WMZ

RESOL®

Calorimeter

Manual for the
specialised craftsman

Mounting
Connection
Operation

11205052

Thank you for buying this RESOL product.
Please read this manual carefully to get the best performance from this unit.
Please keep this manual safe.

en
Manual
www.resol.com

Safety advice

Please pay attention to the following safety advice in order to avoid danger and damage to people and property.

Instructions

Attention must be paid to the valid local standards, regulations and directives!

Information about the product

Proper usage

The WMZ is to be used for the measurement and the display of heat quantity and other system data in compliance with the technical data specified in this manual. Improper use excludes all liability claims.

CE Declaration of conformity

The product complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available on request, please contact the manufacturer.

Note
Strong electromagnetic fields can impair the function of the device.
➔ Make sure the device as well as the system are not exposed to strong electromagnetic fields.

Target group

These instructions are exclusively addressed to authorised skilled personnel.
Only qualified electricians should carry out electrical works.
Initial installation must be effected by the system owner or qualified personnel named by the system owner.

Description of symbols

WARNING!

Warnings are indicated with a warning triangle!
➔ **They contain information on how to avoid the danger described.**

Signal words describe the danger that may occur, when it is not avoided.

- **WARNING** means that injury, possibly life-threatening injury, can occur.
- **ATTENTION** means that damage to the appliance can occur.

Note
Notes are indicated with an information symbol.

➔ Arrows indicate instruction steps that should be carried out.

Disposal

- Dispose of the packaging in an environmentally sound manner.
- Dispose of old appliances in an environmentally sound manner. On request we will take back your old appliances bought from us and guarantee an environmentally sound disposal of the devices.

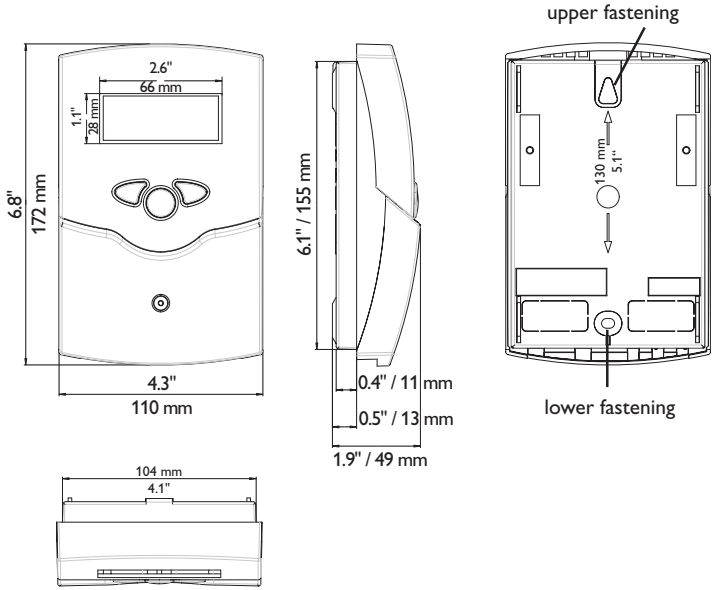
WMZ Calorimeter

Universal calorimeter module for solar and heating systems. Graphic display for indication of flow and return temperature, heat quantity, flow rate and sensor faults (balance values are also stored in the case of a power failure). Suited for solar systems with water or water-glycol mixtures (water, propylene glycol, ethylene glycol and Tyfocor® LS adjustable).

