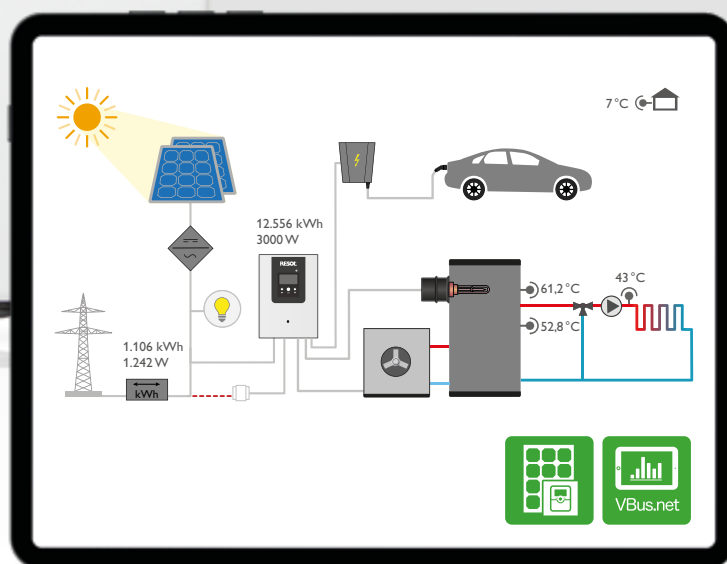




2024 | EN

SOLAR THERMAL | HEATING | POWER-TO-HEAT | ACCESSORIES
VISUALISATION | BUILDING MANAGEMENT | MADE IN GERMANY

Discover our product portfolio

The RESOL product portfolio encompasses solar thermal, DHW and heating controllers, pump stations, accessories, apps for visualisation and monitoring as well as the VBus.net Internet portal.

Whether you're looking for a reliable partner in developing innovative new solutions or a sophisticated product portfolio to tap into – you've come to the right place!



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RESOL – Your partner in control technology

Sustainable growth prospers on a solid basis – so the innovations of today become the standards of tomorrow. Our research & development division with its extensive lab and testing facilities is our own in-house think-tank. Co-operations with universities and research institutes boost the technological exchange.

Top-of-the-range production lines and a sophisticated quality management warrant the best possible products. Several awards and the ISO:9001 certification confirm our course into the future.

Steady

- More than 45 years of experience
- More than 100 employees
- More than 20 distributors and subsidiaries worldwide
- Our products control more than 4 million systems in over 70 countries



High-class products

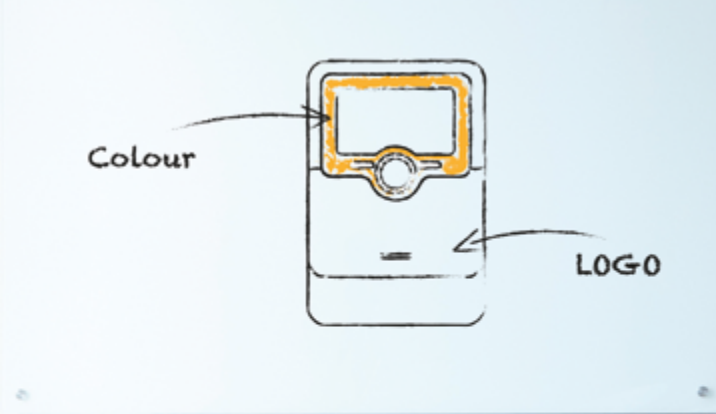
- All products are tested in our in-house EMC and hydraulics laboratory
- Controls after each individual manufacturing step warrant a 100 % quality assurance
- Sophisticated and award-winning design for future-oriented technology
- All processes under one roof – products 100 % Made in Germany



Flexible

- Adaptation to your corporate design and target markets, even for the smallest batches
- Individual customisation of all our soft- and hardware is possible
- Pre-connected cables and sensors to suit your requirements
- Our product managers will support you in any question that may arise





Customisation of RESOL controllers

All our products can be adapted to your corporate design and to your target markets.

Controllers with display cover pane (e.g. DeltaSol® SL, SLT)

	Logo	Type designation	Company headquarters	Company address
Display cover pane	✓			
Type label	✓	✓	✓	
Manual	✓	✓		✓

Alternatively, the DeltaSol® SL series can be printed by pad printing.

Controllers with printed housing (e.g. DeltaSol® CS, AL E HE)

	Logo	Type designation	Company headquarters	Company address
Housing cover	✓	✓		
Type label	✓	✓	✓	
Manual	✓	✓		✓

Controllers with inlay (e.g. DeltaSol®, BX, MX)

	Logo	Type designation	Company headquarters	Company address
Inlay	✓	✓		
Type label	✓	✓	✓	
Manual	✓	✓		✓

The customised version of our pump stations includes the following:

	Logo	Type designation	Company headquarters	Company address
Embossed label	✓			
Type label	✓	✓	✓	
Manual	✓	✓		✓

Embossed label with your company logo:

On request the pump stations can be manufactured with a customised embossed label on the front half of the insulation. Alternatively, our standard embossed label with the inscription FlowSol® can be used.

For this purpose we will need the following:

Your company logo – Format: JPG, TIF (300 dpi), or EPS
(For devices with printed housing or embossed label: vector EPS file)



Ask our sales team for the price of your personal customisation!



WE DEVELOP YOUR PRODUCT!

From the very beginning, we accompany your product or sales idea with our know-how! Our product managers will support you

throughout the development process and, in collaboration with you, devise the best solution to suit your wishes.

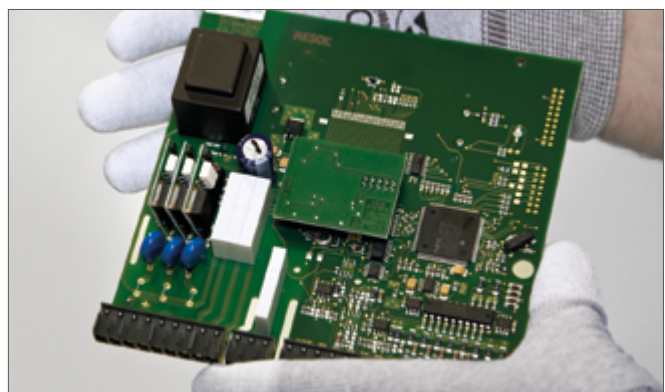
Custom-made software

Our software developers program individual functions and additional system features according to your requirements.

Factory settings can be changed quickly and inexpensively to suit your wishes.

In addition to controller firmware, we also offer personalised solutions all around operating our products.

Visualising system data, e.g. on your website, is just as easily possible as acquiring a customised software for controller parameterisation. Naturally, our apps can be adapted to your design, too.



The optimum circuit board

Our hardware development division designs circuit boards for our and our customer's products. Thus, your individual wishes can be implemented directly in order to establish the optimum basis for your product.

In-process tests:

- EMC software and laboratory
- Flying-probe tests





Production – we set standards

Top-of-the-range production lines and a sophisticated quality management warrant the best possible products. Several awards and the ISO:9001 certification confirm our course into the future.



In our in-house laboratories, we test our own as well as, if our customers so wish, third-party products under real-life conditions.

The high production depth “Made in Germany” warrants flexibility and quality, so even small-batch series can be manufactured economically.

Controls take place after each individual production step, so that 100% quality assurance is ensured.

We can also pre-connect sensors and cables to suit your requirements, up to a complete plug-and-play version.

- Modern quality assurance technology such as AOI station, etc.
- In-house hydraulics lab with versatile testing fields

CONTACT US, WE WILL BE HAPPY TO HELP YOU!



Solar and system controllers





Survey of solar controllers: Hardware

CONTROLLERS FOR SOLAR THERMAL & COMBINED SYSTEMS



	DeltaSol® A/AX/AX HE	DeltaSol® AL E HE	DeltaSol® CS/2,CS/4	DeltaSol® SLL	DeltaSol® CS Plus	
Max. number of collector fields	1	1	1	2	2	
Max. number of stores	1	1	1	2	2	
Weather-compensated heating circuits	-	-	-	-	-	
External heat exchanger	-	-	-	-	-	
Speed control of standard pumps	-	✓	✓	✓	✓	
Speed control of HE pumps	✓ [AX HE]	✓	✓	✓	✓	
■ via integrated PWM output	✓ [AX HE]	✓	✓	✓	✓	
■ via PSW adapter	-	✓	✓	✓	✓	

Hardware

Max. number of temperature sensor inputs	2	4	4	4	4	
Sensor type	Pt1000	Pt1000	Pt1000	Pt1000, Pt500, KTY	Pt1000	
Inputs for Grundfos Direct Sensors™	-	digital	digital	-	digital	
■ can optionally be used for humidity sensors	-	-	-	-	-	
Input for CS10 irradiation sensor	-	-	-	-	-	
Impulse inputs for V40 flowmeter	-	-	-	1	-	
Relay outputs in total	1	3	1 [CS/2], 2 [CS/4]	3	2	
■ semiconductor relays (speed control)	-	1	1 (1) [CS/2], 2 (1) [CS/4]	2 (2)	2 (2)	
■ electromechanical relay	1	-	-	-	-	
■ potential-free relay with changeover contact	-	-	-	-	-	
■ potential-free relay with normally open contact	-	-	-	1*	-	
■ potential-free high-current relay	-	2	-	-	-	
PWM outputs	1 [AX HE]	1	1	2	2	
■ convertible to 0-10 V	-	-	-	-	-	
Real-time clock	-	✓	✓ [CS/4]	✓	✓	
Data interface	-	VBus®	VBus®	VBus®	VBus®	
Energy-efficient SMPS	✓ [AX HE]	✓	✓	✓	✓	
Power supply	220–240V~ / 115V~ 100–240V~ [AX HE]	100–240V~	100–240V~	100–240V~	100–240V~	

