated resistors.
- In the resistor range from 20 Ω to 30 k Ω applied voltages even far lower than 250 V AC rms / DC may overload the decade independent of using the fuse connections or not !
- refer to limits in table 1.

f) Conformity

The appliance "cmt Mini-Decade R1-3000" conforms to the current version of **IEC 61010-1:2010 (3rd Edition) + Cor.: 2011** und **IEC 61010-2-030: 2010 (1st Edition)** at date of print.

NOTICE

→ If you have any further technical questions, please directly contact the manufacturer under:

www.cosinus.de

office@cosinus.de

5. Maintenance

a) Change of Fuse

The decade's fuse may only be changed by a person belonging to the target group (cf. chapter 1 "Target group").



→ There is possible hazard of electric shock in case of applied voltage when changing the fuse, which may lead to death or severe personal injury !!!

→ **DISCONNECT ALL** connection cables from the decade **BEFORE** removing the fuse holder !!!

NOTICE

→ The fuse holder is located on top of the decade box as described in chapter 4 "design".



ACHTUNG

→ Only use identical fuses type **5x20mm 400mA, delay, AC/DC**.

→ If using different types of fuses the decade may be damaged or even destroyed under certain circumstances.



→ **NEVER** short the fuse holder with any conducting material !
→ Like using a wrong fuse this may lead to destruction of the decade even easier !

b) Fault Diagnostics

NOTICE

→ If any disturbance occurs, first check the fuse for its function. In case of a triggered fuse, change it according to the previous chapter “change of fuse”.

→ If the problem persists or the cause does not refer to the fuse, stop using the decade and contact the manufacturer, e.g. under office@cosinus.de.

c) Calibrating

Factory-provided every decade has been calibrated to ensure accuracy according to “technical data” in the appendix.

NOTICE

→ Over the years the resistor values may show higher deviation.

→ If you wish a re-calibration, please contact the manufacturer.

d) Cleaning

After disconnecting ALL connection cables every person may clean the decade with a moist (not wet!) cleaning tissue under application of a mild (not aggressive!) cleanser.

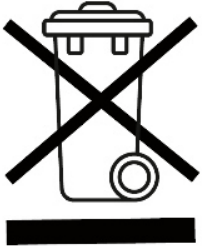
ATTENTION

→ Take care that no liquids get into the decade.

6. Storage

If you do not use your decade, store it on a dry and tidy place away from direct sunlight.

7. Disposal



Do not dispose of the decade into normal household waste.

This product is subject to the provisions of the European Directive 2012/19/EU (Waste Electrical and Electronic Equipment).