Contents

Overview

- **Energy, temperature and flow rate displays with imperial units**
- **Commissioning menu for easy configuration**
- **Available for different voltages**



Technical data

Sensors: RESOL Pt1000 sensors only
Power supply: 220 … 240 V~
Measuring range: -30 … +150 °C
Power consumption: approx. 2 VA
Settings:
Volumetric content of glycol: 0 … 70 % (1 % - steps)
Impulse rate of flow rate: 0 … 99 l/Imp (1 l/Imp - steps) for RESOL V40 flow-meter
Housing: plastic, PC-ABS and PMMA
Protection type: IP 20 / EN 60529
Display: graphic display as well as bi-coloured LED display
Temperature measurement: ± 0.3 K
Interface: RESOL VBus®
Ambient temp.: 0 … 40 °C

1 Installation

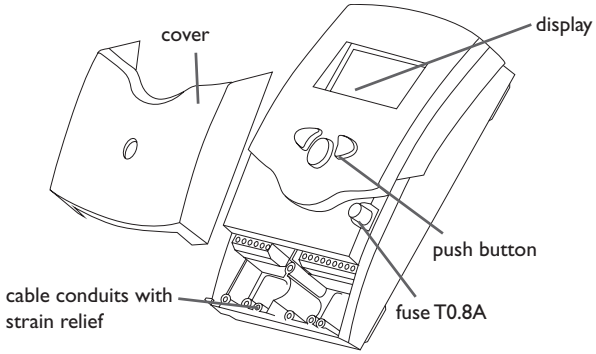
1.1 Mounting

WARNING! **Electric shock!**
Upon opening the housing, live parts are exposed!
➔ **Always disconnect the device from power supply before opening the housing!**

Note
Strong electromagnetic fields can impair the function of the device.
➔ Make sure the device as well as the system are not exposed to strong electromagnetic fields.

The device must only be located in dry interior rooms.
The device must additionally be supplied from a double pole switch with contact gap of at least 3 mm.
Please pay attention to separate routing of sensor cables and mains cables.
In order to mount the device to the wall, carry out the following steps:

➔ Unscrew the crosshead screw from the cover and remove it along with the cover from the housing.
➔ Mark the upper fastening point on the wall. Drill and fasten the enclosed wall plug and screw leaving the head protruding.
➔ Hang the housing from the upper fastening point and mark the lower fastening point (centres 130 mm).
➔ Insert lower wall plug.
➔ Fasten the housing to the wall with the lower fastening screw and tighten.
➔ Carry out the electrical wiring in accordance with the terminal allocation (see chap. 1.2).
➔ Put the cover on the housing.
➔ Attach with the fastening screw.



1.2 Electrical connection

WARNING! **Electric shock!**
Upon opening the housing, live parts are exposed!
➔ **Always disconnect the device from power supply before opening the housing!**

ATTENTION! **ESD damage!**
Electrostatic discharge can lead to damage to electronic components!
➔ **Take care to discharge properly before touching the inside of the device!**

Note
Connecting the device to the power supply must always be the last step of the installation!

Note
It must be possible to disconnect the device from the mains at any time.
➔ Install the mains plug such that it is accessible at any time.
➔ If this is not possible, install a switch that can be accessed.

Do not use the device if it is visibly damaged!

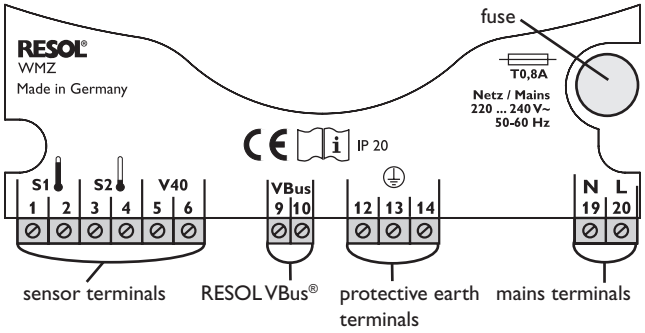
The power supply of the controller must be carried out via an external power supply (last step!). The supply voltage must be 220 ... 240 Volt (50 ... 60 Hz). Flexible cables are to be attached to the housing using the enclosed strain reliefs and the respective screws.