* Extra-low voltage relay ² via EM Extension module(s) in total

SYSTEM CONTROLLERS



DeltaSol® SL



DeltaSol® BX



DeltaSol® SLT



DeltaSol® BX Plus



DeltaSol® MX



DeltaSol® MX Plus

	2	2	2	3	3	3
	2	2	2	4	5	5
	-	-	-	1(3 ²)	2 (7 ²)	2 (7 ²)
	✓	-	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	5	5	5	9	15	15
	Pt1000, Pt500, KTY	Pt1000	Pt1000, Pt500, KTY	Pt1000, Pt500, KTY	Pt1000, Pt500, KTY	Pt1000, Pt500, KTY
	analogue	analogue	analogue	digital	analogue, digital	analogue, digital
	-	-	-	✓	✓	✓
	-	-	-	✓	✓	✓
	1	1	1	1	3	4
	4	4	4	5	14	15
	3 (3)	3 (3)	3 (3)	4 (4)	13 (13)	13 (13)
	-	1	-	-	-	-
	-	-	-	-	1	1
	1*	-	1*	1	-	1*
	-	-	-	-	-	-
	2	2	2	2	4	4
	2	-	2	2	4	4
	✓	✓	✓	✓	✓	✓
	VBus®, MicroSD card	VBus®, SD card	VBus®, MicroSD card	VBus®, SD card	VBus®, SD card	VBus®, SD card, LAN, WLAN
	✓	✓	✓	✓	✓	✓
	100–240V~	100–240V~	100–240V~	100–240V~	100–240V~	100–240V~

Survey of solar controllers: Software

CONTROLLERS FOR SOLAR THERMAL & COMBINED SYSTEMS



DeltaSol® A/AX/AX HE

DeltaSol® AL E HE

DeltaSol® CS/2,CS/4

DeltaSol® SLL

DeltaSol® CS Plus

Heat quantity measurement

■ with flowmeter	-	✓	✓	✓	✓ ¹
■ with V40 flowmeter	-	-	-	✓	-
■ with Grundfos Direct Sensors™	-	VFD	VFD	-	VFD

Software functions

Antifreeze function for solar circuit	✓	✓	✓	✓	✓
Collector minimum limitation	✓ ¹ [AX HE]	✓	✓	✓	✓
Collector emergency shutdown	-	✓	✓	✓	✓
Store maximum limitation	✓ ¹ [AX HE]	✓	✓	✓	✓
Set store temperature	-	-	-	✓	-
Store emergency shutdown	✓ [AX,AX HE]	✓	✓	✓	✓
Drainback option	-	✓	✓ ¹	✓	✓ ¹
Tube collector function	-	✓	✓ [CS/4]	✓	✓
■ with adjustable time frame, interval	-	✓	✓ [CS/4]	✓	✓
Additional ΔT control	-	-	-	✓	✓ ¹
Thermostat function	-	✓	✓ ¹ [CS/4]	✓ ¹	✓ ¹
Target temperature	-	-	-	-	-
Heat dump function	-	-	✓ ¹ [CS/4]	✓ ¹	✓ ¹
Heat exchange	-	-	-	✓ ¹	✓ ¹
Store loading in layers	-	-	-	✓ ¹	✓ ¹
Priority loading	-	-	-	✓ ¹	✓ ¹
■ Parallel loading	-	-	-	✓ ¹	✓ ¹
■ Store sequence control	-	-	-	✓ ¹	✓ ¹
■ Progressive loading	-	-	-	✓ ¹	✓ ¹
■ Successive loading	-	-	-	✓ ¹	✓ ¹
■ Spreaded loading	-	-	-	✓ ¹	✓ ¹

¹ system-dependent

SYSTEM CONTROLLERS



DeltaSol® SL



DeltaSol® BX Plus



DeltaSol® MX

DeltaSol® MX Plus

Table 1: Comparison of the proposed VFS and VFD methods with the VFS/VFD method						
	VFS	VFS	VFS	VFD	VFS/VFD	VFS/VFD
1	✓	✓ ¹	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓
3	VFS	VFS	VFS	VFD	VFS/VFD	VFS/VFD
4	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓
10	✓	✓ ¹	✓	✓	✓	✓
11	✓	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓	✓
13	✓	✓	✓	✓	✓	✓
14	✓	✓ ¹	✓	✓	✓	✓
15	✓	✓	✓	✓	✓	✓
16	-	-	✓	✓	✓	✓
17	✓ ¹	✓	✓	✓	✓	✓
18	✓ ¹	✓ ¹	✓	✓	✓	✓
19	✓ ¹	✓ ¹	✓	✓	✓	✓
20	✓ ¹	✓ ¹	✓	✓	✓	✓
21	✓ ¹	✓ ¹	✓	✓	✓	✓
22	✓ ¹	✓ ¹	✓	✓	✓	✓
23	✓ ¹	✓ ¹	✓	✓	✓	✓
24	✓ ¹	✓ ¹	-	✓	✓	✓
25	✓ ¹	✓ ¹	-	✓	✓	✓

Survey of solar controllers: Software

CONTROLLERS FOR SOLAR THERMAL & COMBINED SYSTEMS



DeltaSol® A/AX/AX HE

DeltaSol® AL E HE

DeltaSol® CS/2,CS/4

DeltaSol® SLL

DeltaSol® CS Plus

Software functions

Solar circuit bypass	-	-	-	-	-
Irradiation-dependent bypass	-	-	-	-	-
Irradiation switch	-	-	-	-	-
Backup heating suppression	-	✓	-	✓	-
Parallel relay	-	-	-	solar	-
Twin pump for solar circuit	-	-	-	-	-
Cooling functions and cooling mode	-	✓	✓	✓	✓
Flow rate monitoring	-	-	-	-	-
Pressure monitoring	-	-	-	-	-
Function control	-	✓	✓	✓ VDI 2169	✓
Error relay	-	-	-	-	-
DHW hygiene functions	-	✓	✓ ¹ [CS/4]	✓	✓ ¹
■ Thermal disinfection	-	✓	✓ ¹ [CS/4]	✓	✓ ¹
DHW heating	-	✓	✓ ¹ [CS/4]	✓	✓ ¹
Heating circuit return preheating	-	-	-	✓ ¹	✓ ¹
Boiler loading/Zone loading	-	-	-	-	-
Solid fuel boiler	-	-	-	✓ ¹	✓ ¹
Mixed heating circuits	-	-	-	-	-
■ Weather-compensated	-	-	-	-	-
■ Room control	-	-	-	-	-
■ Room thermostats	-	-	-	-	-
■ Target temperature	-	-	-	-	-
■ Cooling over the heating circuit	-	-	-	-	-
■ Antifreeze function	-	-	-	-	-
■ Chimney sweeper function	-	-	-	-	-
Circulation	-	-	-	-	-
Function block	-	-	-	-	-
Heat pump demand (optional)	-	-	✓	✓	✓
Web interface	-	-	-	-	-

¹ system-dependent

² via EM Extension module(s)

SYSTEM CONTROLLERS



DeltaSol® SL



DeltaSol® BX



DeltaSol® SLT



DeltaSol® BX Plus



DeltaSol® MX



DeltaSol® MX Plus

	-	-	✓	✓	✓	✓
	-	-	-	✓	✓	✓
	-	-	-	✓	✓	✓
	✓	-	✓	✓	✓	✓
	solar	solar	solar, freely selectable	solar, freely selectable	solar, freely selectable	solar, freely selectable
	-	-	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	VDI 2169	✓	VDI 2169	VDI 2169	VDI 2169	VDI 2169
	-	-	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓ ¹	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓	✓ ¹	✓	✓	✓	✓
	-	-	✓	✓	✓	✓
	✓	✓ ¹	✓	✓	✓	✓
	-	-	-	✓	✓	✓
	-	-	-	✓ ²	✓	✓
	-	-	-	✓	✓	✓
	-	-	-	✓	✓	✓
	-	-	✓	✓	✓	✓
	-	-	-	✓	✓	✓
	-	-	-	✓	✓	✓
	-	-	-	✓	✓	✓
	-	-	✓	✓	✓	✓
	-	-	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	-	-	-	-	-	✓



rosenthal design 



DeltaSol® A series

The *DeltaSol® A*, *AX* and *AX HE* controllers are the simplest solution for all differential controls. The version *DeltaSol® A* is equipped with an adjustable temperature difference and an antifreeze function.

The *DeltaSol® AX* presents an extended version which is additionally equipped with an adjustable target temperature for minimum or maximum temperature limitation.

Equipped with an electromechanical relay and a PWM output, the *DeltaSol® AX HE* controller manages the speed control of a high-efficiency pump.

The enclosed silicone sealing cord guarantees a protection against dripping water.

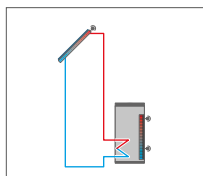
Differential temperature controller for solar, heating & air conditioning systems

- Adjustable temperature difference 2...16 K, hysteresis 1.6 K
- Antifreeze function adjustable by jumper/DIP switch
- Maximum or minimum temperature limitations adjustable by DIP switches (*DeltaSol® AX/AX HE*)
- Protection against dripping water
- Speed control of a high-efficiency pump with adjustable minimum speed (*DeltaSol® AX HE*)

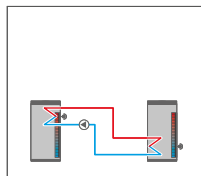
Also available as 12V~, 12V=, 24V= and 115V~ versions!