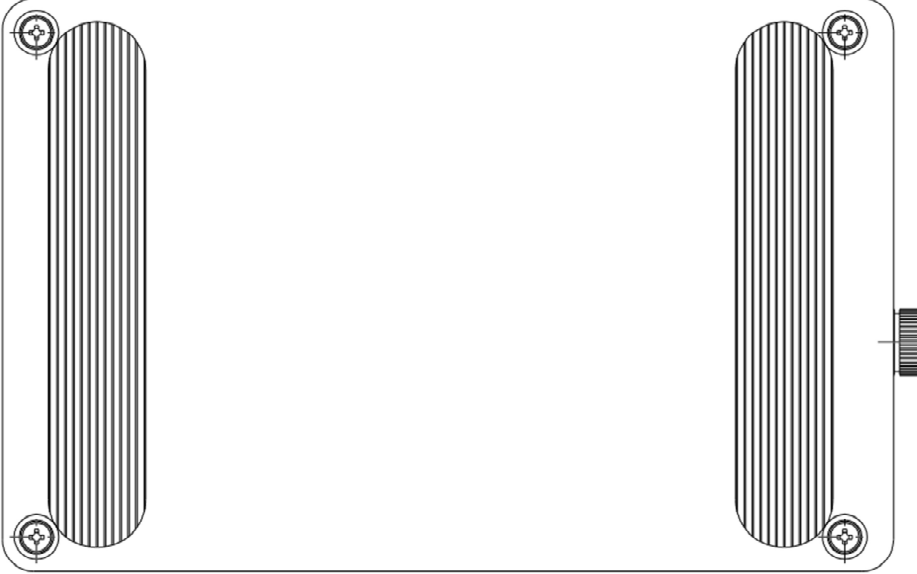
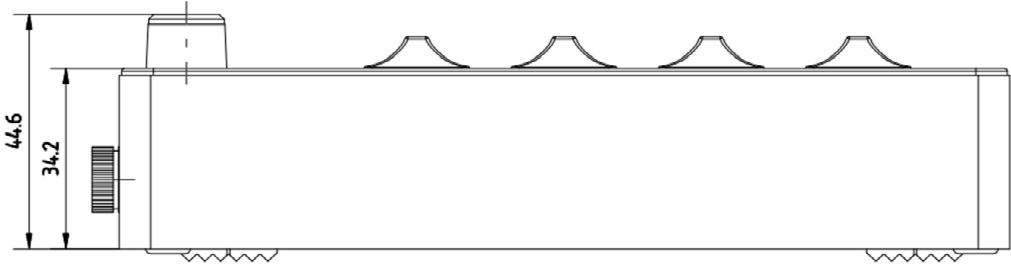
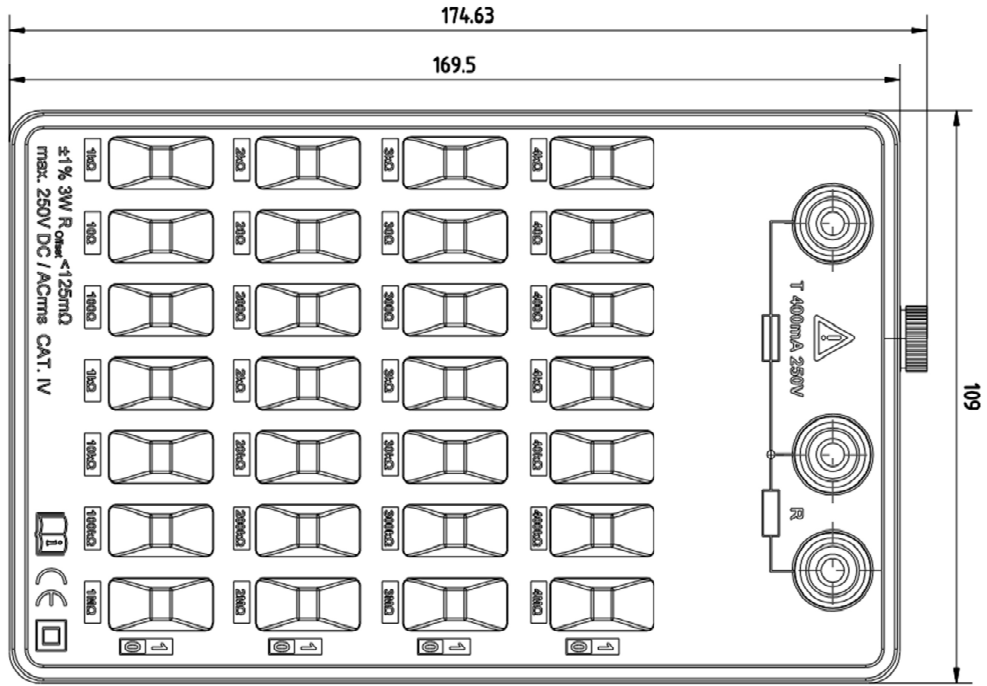
Dispose the decade through an approved disposal centre or at your community waste facility. Pay heed to the currently applicable regulations. In case of doubt, please contact your local waste disposal centre.

8. Appendix

a) Technical Data

Maximum voltage	250 V rms AC/DC
Maximum power rating	3 W
Maximum operational voltage	refer to table 1 .
Overvoltage category	CAT. IV 300 V
Protection class	II
Tolerance	± 1 %
Residual resistor	≤ 125 mOhm
Fuse	400 mA / delay / 250V AC/DC, 5x20mm ²
Ambient temperature range	-20°C to + 60°C / -4°F to 140°F
IP-protection degree	IP21
Dimensions	L 170 x B 110 x H 45 mm ³
Weight	ca. 360g

b) Dimensions



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