In order to use the RESOL WMZ along with a flowmeter RESOL V40, the following connection is to be carried out (polarity of the separate terminals is arbitrary):

1/2 = sensor S1 (flow temperature)
3/4 = sensor S2 (return temperature)
5/6 = flowmeter V40
9/10 = RESOL VBus®

The **mains connection** is carried out via the terminals:

19 = neutral conductor N
20 = line L
12/13/14 = protective conductor ⏚



1.3 Flowmeter

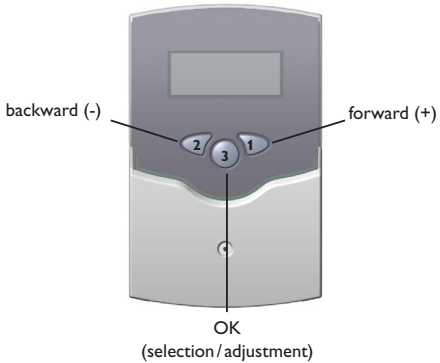
A flowmeter RESOL V40 is used in order to determine the volumetric flow rate in the solar circuit. The installation is to be carried out taking the flow direction into consideration (consider direction indication on the flowmeter). In order to tranquilise the flow ratio, an inlet and an outlet distance of 30 cm in front of and behind the flowmeter have to be taken into account.

Note

Versions V40 0.6 to 2.5 are suited for horizontal as well as for vertical installation. Versions V40 3.5 to 15 are for horizontal installation only. In order to avoid a pressure surge caused by cavitation in hydraulic systems, the heat transfer fluid should be filled in when it is cold, and de-aerators should be used. Pressure surge and turbulent flow ratios lead to damage of the sensitive measuring instruments.

2 Operation and function

2.1 Push buttons for adjustment



The WMZ is operated by 3 push buttons below the display. The forward-key (1) is used for scrolling forward through the indication menu or to increase the adjustment values. The backward-key (2) is used for scrolling backwards through the menu or to decrease adjustment values.
In order to change from the display level to the adjustment level, briefly press button 3. The indication changes to the adjustment mode.

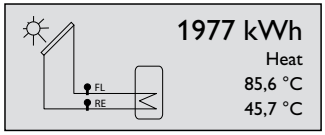
- ➔ Select channel with buttons 1 and 2
- ➔ Briefly press button 3.
- ➔ Adjust value with the buttons 1 and 2
- ➔ Briefly press button 3. Answer the safety prompt "Save ?" with "yes" oder "no" (select with buttons 1 and 2) and confirm with button 3.

In order to get back to the display level, select the item "back", and briefly press button 2.

Adjust. values:	
back	
▸ Reset balance	
Antifr. type	Water

Safety prompt:	
Save?	Yes_

2.2 Graphic display



The WMZ has two display levels. In the 1st level, the heat quantity as well as flow and return temperatures are shown. Furthermore, it contains a system screen. System screen: in the system screen, the system scheme and the sensors used are shown.
The 2nd level is the adjustment level in which various parameters and values can be adjusted.

2.3 LED flashing codes

constant green: everything OK
flashing red: sensor fault

3 Determining the ratio of the glycol-water mixture

(when using ready mixed fluids, pay attention to manufacturers' instructions)

Since the heat capacity of the heat transfer fluid depends on the concentration of glycol, the proportion of the glycol/water-mixture has to be determined first.
Determining the ratio for known volumes:
If the volumes of water and glycol in the system are known, the value in vol. % is calculated as follows:
Vol % = (VG : (VW + VG)) x 100
VG: volume of glycol
VW: volume of water
Example: if 15 liters of water and 20 liters of glycol are used in the solar circuit, then follows: Vol % = (20 : (15 + 20)) x 100 = 57

Determining the ratio for unknown volumes:

RESOL refractomter:
In order to analyse the system, a small amount of fluid has to be withdrawn from the solar circuit and applied to the prism surface of the refractometer. Hold the pointy end against the light and turn the ocular until the borderlines become visible. The borderlines indicate the freezing temperature. In a table on the receptacle of the heat transfer fluid, the value for the vol.-% corresponding to the temperature value, is shown.