Article no.	Article	Price bracket
115 211 23	<i>DeltaSol® A</i> – Differential temperature controller	A
115 211 33	<i>DeltaSol® A</i> – Full kit » incl. 2 Pt1000 sensors (1 x FKP6, 1 x FRP6)	A
115 211 73	<i>DeltaSol® AX</i> – Differential temperature controller	A
115 211 83	<i>DeltaSol® AX</i> – Full kit » incl. 2 Pt1000 sensors (1 x FKP6, 1 x FRP6)	A
115 213 43	<i>DeltaSol® AX HE</i> – Differential temperature controller	A
115 213 53	<i>DeltaSol® AX HE</i> – Full kit » incl. 2 Pt1000 sensors (1 x FKP6, 1 x FRP6)	A

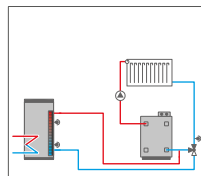
EXAMPLES



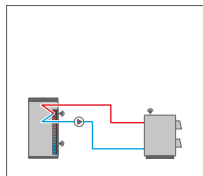
Solar system with 1 store



Heat exchange control

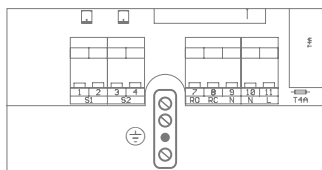


Heating circuit return preheating

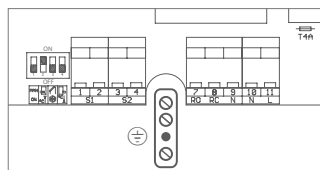


Solid fuel boiler
(DeltaSol® AX/AX HE)

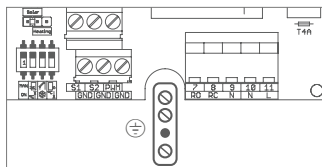
ELECTRICAL CONNECTION



DeltaSol® A



DeltaSol® AX



DeltaSol® AX HE

TECHNICAL DATA

Inputs: 2 Pt1000 temperature sensors

Outputs:

1 electromechanical relay (changeover), 1 PWM output (DeltaSol® AX HE)

PWM frequency: 1000 Hz (DeltaSol® AX HE)

PWM voltage: 11.0 V (DeltaSol® AX HE)

Switching capacity:

4 (1) A 240 V~ (electromechanical relay)

Total switching capacity: 4 A 240 V~

Power supply:

220–240 V~ (50–60 Hz),

100–240 V~ (50–60 Hz) (DeltaSol® AX HE)

Supply connection: type X attachment

Standby:

1.35 W (DeltaSol® A),

1.36 W (DeltaSol® AX),

0.39 W (DeltaSol® AX HE)

Mode of operation: type 1.B action

Rated impulse voltage: 2.5 kV

Functions: antifreeze function, DeltaSol® AX/AX HE

additionally with maximum or minimum temperature limitation

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting

Display: 1 operating control LED

Operation:

potentiometre and 1 jumper (DeltaSol® A), 2 potentiometres and 4 DIP

switches (DeltaSol® AX), 3 potentiometres, 4 DIP switches and 1 jumper

(DeltaSol® AX HE)

Ingress protection: IP 20/EN 60529 (with IP 22 seal)

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: Ø 139 mm, depth 45 mm

ACCESSORIES

For a survey of accessories see page 60!

HR230 Auxiliary relay



Single-phase, suitable for all RESOL controllers

(see page 59)

HR230/3 Auxiliary relay



Three-phase, suitable for all RESOL controllers

(see page 59)

HRG2 Housing



For up to 2 HR230 Auxiliary relays

(see page 59)

HRG3 Housing



For 1 HR230/3 Auxiliary relay

(see page 59)

SP10



Sensor overvoltage protection

(see page 113)



rosenthal design 



DeltaSol® AL E HE

The **DeltaSol® AL E HE** controller is especially designed for standard solar systems with a high-efficiency pump and electric backup heating. It is equipped with a PWM output and two high-current relays to which an electric immersion heater of up to 3 kW (230 V~) can be connected. The heater can be directly connected to the controller without the need of auxiliary relays.

For data communication, the controller has a RESOL VBus®.



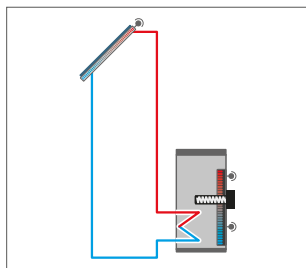
For electric immersion heaters!

The simple solution for your DHW supply!

- Direct connection of an electric immersion heater up to 3 kW (230 V~)
- DHW heating with rapid heat-up and thermal disinfection
- Time and temperature control of the electric backup heating
- Solar backup heating suppression
- Heat quantity measurement via VFD Grundfos Direct Sensor™
- PWM output for the speed control of a high-efficiency pump
- Quick access to the holiday and the manual modes
- Status display for a bidirectional HE pump
- Drainback option and tube collector function
- Commissioning menu

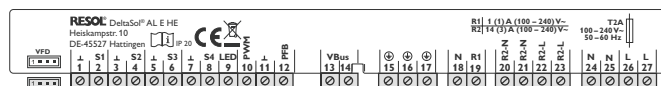
Article no.	Article	Price bracket
115 325 93	DeltaSol® AL E HE – Solar controller	A
115 326 03	DeltaSol® AL E HE – Full kit » incl. 3 Pt1000 sensors (1x FKP6, 2x FRP6)	A

EXAMPLES



Solar system with electric backup heating
(Abstracted representation on the display)

ELECTRICAL CONNECTION



TECHNICAL DATA

Inputs: for 4 Pt1000 temperature sensors (thereof 1 usable as an RCTT input), 1 VFD Grundfos Direct Sensor™, 1 PWM feedback

Outputs:

1 semiconductor relay, 2 high-current relays for electric immersion heater, 1 PWM output

PWM frequency: 512 Hz

PWM voltage: 10 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

14 (3) A 240 V~ / 24 V= (potential-free high-current relay)

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.67 W

Temperature controls class: I

Energy efficiency contribution: 1 %

Mode of operation: type 1.B.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®

VBus® current supply: 35 mA

Functions: function control, operating hours counter, tube collector function, heat quantity measurement, time-controlled thermostat function, DHW heating with rapid heat-up, thermal disinfection, holiday mode and backup heating suppression

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: System-Monitoring-Display for system visualisation, 16-segment display, 7-segment display, 8 symbols for system states, back-ground illumination and operating control LED

Operation: 3 buttons and 1 slide switch

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T2A

Maximum altitude: 2000 m above MSL

Dimensions: 144 x 208 x 43 mm

ACCESSORIES

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

VFD Grundfos Direct Sensor™



Digital sensors in different versions

(see page 110)

SD3 Smart Display



Display module with 3 displays for collector and store temperature as well as for heat quantity

(see page 88)

Electric immersion heater



Electric immersion heater 3 kW 230V~ (1½")

(see page 79)

AM1



Alarm module for signalling system failures

(see page 89)

RCTT Remote control



Activating the rapid heat-up function without accessing the controller menu

(see page 103)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® CS series

The controllers of the **DeltaSol® CS** series are used for speed control of a HE pump in small standard solar thermal and heating systems.

They are equipped with up to 2 PWM outputs as well as with an input for a VFD Grundfos Direct Sensor™ which enables precise heat quantity measurement. The commissioning menu ensures an easy and quick configuration.

The **DeltaSol® CS** series is available in 3 versions, depending on the demands. Details concerning the number of the relays as well as additional functions are shown in the technical data.

High efficiency even for small systems!

DeltaSol® CS series

- 1 input for a VFD Grundfos Direct Sensor™
- Heat quantity measurement
- Commissioning menu
- Drainback option

DeltaSol® CS/4, CS Plus

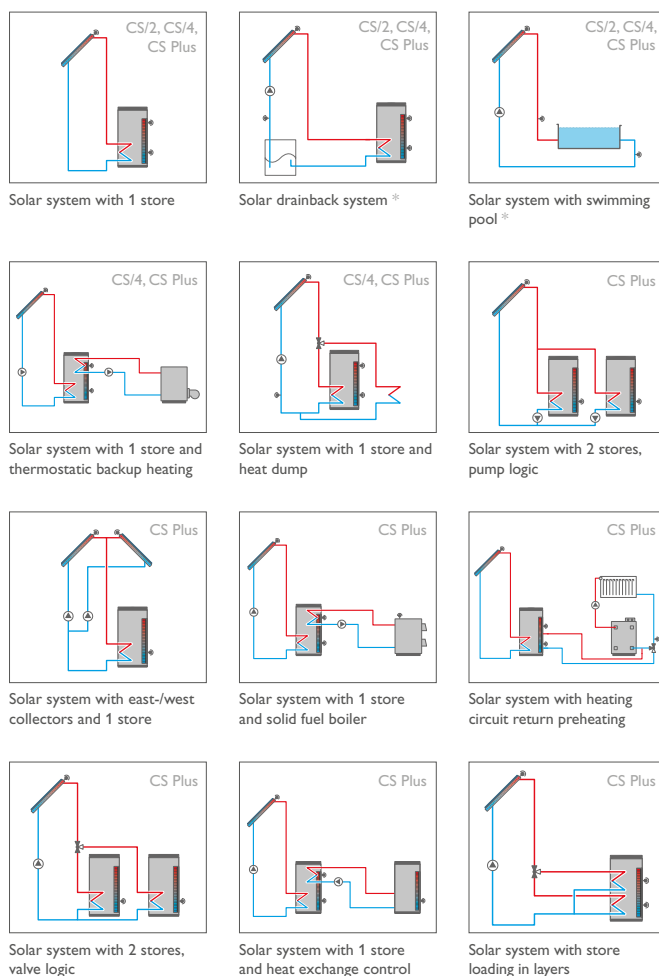
- 3 basic system layouts (**DeltaSol® CS/4**), 10 basic system layouts (**DeltaSol® CS Plus**) to choose from
- Tube collector function, thermal disinfection function
- Heat pump demand (optional)

A PWM adapter cable is included with the controller.

For our range of Grundfos Direct Sensors™ see page 110.

Article no.	Article	Price bracket
115 004 73	DeltaSol® CS/2 – Solar controller	A
115 004 63	DeltaSol® CS/2 – Full kit » incl. 3 Pt1000 sensors (1 x FKP6, 2 x FRP6)	A
115 004 53	DeltaSol® CS/4 – Solar controller	A
115 004 43	DeltaSol® CS/4 – Full kit » incl. 3 Pt1000 sensors (1 x FKP6, 2 x FRP6)	A
115 003 13	DeltaSol® CS Plus – Solar controller	A
115 003 03	DeltaSol® CS Plus – Full kit » incl. 4 Pt1000 sensors (2 x FKP6, 2 x FRP6)	A

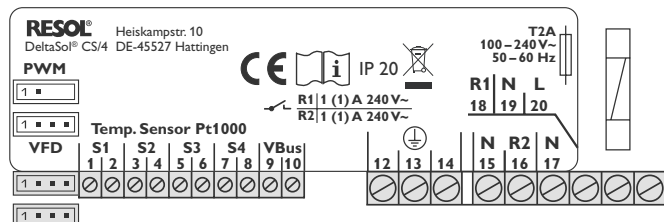
EXAMPLES



* Abstracted representation on the display

ELECTRICAL CONNECTION

Example DeltaSol® CS/4



TECHNICAL DATA

Inputs:

4 Pt1000 temperature sensors, 1 VFD Grundfos Direct Sensor™

Outputs 1 semiconductor relay, 1 PWM output (CS/2),

2 semiconductor relays, 1 PWM output (CS/4),

2 semiconductor relays, 2 PWM outputs (CS Plus)

PWM frequency: 512 Hz

PWM voltage: 10.5 V

Switching capacity: 1 (1) A 240 V~ (semiconductor relay)

Total switching capacity:

1 A 240 V~ (CS/2)

2 A 240 V~ (CS/4, CS Plus)

Power supply: 100-240 V~ (50-60 Hz)

Supply connection: type X attachment

Standby: 0.86 W (CS/2, CS/4, CS Plus)

Temperature controls class:

I (CS/4, CS Plus)

Energy efficiency contribution:

1 % (CS/4, CS Plus)

Mode of operation: type 1.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®

VBus® current supply: 35 mA

Functions: tube collector function and thermostat function (CS/4, CS Plus), function control, operating hours counter, speed control, drainback option and heat quantity measurement

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: System-Monitoring-Display for system visualisation, 16-segment and 7-segment display, 8 symbols for indication of system status

Operation: 3 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T2A

Maximum altitude: 2000 m above MSL

Dimensions: 172 x 110 x 46 mm

ACCESSORIES

For a survey of accessories see page 60!

KM2 Communication module

For remote access to the controller via VBus.net



(see page 84)

VBus®/USB interface adapter

PC connection kit for RESOL controllers with VBus® incl. Service CD



(see page 87)

VFD Grundfos Direct Sensor™

Digital sensors in different versions



(see page 110)

SP10

Sensor overvoltage protection



(see page 113)

AM1

Alarm module for signalling system failures



(see page 89)

SD3 Smart Display

Display module with 3 displays for collector and store temperature as well as for heat quantity



(see page 88)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® SLL

The **DeltaSol® SLL** is the smallest controller of the SL series. Its equipment is optimised for small and medium-sized solar thermal and heating systems, 10 pre-configured basic systems are available. The **DeltaSol® SLL** is also the first controller of its category to offer the automatic function control according to the VDI 2169 directive.

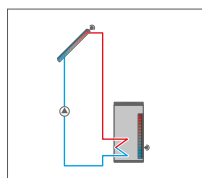
Additionally, it is equipped with a potential-free extra-low voltage relay for backup heating demand and a V40 flowmeter input for heat quantity measurement.

Versatile and easy to operate!

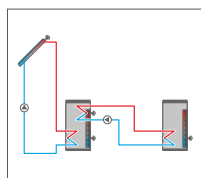
- Microbuttons for quick access to the manual mode and the holiday function
- 3 relay outputs (incl. 1 potential-free extra-low voltage relay)
- 4 inputs for Pt1000, Pt500 or KTY temperature sensors
- 1 V40 impulse input
- 2 PWM outputs for the speed control of high-efficiency pumps
- 10 basic system layouts to choose from
- Automatic function control according to VDI 2169
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 431 53	DeltaSol® SLL – Solar controller	A
115 431 63	DeltaSol® SLL – Full kit » incl. 3 Pt1000 sensors (1 x FKP6, 2 x FRP6)	A

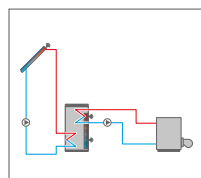
EXAMPLES



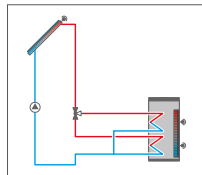
Solar system with 1 store



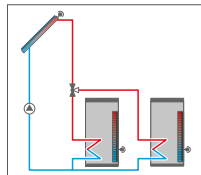
Solar system with 1 store and heat exchange control



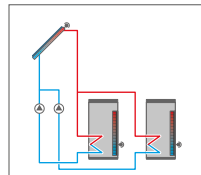
Solar system with 1 store and thermostatic backup heating



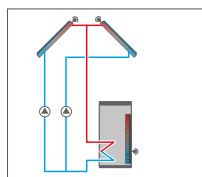
Solar system with store loading in layers



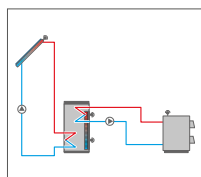
Solar system with 2 stores, valve logic



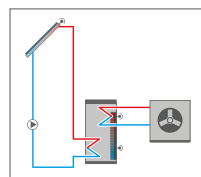
Solar system with 2 stores, pump logic



Solar system with east-west collectors and 1 store

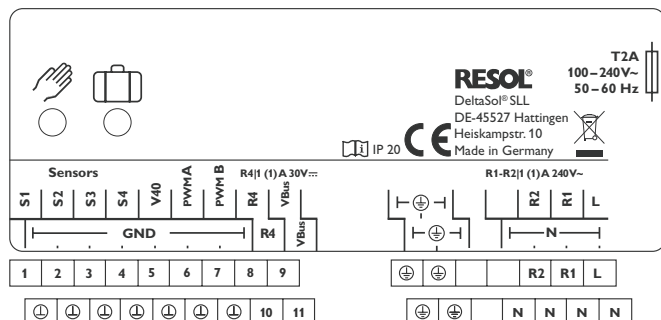


Solar system with 1 store and solid fuel boiler



Solar system with 1 store and backup heating with heat pump

ELECTRICAL CONNECTION



TECHNICAL DATA

Inputs: 4 inputs for Pt1000, Pt500 or KTY temperature sensors, 1 V40 impulse input

Outputs: 2 semiconductor relays, 1 potential-free extra-low voltage relay, 2 PWM outputs

PWM frequency: 1000 Hz

PWM voltage: 10.5 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

1 (1) A 30 V= (potential-free relay)

Total switching capacity: 2 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.69 W

Temperature controls class: I

Energy efficiency contribution: 1 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®

VBus® current supply: 60 mA

Functions: operating hours counter, tube collector function, thermostat function, pump speed control, heat quantity measurement, adjustable system parameters and optional functions (menu-driven), balance and diagnostics function, function control according to VDI 2169

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: System-Monitoring-Display for system visualisation, 16-segment-display, 8 symbols for indication of the system status, operating control LED (Lightwheel®)

Operation: 4 buttons and 1 adjustment dial (Lightwheel®)

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T2A

Maximum altitude: 2000 m above MSL

Dimensions: 110 x 166 x 47 mm

ACCESSORIES

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

V40



V40 flowmeter in different versions

(see page 106)

SP10



Sensor overvoltage protection

(see page 113)

AM1



Alarm module for signalling system failures

(see page 89)

Calorimeter extension kits



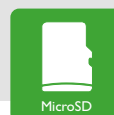
Calorimeter extension kits (consisting of 2 x FRP30, 1 x V40 flowmeter)

(see page 59)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® SL

With its versatile software, the DeltaSol® SL can control even complex systems easily and reliably. 27 pre-configured system layouts with up to 3 hydraulic variants each facilitate the commissioning and enable the adaptation to the individual system requirements.

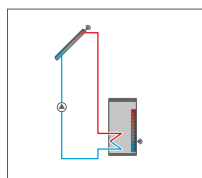
The operation via 2 main buttons and 1 adjustment dial, the Light-wheel®, follows the well-known operating concept. The manual mode and the holiday function can be activated by pressing a single button.

Modern design, many application possibilities!

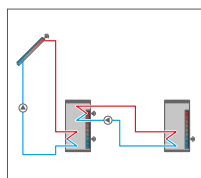
- Integrated MicroSD card slot
- 4 relay outputs (incl. 1 potential-free extra-low voltage relay)
- 4 inputs for Pt1000, Pt500 or KTY temperature sensors
- Input for 1 analogue Grundfos Direct Sensor™
- 1 V40 impulse input (also usable as a Pt1000, Pt500 or KTY temperature sensor input)
- 2 PWM outputs for the speed control of high-efficiency pumps
- 27 basic system layouts with up to 3 hydraulic variants each to choose from
- Automatic function control according to VDI 2169
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 003 33	DeltaSol® SL – Solar controller	A
115 003 43	DeltaSol® SL – Full kit » incl. 4 Pt1000 sensors (2 x FKP6, 2 x FRP6)	A

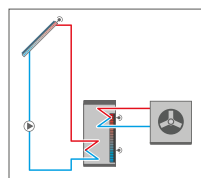
EXAMPLES



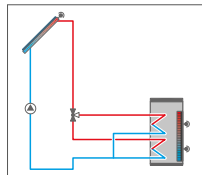
Solar system with 1 store



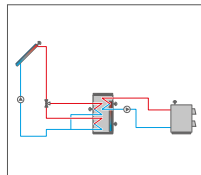
Solar system with 1 store and heat exchange control



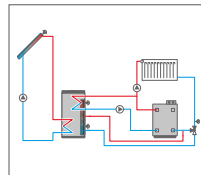
Solar system with 1 store and backup heating with heat pump



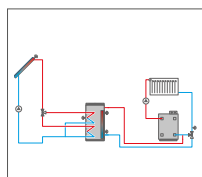
Solar system with store loading in layers



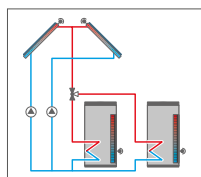
Solar system with store loading in layers and solid fuel boiler



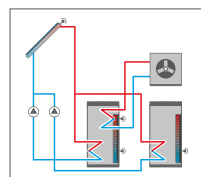
Solar system with 1 store, heating circuit return preheating and thermostatic backup heating