4 Commissioning

When the RESOL WMZ calorimeter is commissioned for the first time or after a reset, it will run a commissioning menu. The commissioning menu leads the user through the most important adjustment channels needed.

Commissioning:	
▸ Version	x.xx
Language	English
Temp. unit	°C

Commissioning menu
The commissioning menu consists of the channels described in the following.
At the top of the commissioning menu, the version number of the device is indicated.

Commissioning:	
▸ Language	English
Temp. unit	°C
Flow unit	Litres/hour

Language
Selection: Deutsch, English, Francais, Italiano, Espanol
Factory setting: Deutsch
➔ Adjust the desired menu language.

Commissioning:	
▸ Temp. unit	°C
Flow unit	Litres/hour
Energy unit	kWh

Temp. unit
Selection: °C, °F
Factory setting: °C
➔ Adjust the desired temeprature unit.

Commissioning:	
▸ Flow unit	Litres/hour
Energy unit	kWh
Antifr. type	Water

Flow unit
Selection: Litres/hour, Gal./minute
Factory setting: Litres/hour
➔ Adjust the desired flow rate unit.

Commissioning:	
▸ Energy unit	kWh
Antifr. type	Water
Antifreeze	40 %

Energy unit
Selection: kWh, BTU
Factory setting: kWh
➔ Adjust the desired energy unit.

Commissioning:	
Energy unit	kWh
▸ Antifr. type	Water
Antifreeze	40 %

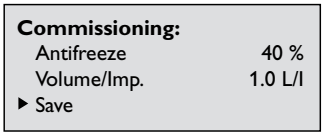
Antifr. type
Selection: Water, Propylene, Ethylene, Tyfo LS
Factory setting: Water
➔ Adjust the heat transfer fluid used in the system.

Commissioning:	
Antifr. type	Propylene
▸ Antifreeze	40 %
Volume/Imp.	1.0 L/l

Antifreeze
Adjustment range: 20 … 70 %
Factory setting: 40 %
Available only if Antifr. type is set to Propylene or Ethylene.
➔ Adjust the antifreeze ratio of the heat transfer fluid used in the system.

Commissioning:	
Antifr. type	Propylene
Antifreeze	40 %
▸ Volume/Imp.	1.0 L/l

Volume/Imp.
Adjustment range: 0.1 … 99.9 L/l
Factory setting: 1.0 L/l
➔ Adjust the impulse rate of the flowmeter or flow rate sensor respectively.



Completing the commissioning menu:
When the last menu item of the commissioning menu (Save) has been selected, a security inquiry appears. If the inquiry is confirmed, the adjustments will be saved. All adjustments made during commissioning can, if necessary, be changed later on in the corresponding menus.

5 Function

During the calculation of the transferred heat quantity, the calorimeter RESOL WMZ takes into account that the specific heat capacity c and the density ρ depend on the temperature and the mixing proportion (access to limited values). Using these parameters, the measurement of the flow and return temperatures with two precision temperature sensors, and the evaluation of the impulses of a volumetric flowmeter, the WMZ calculates the transferred quantity.

This device can be used in systems which use water or water-propylene glycol mixtures as the heat transfer fluid. The proportion (in vol%) used in a system and the specification of the selected flowmeter (in liters per impulse) are adjusted locally after the installation.

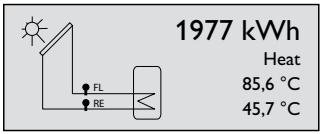
6 Indication and adjustment channels

Display channels
- FL (flow temperature in °C / °F)
- RE (return temperature in °C / °F)
- heat quantity (in Wh / MBTU or kWh / MMBTU respectively)
- volumetric flow rate (in l/min or gpm)
- power (in kW)

Adjustment channels
- antifreeze type
- antifreeze
- flow measurement (V40 or VTP)
- volume per impulse
- subaddress
- bus mode
- bus master
- sensor offset
- language
- temperature unit
- flow rate unit
- energy unit

Note
After a change in the adjustment channel has been made, a safety prompt appears. The adjustment is saved after the question has been confirmed with "yes".