Solar system with store loading in layers and heating circuit return preheating

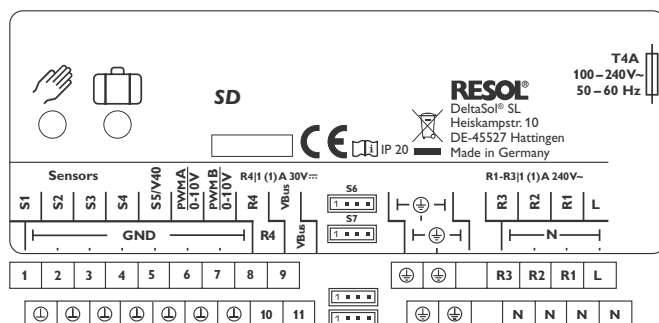


Solar system with east-/west collectors and 2 stores (valve logic)



Solar system with 2 stores, pump logic and backup heating with heat pump

ELECTRICAL CONNECTION



Sensor 6: Grundfos Direct Sensor™, Sensor 7: frequency input

TECHNICAL DATA

Inputs: 4 inputs for Pt1000, Pt500 or KTY temperature sensors, 1 analogue Grundfos Direct Sensor™, 1 frequency input, 1 V40 impulse input (also usable as a Pt1000, Pt500 or KTY temperature sensor input)

Outputs: 3 semiconductor relays, 1 potential-free extra-low voltage relay, 2 PWM outputs (switchable to 0-10 V)

PWM frequency: 512 Hz

PWM voltage: 10.8 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

1 (1) A 30 V== (potential-free relay)

Total switching capacity: 3 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.77 W

Temperature controls class: I

Energy efficiency contribution: 1 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, MicroSD card slot

VBus® current supply: 60 mA

Functions: operating hours counter, tube collector function, thermostat function, pump speed control, heat quantity measurement, adjustable system parameters and optional functions (menu-driven), balance and diagnostics function, function control according to VDI 2169

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: System-Monitoring-Display for system visualisation, 16-segment-display, 8 symbols for indication of the system status, operating control LED (Lightwheel®)

Operation: 4 buttons and 1 adjustment dial (Lightwheel®)

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 110 x 166 x 47 mm

ACCESSORIES

For a survey of accessories see page 60!

DL2 Plus Datalogger



For remote access to 2 controllers, integrated data logging and connection to a BMS

(see page 85)

SP10



Sensor overvoltage protection

(see page 113)

VFS/RPS Grundfos Direct Sensor™



Analogue sensors in different versions

(see page 110)

AM1



Alarm module for signalling system failures

(see page 89)

MicroSD card



MicroSD card, 16 GB memory capacity, incl. adapter

(see page 59)

Calorimeter extension kits



Calorimeter extension kits (consisting of 2 x FRP30, 1 x V40 flowmeter)

(see page 59)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® BX

The DeltaSol® BX is equipped with 26 pre-programmed basic systems for a broad range of 1- and 2-store systems. Pre-defined functions facilitate system parameterisation.

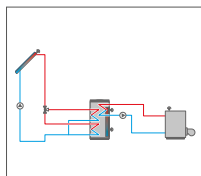
With the integrated SD card slot, system data can easily be logged and transferred to a computer.

Complex systems simply mastered!

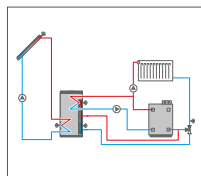
- 4 relay outputs and 5 Pt1000 temperature sensor inputs
- 2 inputs for analogue Grundfos Direct Sensors™
- 2 PWM outputs for the speed control of high-efficiency pumps
- 26 basic systems to choose from
- Drainback option
- Thermal disinfection function, heat dump function
- Selection between SI and imperial units
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 450 03	DeltaSol® BX – Solar controller	A
115 450 13	DeltaSol® BX – Full kit » incl. 5 Pt1000 sensors (2 x FKP6, 3 x FRP6)	A

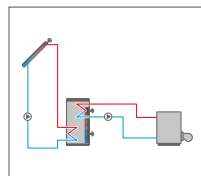
EXAMPLES



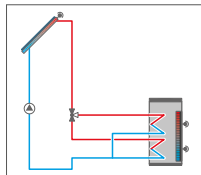
Solar system with store loading in layers and solid fuel boiler



Solar system with 1 store, heating circuit return preheating and thermostatic backup heating



Solar system with 1 store and thermostatic backup heating



Solar system with store loading in layers

TECHNICAL DATA

Inputs: 5 Pt1000 temperature sensors, 1 V40 impulse input, 2 analogue Grundfos Direct Sensors™

Outputs:

3 semiconductor relays, 1 electromechanical relay and 2 PWM outputs

PWM frequency: 512 Hz

PWM voltage: 10.8 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)
2 (1) A 240 V~ (electromechanical relay)

Total switching capacity: 4 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.58 W

Temperature controls class: I

Energy efficiency contribution: 1 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, SD card slot

VBus® current supply: 35 mA

Functions: ΔT control, pump speed control, heat quantity measurement, operating hours counter for the solar pump, tube collector function, thermostat function, store loading in layers, priority logic, heat dump function, thermal disinfection function, function control

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: System-Monitoring-Display for system visualisation, 16-segment display, 7-segment display, 8 symbols, operating control LED (directional pad) and background illumination

Operation: 7 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

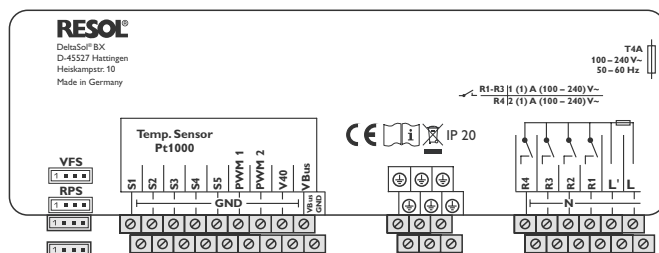
Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 198 x 170 x 43 mm

ELECTRICAL CONNECTION



ACCESSORIES

An SD card is included with the controller.

For a survey of accessories see page 60!

DL2 Plus Datalogger



For remote access to 2 controllers, integrated data logging and connection to a BMS

(see page 85)

SP10



Sensor overvoltage protection

(see page 113)

VFS/RPS Grundfos Direct Sensor™



Analogue sensors in different versions

(see page 110)

AM1



Alarm module for signalling system failures

(see page 89)

Calorimeter extension kits



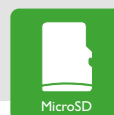
Calorimeter extension kits (consisting of 2 x FRP30, 1 x V40 flowmeter)

(see page 59)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® SLT

The **DeltaSol® SLT** effortlessly controls even complex systems and enables adaptation to the individual system requirements. Numerous pre-programmed optional functions such as thermal disinfection or zone loading can be combined and parameterised. It is also possible to directly choose from 27 pre-programmed basic systems.

The operation via 2 main buttons and 1 adjustment dial, the **Light-wheel®**, follows the well-known operating concept.

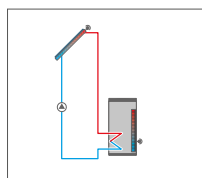
The manual mode and the holiday function can be activated by pressing a single button.

Freely configurable compact-class controller!

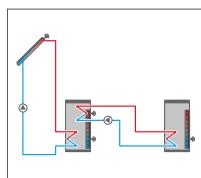
- 4 relay outputs (incl. 1 potential-free extra-low voltage relay)
- 4 inputs for Pt1000, Pt500 or KTY temperature sensors
- 1 extension module via VBus® (11 sensors and 9 relays in total)
- Input for 1 analogue Grundfos Direct Sensor™ and 1 frequency input
- 1 V40 impulse input (also usable as a Pt1000, Pt500 or KTY temperature sensor input)
- 2 PWM outputs for the speed control of high-efficiency pumps
- Numerous pre-programmed optional functions
- 27 basic system layouts to choose from
- Automatic function control according to VDI 2169
- MicroSD card slot
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 005 33	DeltaSol® SLT – System controller	A
115 004 93	DeltaSol® SLT – Full kit » incl. 4 Pt1000 sensors (2 x FKP6, 2 x FRP6)	A

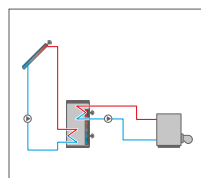
EXAMPLES



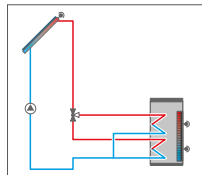
Solar system with 1 store



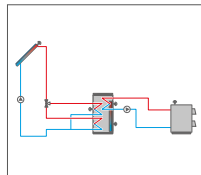
Solar system with 1 store and heat exchange control



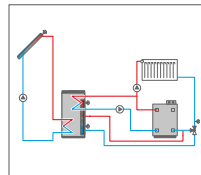
Solar system with 1 store and thermostatic backup heating



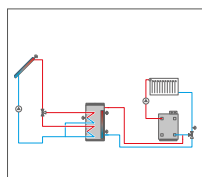
Solar system with store loading in layers



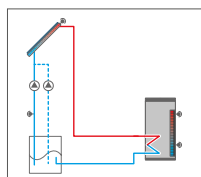
Solar system with store loading in layers and solid fuel boiler



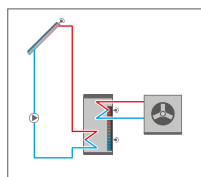
Solar system with 1 store, heating circuit return preheating and thermostatic backup heating



Solar system with store loading in layers and heating circuit return preheating



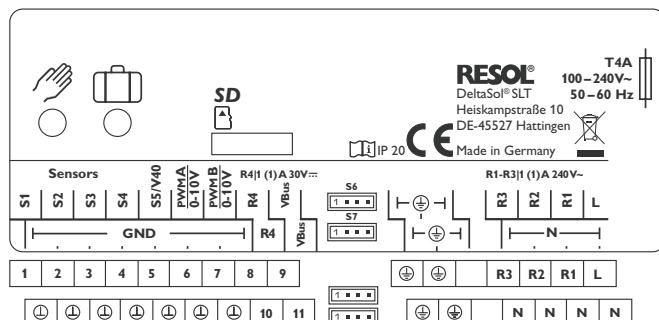
Solar drainback system with booster pump *



Solar system with 1 store and backup heating with heat pump

* Abstracted representation on the display

ELECTRICAL CONNECTION



Sensor 6: Grundfos Direct Sensor™, Sensor 7: frequency input

TECHNICAL DATA

Inputs: 4 inputs for Pt1000, Pt500 or KTY temperature sensors, 1 analogue Grundfos Direct Sensor™, 1 frequency input, 1 V40 impulse input (also usable as a Pt1000, Pt500 or KTY temperature sensor input)

Outputs: 3 semiconductor relays, 1 potential-free extra-low voltage relay, 2 PWM outputs (switchable to 0-10 V)

PWM frequency: 512 Hz

PWM voltage: 10.8 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

1 (1) A 30 V== (potential-free relay)

Total switching capacity: 3 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.75 W

Temperature controls class: I

Energy efficiency contribution: 1 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, MicroSD card slot

VBus® current supply: 60 mA

Functions: operating hours counter, tube collector function, zone loading, heat exchange, speed control, heat quantity measurement, adjustable system parameters and optional functions (menu-driven), balance and diagnostics function, function control according to VDI 2169

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication/Display: full graphic display, operating control LED (Lightwheel®)

Operation: 4 buttons and 1 adjustment dial (Lightwheel®)

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 110 x 166 x 47 mm

ACCESSORIES

For a survey of accessories see page 60!