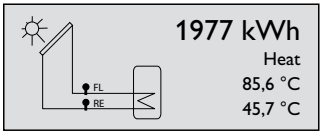
Heat quantity



The determined heat quantity is indicated. If the heat quantity is smaller than 1 MWh, the quantity is indicated with the unit Wh (MBTU). If the quantity is larger, it is indicated using the unit kWh (MMBTU).

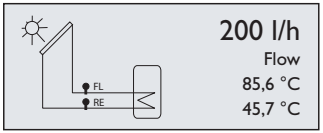
Note
When the indication has reached 999,999 kWh (3412.138 MMBTU), it will start again at 0.

Flow and return temperatures



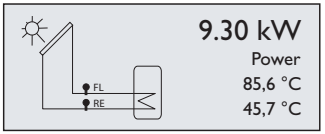
FL = indicates the current flow temperature (example: 85.6 °C)
RE = indicates the current return temperature (example: 45.7 °C)

Volumetric flow rate



The volumetric flow rate is indicated (l/h or gpm).

Power



The current power is indicated (in kW).

Note
The precision of the power indication depends on the flowmeter used. At low flow rates, deviations from the actual value are possible and caused by technical reasons!

Reset balance

Adjust. values:	
back	
▶ Reset balance	
Antifr. type	Water

All balance values will be reset to 0.

Antifreeze type

Adjust. values:	
back	
▶ Antifr. type	Water
Flow measurem.	V40

Adjustment channel for the antifreeze type used. There are different types of heat tranfer fluid to choose from. Water or water / glycol mixtures are used:

- water
- propylene
- ethylene
- Tyfo LS

Antifreeze

Adjust. values	
back	
Antifr. type	Propylene
▶ Antifreeze	40 %

Adjustment channel for the ratio of water / glycol ("antifreeze" is only visible, when the antifreeze type "propylene" or "glycol" has been selected before).
ajdustment range: 20 % … 70 vol. %
factory setting: 40 %

Type of flowmeter

Adjust. values:	
back	
Antifr. type	Water
▶ Flow measurem.	V40

Adjustment channel for the flowmeter type which is used. The factory setting is RESOL Flowmeter V40.

- V40
- VTP

Impulse Rate

Adjust. values:	
Antifr. type	Water
Flow. measurem.	V40
▶ Volume/Imp.	1,0 L/I

This adjustment channel depends on the selected flowmeter type.
If the flowmeter V40 is used, the value is indicated in L/I ("Volume/Imp" is indicated on the display).
adjustment range: 0.1 … 99.9 L/I
If the flowmeter type VTP is used, the value is indicated in I/L ("heat" appears on the display)
adjustment range: 1 … 2000 I/L

Note
Pay attention to the indicated I/Imp on your flowmeter!

Subaddress

Adjust. values:	
Flow measurem.	V40
Volume/Imp.	1,0 L/l
▶ Subaddress	0

Adjustment of the subaddress. An individual module address for one WMZ can be adjusted. This way it is possible to use several WMZ with an individual address in one system. If several WMZ (up to max. 16) are connected to a PC or a datalogger, the calorimeters have to be numbered serially, starting with 0. The connection sequence at the VBus® is arbitrary.
adjustment range: 0 … 15

Bus mode

Adjust. values:	
Volume/Imp.	1,0 L/l
Subaddress	0
▶ Bus mode	Cascded

Change of the bus mode: active, passive, or cascaded.
Do not change the factory setting if the WMZ is connected to a RESOL controller with VBus® output terminal (corresponds to the bus mode "passive").
Select bus mode "active", if the WMZ is not connected to a controller and if data are recorded on a PC or datalogger.
Select bus mode "cascaded", if several WMZ are connected to a PC or datalogger. The WMZ modules are linearily numerated starting with 0.