DL2 Plus Datalogger



For remote access to 2 controllers, integrated data logging and connection to a BMS

(see page 85)

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

VFS/RPS Grundfos Direct Sensor™



Analogue sensors in different versions

(see page 110)

SP10



Sensor overvoltage protection

(see page 113)

EM Extension module



Sensor and relay extension module with 5 outputs and 6 inputs

(see page 57)

Calorimeter extension kits



Calorimeter extension kits (consisting of 2 x FRP30, 1 x V40 flowmeter)

(see page 59)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® BX Plus

The **DeltaSol® BX Plus** is the most versatile system controller for complex solar and heating systems. It is ideal to control a combination of solar and non-solar parts of the system.

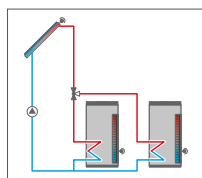
Easy combination and parameterisation of pre-programmed functions for several millions of hydraulic variants.

More possibilities!

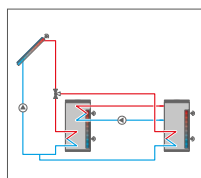
- 5 relay outputs and 8 inputs for Pt1000, Pt500 or KTY temperature sensors
- Up to 2 extension modules via VBus® (21 sensors and 15 relays in total)
- Inputs for digital Grundfos Direct Sensors™ as well as for FRHd humidity sensors
- Integrated control of up to 2 high-efficiency pumps via PWM outputs
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card
- Cooling over the heating circuit with condensation detection
- Dew point calculation by means of the FRHd humidity sensor to avoid condensation
- Simplified timer, 0-10 V boiler control and DHW preheating
- Remote access to the heating circuits with room control unit(s) or the VBus®Touch HC App
- Extended optional functions, e.g. solid fuel boiler function with mixer and target temperature control
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 001 33	DeltaSol® BX Plus – System controller	A
115 001 43	DeltaSol® BX Plus – Full kit » incl. 5 Pt1000 sensors (2 x FKP6, 3 x FRP6)	A

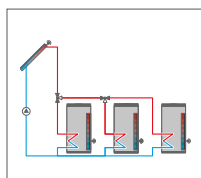
EXAMPLES



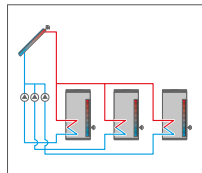
2-store system with valve logic, 1 pump, 3 sensors and 3-port valve



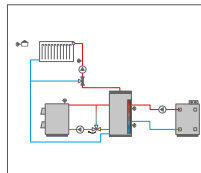
2-store solar system with valve logic and heat exchange control



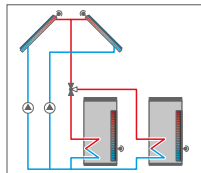
Solar system with 3 stores, 3-port-valve logic



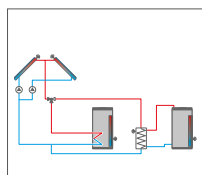
3-store solar system with pump logic and priority logic



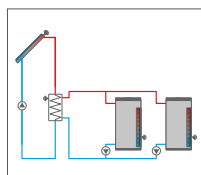
1 mixed heating circuit with solid fuel boiler and backup heating (demand)



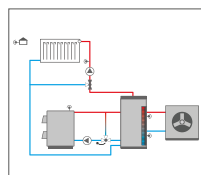
Solar system with east-/west collectors and 2 stores (valve logic)



Solar system with east-/west collectors, 2 stores and external heat exchanger, 3-port valve control

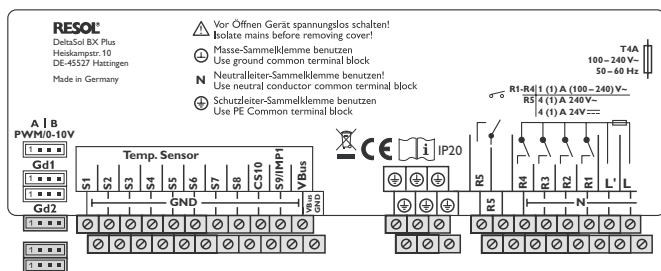


Solar system with 2 stores and external heat exchanger, pump logic



1 mixed heating circuit with solid fuel boiler and backup heating with heat pump (demand)

ELECTRICAL CONNECTION



* For the inputs Gd1 and Gd2, the following sensor combinations are possible:
1 x RPD, 1 x VFD / 2 x VFD, but with different measuring ranges only
/ 1 x VFD, 1 x FRHd / 1 x RPD, 1 x FRHd

TECHNICAL DATA

Inputs:

8 Pt1000, Pt500 or KTY temperature sensor inputs (can optionally be used for remote controls, operating mode switches or potential-free switches), 1 impulse input for V40 flowmeters (can optionally be used for Pt1000, Pt500 or KTY temperature sensors, remote controls, operating mode switches or potential-free switches), 1 CS10 solar cell, 2 digital inputs* for VFD/RPD Grundfos Direct Sensors™ or FRHd humidity sensors

Outputs:

5 relays, 4 of them semiconductor relays for speed control, 1 potential-free relay, 2 PWM outputs (switchable to 0-10 V)

PWM frequency: 512 Hz

PWM voltage: 10.5 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

4 (2) A 24 V~ / 240 V~ (potential-free relay)

Total switching capacity: 4 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.91 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, SD card slot

VBus® current supply: 60 mA

Functions: 7 integrated calorimeters and control of weather-compensated heating circuits. Adjustable system parameters and add-on options (menu-driven), balance and diagnostics functions, function control according to VDI 2169

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: full graphic display, operating control LED (directional pad) and background illumination

Operation: 7 buttons

Ingress protection: IP 20 / EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 198 × 170 × 43 mm

ACCESSORIES

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

VFD / RPD Grundfos Direct Sensor™



Digital sensors in different versions

(see page 110)

FRHd (digital)



For measuring the relative humidity and the room temperature

(see page 111)

Calorimeter extension kits



Calorimeter extension kits (consisting of 2 x FRP30, 1 x V40 flowmeter)

(see page 59)

EM Extension module



Sensor and relay extension module with 5 outputs and 6 inputs

(see page 57)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® MX

The *DeltaSol® MX* is the most versatile system controller for complex solar and heating systems in our product range. It is ideal to control a combination of solar and non-solar parts of the system.

Easy combination and parameterisation of pre-programmed functions for several millions of hydraulic variants.

**Certified for the
North American market!**



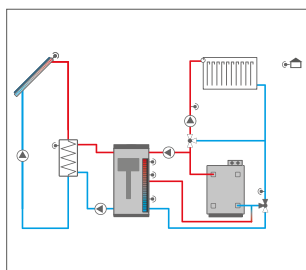
The cLCus certification confirms that the controller is certified to UL 60730-2-9 and CSA - E60730-2-9-01.

The all-rounder!

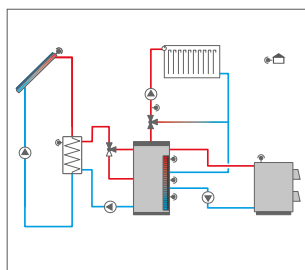
- 14 relay outputs and 12 inputs for Pt1000, Pt500 or KTY temperature sensors
- Up to 5 extension modules via RESOL VBus® (45 sensors and 39 relays in total)
- Inputs for analogue and digital Grundfos Direct Sensors™ as well as for FRH and FRHd humidity sensors
- Integrated control of up to 4 high-efficiency pumps via PWM outputs
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card
- Cooling over the heating circuit with condensation detection
- Dew point calculation by means of the FRH(d) humidity sensor to avoid condensation
- Simplified timer, 0-10V boiler control and DHW preheating
- Remote access to the heating circuits with room control unit(s) or the VBus®Touch HC App
- Extended optional functions, e.g. solid fuel boiler function with mixer and target temperature control
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 992 03	DeltaSol® MX – System controller	A
115 992 13	DeltaSol® MX – Full kit » incl. 6 Pt1000 sensors (2 x FKP6, 4 x FRP6)	A

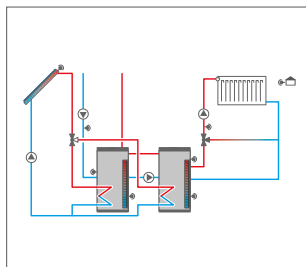
EXAMPLES



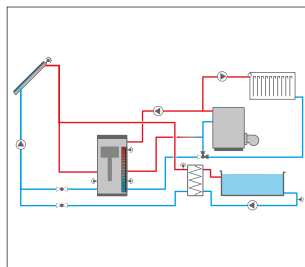
Solar system with combined store, external heat exchanger, weather-compensated heating circuit, return preheating and backup heating