- active
- passive
- cascaded

Bus master

Adjust. values:	
Subaddress	0
Bus mode	Cascaded
▶ Bus master?	Yes

The item "bus master" only appears when subadress "0" and bus mode "cascaded" have been selected.
Select bus master "No" when several WMZ modules are cascaded and used along with a controller.
Select bus master "Yes" when several WMZ modules are cascaded and used without a controller.

Sensor offset

Adjust. values:	
Bus master?	Yes
Sensor 1	0,0 K
▶ Sensor 2	0,0 K

In order to offset the sensors, an individual offset can be allocated to each sensor (range -5.0 K … +5.0 K, in steps of 0.1 K).

Language

Adjust. values:	
Bus mode	Cascaded
▶ Language	English
Temp. unit	°C

Selection of the language

- Deutsch
- English
- Francais
- Italiano
- Espanol

Temp. unit

Adjust. values:	
Language	English
▶ Temp. unit	°C
Flow unit	Litres/hour

Selection of the temperature unit for display indication (°C or °F).

Flow unit

Adjust. values:	
Temp. unit	°C
▶ Flow unit	Litres/hour
Energy unit	kWh

Selection of the flow rate unit for display indication (Litres/hour or Gal./minute).

Energy unit

Adjust. values:	
Flow unit	Litres/hour
▶ Energy unit	kWh
Reset	

Selection of the energy unit for display indication (kWh or BTU).

Reset

Adjust. values:	
Energy unit	kWh
▶ Reset	
Version	x.xx

A reset will delete all previously made adjustments and set all balance values back to 0. The device starts up again with the commissioning menu.

Version

Adjust. values:	
Energy unit	kWh
Reset	
▶ Version	x.xx

Below the last menu item, the version number of the device is indicated.

7 Examples of connection

7.1 WMZ module in individual operation mode

- WMZ: master board
  subaddress: "0"
  bus mode: "active"

7.2 WMZ with controller

- controller: register WMZ module
- WMZ: slave board
  subaddress: "0"
  bus mode: "passive"

7.3 Cascade without controller

- WMZ 0: master board
  subaddress "0"
  bus mode: "Cascaded"
  bus master: "Yes"
- WMZ 1 … 15: slave board
  subaddress: 1 … 15*
  bus mode: "Cascaded"

The connection sequence at the VBus® is arbitrary.

7.4 Cascade with controller

WMZ 0

- controller: No adjustments have to be made (**WMZ-module must not be registered!**)
- WMZ 0: slave board
  subaddress: "0"
  bus mode: "cascaded",
  bus master: "No"
- WMZ 1 … 15: Slave board
  subaddress: 1 … 15*
  Bus mode: "Cascaded"

The connection sequence at the VBus® is arbitrary.

* The maximum number of cascaded WMZ modules is 16. Whether this number can be reached depends on the construction.

Disturbing factors can be the following: distances, voltage- carrying lines etc.

8 Accessory

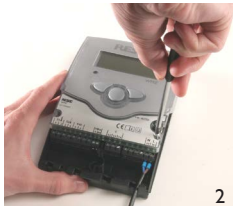
VBus® board

ATTENTION! When the WMZ is connected to a controller, the VBus® master board has to be replaced with the VBus® slave board!
When several WMZ are cascaded and connected to a data-logger or PC (see p. 10), only the VBus® master boards of the WMZs with the subaddress 1 or higher have to be replaced with the VBus® slave boards!

WARNING! Electric shock!
Upon opening the housing, live parts are exposed!
➔ **Always disconnect the device from power supply before opening the housing!**

ATTENTION! ESD damage!
Electrostatic discharge can lead to damage to electronic components!
➔ **Take care to discharge properly before touching the inside of the device!**


1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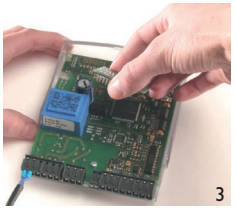

3

➔ Unscrew the cross-head screw of the cover and remove the cover from the housing.
➔ Unscrew the two lateral srews of the transparent shield and remove the shield.
➔ Pull out the board which has to be replaced carefully.Replace with new board.