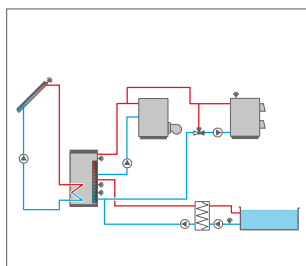
Solar system with external heat exchanger, store loading in layers and backup heating by solid fuel boiler



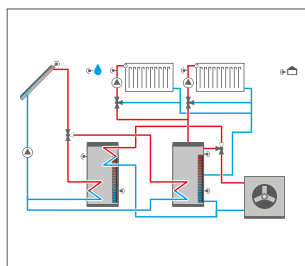
Solar system with 2 stores, circulation pump control, heat exchange control and weather-compensated heating circuit



Solar system with combined store and swimming pool, backup heating, heating circuit loading and return preheating

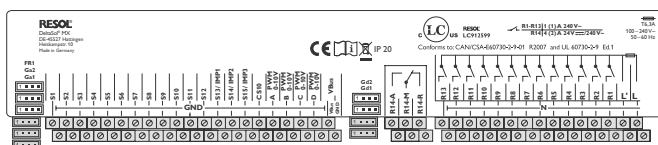


Solar system with store, swimming pool and backup heating over gas- and solid fuel boiler



Solar system with 2 stores and 2 weather-compensated heating circuits for heating or cooling application of a heat pump as well as dew point calculation by means of the FRH(d) humidity sensor

ELECTRICAL CONNECTION



Inputs: 12 Pt1000, Pt500 or KTY temperature sensor inputs (can optionally be used for remote controls, operating mode switches or potential-free switches), 3 impulse inputs for V40 flowmeters (can optionally be used for Pt1000, Pt500 or KTY temperature sensors, remote controls, operating mode switches or potential-free switches), 1 frequency input, 1 CS10 solar cell, 2 analogue inputs for VFS/RPS Grundfos Direct Sensors™ or FRH humidity sensors, 2 digital inputs* for VFD/RPD Grundfos Direct Sensors™ or FRHd humidity sensors

Outputs: 14 relays, 13 of them semiconductor relays for pump speed control, 1 potential-free relay and 4 PWM outputs (switchable to 0-10 V signal outputs)

PWM frequency: 512 Hz

PWM voltage: 10.5 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

4 (2) A 24 V~ / 240 V~ (potential-free relay)

Total switching capacity: 6.3 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.84 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, SD card slot

VBus® current supply: 35 mA

Functions: 7 integrated calorimeters and control of weather-compensated heating circuits. Adjustable system parameters and add-on options (menu-driven), balance and diagnostics functions, function control according to VDI 2169

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication/Display: full graphic display, operating control LED

(directional pad) and background illumination

Operation: 7 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0...40 °C

Degree of pollution: 2

Relative humidity: 10...90 %

Fuse: T6.3A

Maximum altitude: 2000 m above MSL

Dimensions: 253 x 200 x 47 mm

* For the inputs Gd1 and Gd2, the following sensor combinations are possible:

1 x RPD, 1 x VFD / 2 x VFD, but with different measuring ranges only

/ 1 x VFD, 1 x FRHd / 1 x RPD, 1 x FRHd

ACCESSORIES

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

EM Extension module



Sensor and relay extension module with 5 outputs and 6 inputs

(see page 57)

FRH (analogue) and FRHd (digital)



For measuring the relative humidity and the room temperature

(see page 111)

RCP12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

RTA12 Remote control



The heating curve can be comfortably adjusted from the living area

(see page 112)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaSol® MX Plus

The DeltaSol® MX Plus combines the functional range of the DeltaSol® MX with an integrated Web server. Configuration, function control and access to VBus.net can be carried out easily and conveniently on any mobile device via a Web interface.

Availability expected as of quarter 1/2025

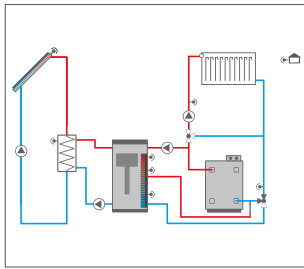
Interfaces such as LAN and Modbus RTU (optional) as well as WLAN functionality and a WLAN access point offer many connectivity options.

The network professional

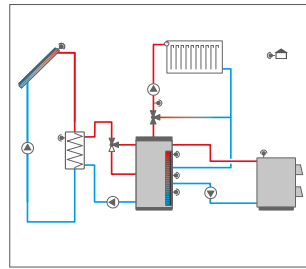
- 15 relay outputs and 15 inputs for Pt1000, Pt500 or KTY temperature sensors
- Up to 5 extension modules via VBus® (45 sensors and 40 relays in total)
- Inputs for analogue and digital Grundfos Direct Sensors™ as well as for FRH and FRHd humidity sensors
- Integrated control of up to 4 high-efficiency pumps via PWM outputs
- Cooling over the heating circuit with condensation detection
- Dew point calculation by means of the FRH(d) humidity sensor to avoid condensation
- Remote access to the heating circuits via the Web interface, room control unit(s) or the VBus®Touch HC App
- Integrated Web server for configuration and function control
- LAN interface, WLAN functionality, WLAN access point and optional Modbus RTU interface
- Easy access to VBus.net via the Web interface
- Operation via any mobile device
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 993 03	DeltaSol® MX Plus – System controller	A
115 993 13	DeltaSol® MX Plus – Full kit » incl. 6 Pt1000 sensors (2 x FKP6, 4 x FRP6)	A

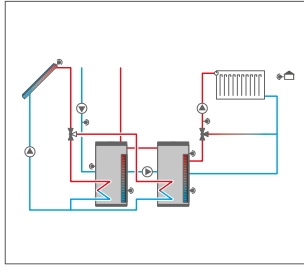
EXAMPLES



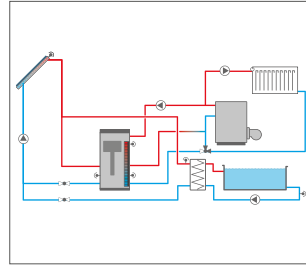
Solar system with combined store, external heat exchanger, weather-compensated heating circuit, return preheating and backup heating



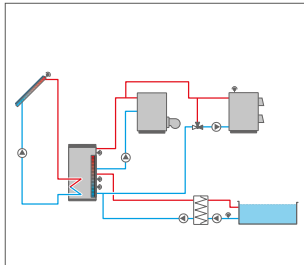
Solar system with external heat exchanger, store loading in layers and backup heating by solid fuel boiler



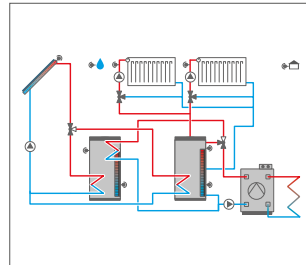
Solar system with 2 stores, circulation pump control, heat exchange control and weather-compensated heating circuit



Solar system with combined store and swimming pool, backup heating, heating circuit loading and return preheating



Solar system with store, swimming pool and backup heating over gas- and solid fuel boiler



Solar system with 2 stores and 2 weather-compensated heating circuits for heating or cooling application of a heat pump as well as dew point calculation by means of the FR-H(d) humidity sensor

ELECTRICAL CONNECTION



Inputs: 15 Pt1000, Pt500 or KTY temperature sensor inputs (can optionally be used for remote controls, operating mode switches or potential-free switches), 4 impulse inputs for V40 flowmeters, 2 frequency inputs, 1 CS10 solar cell, 2 analogue inputs for VFS/RPS Grundfos Direct Sensors™ or FRH humidity sensors, 2 digital inputs* for VFD/RPD Grundfos Direct Sensors™ or FRHd humidity sensors

Outputs: 15 relays, 13 of them semiconductor relays for pump speed control, 1 potential-free relay, 1 potential-free extra-low voltage relay and 4 PWM outputs (switchable to 0-10 V signal outputs)

PWM frequency: 512 Hz

PWM voltage: 10.5 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

4 (2) A 24 V==/240 V~ (potential-free relay)

1 (1) A 30 V== (potential-free relay)

Total switching capacity: 6.3 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: X

Standby: 0.82 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: RESOL VBus®, SD card slot, 10/100 Base TX Ethernet, Auto MDIX, WLAN 2.4–2.4835 GHz, Modbus RTU (optional)

WLAN encryption: WPA/PSK, WPA2/PSK

Transmit power limit (e.i.r.p.): < 100 mW

VBus® current supply: 35 mA

Functions: integrated Web server with Web interface for configuration and function control, 7 integrated calorimeters, control of weather-compensated heating circuits. Adjustable system parameters and add-on options (menu-driven), balance and diagnostics functions, function control according to VDI 2169

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication/Display: full graphic display

Operation: 7 buttons, via the Web interface on the mobile device

Ingress protection: IP 20/DIN EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T6.3A

Maximum altitude: 2000 m above MSL

Dimensions: 253 x 258 x 47 mm

* For the inputs Gd1 and Gd2, the following sensor combinations are possible:
1 x RPD, 1 x VFD / 2 x VFD, but with different measuring ranges only
/ 1 x VFD, 1 x FRHd / 1 x RPD, 1 x FRHd

ACCESSORIES

For a survey of accessories see page 60!

EM Extension module



Sensor and relay extension module with 5 outputs and 6 inputs

(see page 57)

FRH (analogue) and FRHd (digital)



For measuring the relative humidity and the room temperature

(see page 111)

RTA12 Remote control



The heating curve can be comfortably adjusted from the living area

(see page 112)

RC12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

RTS Room control unit

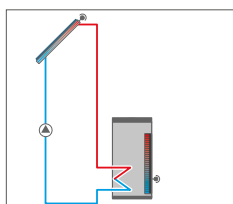


For measuring the relative humidity and the room temperature as well as for adjusting the set room temperature

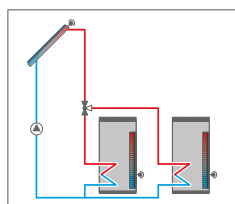
(see page 112)

A table with the current consumption values of all VBus® accessories can be found on page 90.