Carry out assembly in reverse order.

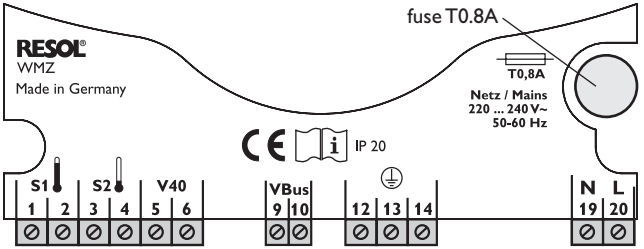
Note
The VBus® master board is marked with a "B", the VBus® slave board with a "J" in the upper right corner of the populated side of the board.

RESOL refractometer set

For determining the concentration of glycol in the heat transfer medium
280 009 60

9 Troubleshooting

Please pay attention to the following items, if the calorimeter WMZ is not working properly.



Operating control lamp off.

Check the power supply. Is it disconnected?

no

The fuse of the device could be blown. It can be replaced after the front cover has been removed (spare fuse is enclosed in the accessory bag).

yes

Check the supply line and reconnect it.

Operating control lamp flashes red.

Sensor defect. An error code instead of a temperature is shown in the corresponding sensor indication channel.

888.8

Line is broken. Check the line.

- 88.8

Short circuit. Check the line.

Pt1000 temperature sensors branched off can be checked with an ohmmeter. In the table shown below, the resistance values corresponding to different temperatures are listed.

°C	°F	Ω	°C	°F	Ω
-10	14	961	55	131	1213
-5	23	980	60	140	1232
0	32	1000	65	149	1252
5	41	1019	70	158	1271
10	50	1039	75	167	1290
15	59	1058	80	176	1309
20	68	1078	85	185	1328
25	77	1097	90	194	1347
30	86	1117	95	203	1366
35	95	1136	100	212	1385
40	104	1155	105	221	1404
45	113	1175	110	230	1423
50	122	1194	115	239	1442

Resistance values of the Pt1000-sensors

10 Order note

The calorimeter RESOL WMZ is available as a single device as well as a full kit with 2 Pt1000 sensors and a flowmeter RESOL V40.

- **RESOL WMZ.....135 303 53**
- **RESOL WMZ full kit 1**
  incl. V40-0.6.....135 304 13
- **RESOL WMZ full kit 2**
  incl. V40-1.5.....135 304 23
- **RESOL WMZ full kit 3**
  incl. V40-2.5.....135 304 33
- **RESOL WMZ full kit 4**
  incl. V40-3.5.....135 304 43
- **RESOL WMZ full kit 5**
  incl. V40-6.0.....135 305 13
- **RESOL WMZ full kit 6**
  incl. V40-10.....135 305 23
- **RESOL WMZ full kit 7**
  incl. V40-15.....135 305 33

Distributed by:

RESOL – Elektronische Regelungen GmbH

Heiskampstraße 10
45527 Hattingen / Germany

Tel.: +49 (0) 23 24 / 96 48 - 0
Fax: +49 (0) 23 24 / 96 48 - 755

www.resol.com
info@resol.com

Important note

The texts and drawings in this manual are correct to the best of our knowledge. As faults can never be excluded, please note:
Your own calculations and plans, under consideration of the current standards and directions should only be basis for your projects. We do not offer a guarantee for the completeness of the drawings and texts of this manual - they only represent some examples. They can only be used at your own risk. No liability is assumed for incorrect, incomplete or false information and / or the resulting damages.

Note

The design and the specifications can be changed without notice.
The illustrations may differ from the original product.

Imprint

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