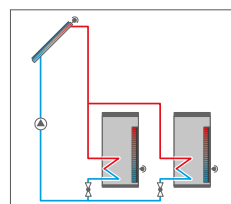
Examples for basic solar systems **DeltaSol® MX / DeltaSol® MX Plus**



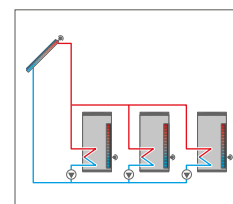
Solar system with 1 store



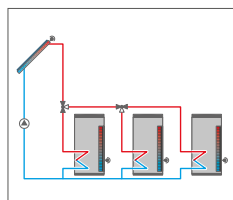
Solar system with 2 stores,
3-port-valve logic



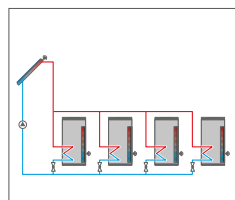
Solar system with 2 stores,
valve logic



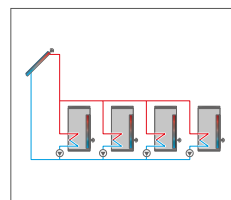
Solar system with 3 stores,
pump logic



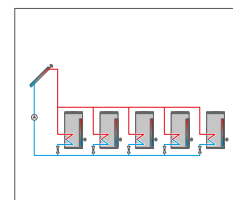
Solar system with 3 stores,
3-port-valve logic



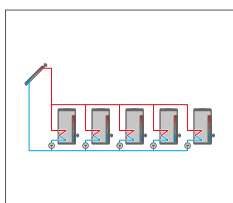
Solar system with 4 stores,
valve logic



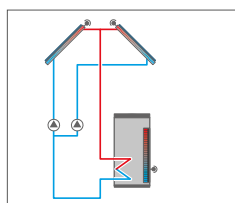
Solar system with 4 stores,
pump logic



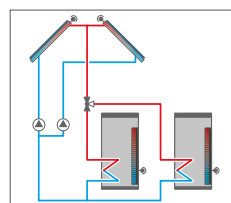
Solar system with 5 stores,
valve logic



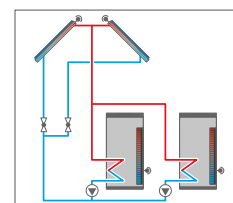
Solar system with 5 stores,
pump logic



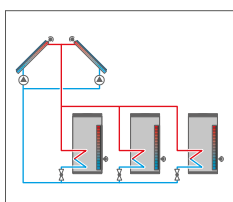
Solar system with east/west
collectors and 1 store, pump
logic



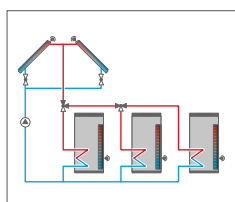
Solar system with east/
west collectors and 2 stores,
pump / 3-port-valve logic



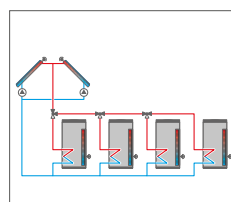
Solar system with east/west
collectors and 2 stores, valve/
pump logic



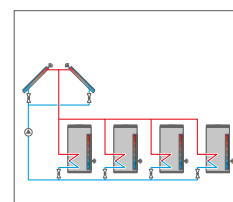
Solar system with east/west
collectors and 3 stores, pump/
valve logic



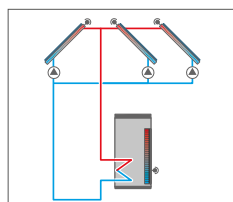
Solar system with east/west
collectors and 3 stores, valve
logic and 3-port valves



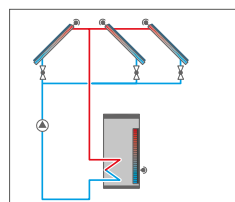
Solar system with east/
west collectors and 4 stores,
pump / 3-port-valve logic



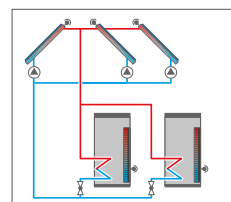
Solar system with east/west
collectors and 4 stores, valve
logic



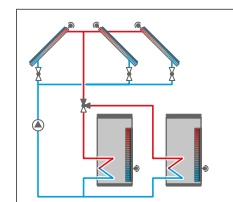
Solar system with 3 collector
fields and 1 store, pump logic



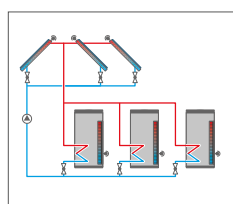
Solar system with 3 collector
fields and 1 store, valve logic



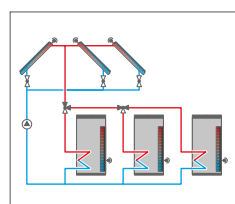
Solar system with 3 collector
fields and 2 stores, pump/
valve logic



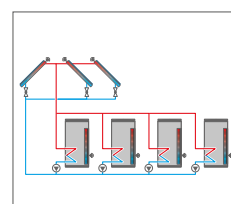
Solar system with 3 collector
fields and 2 stores, valve logic
and 3-port valves



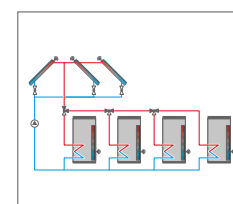
Solar system with 3 collector
fields and 3 stores, valve logic



Solar system with 3 collector
fields and 3 stores, valve logic
and 3-port valves

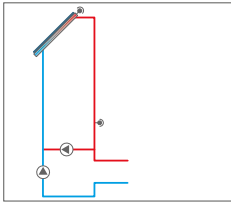


Solar system with 3 collector
fields and 4 stores, valve/
pump logic

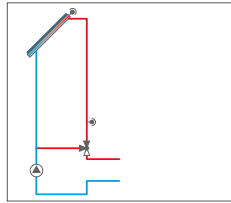


Solar system with 3 collector
fields and 4 stores, valve logic
and 3-port valves

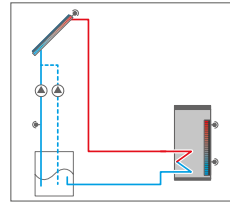
Extendable by a range of pre-programmed optional functions, such as:



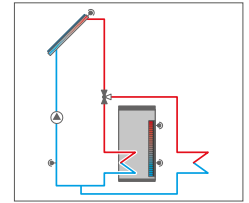
Pump logic bypass



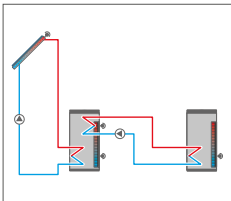
Valve logic bypass



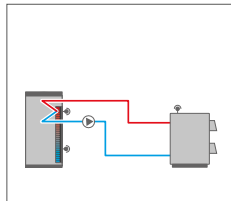
Drainback system with booster pump



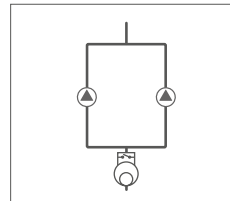
Heat dump



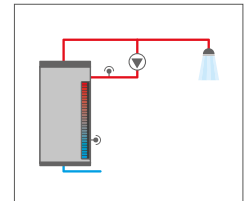
Heat exchange



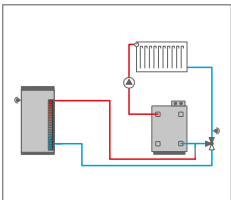
Solid fuel boiler



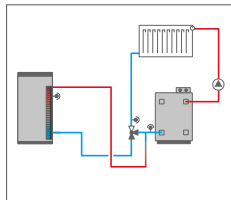
Twin pump



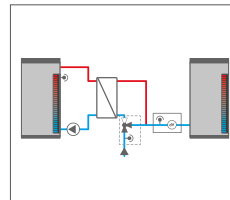
Circulation



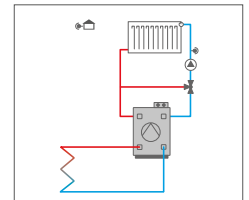
Return preheating



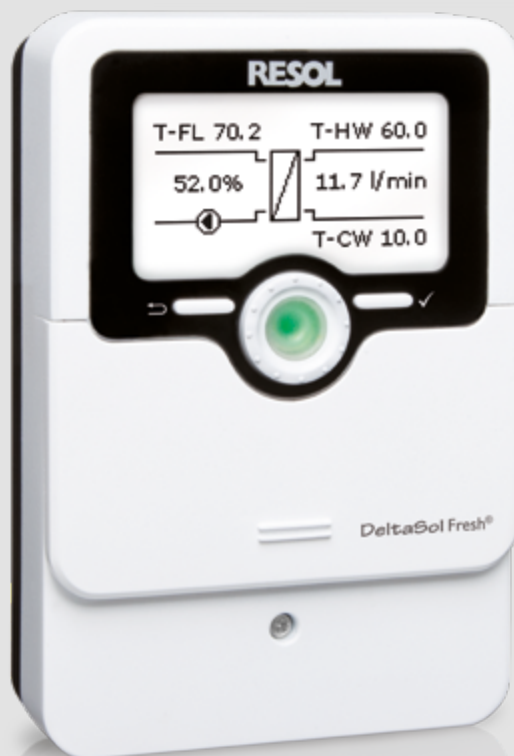
Return mixing function



DHW preheating



Cooling over the heating circuit (e.g. with a heat pump)



rosenthal design 



DeltaSol Fresh®

RESOL offers a range of solutions for the control of DHW exchange modules. The new controller platform is equipped with an enhanced and faster control algorithm and enables the precise and energy-efficient control of the draw-off temperature.

In order to achieve the best possible control quality, our laboratories run a number of dimensioning tests and check measurements. Classification of control quality is conducted on the basis of research results of the Rapperswil Institute for Solar Technology and the Institute for Solar Energy Research in Hamelin (ISFH).

DHW exchange controller platform

- Constantly high control quality by adaptation to the end user system by means of self-learning neural networks
- Customised control for systems with or without circulation
- Flexible circulation function for different user profiles, also available with thermal disinfection
- Reliable DHW heating even in the case of a fault condition
- Control of PWM and LIN bus pumps
- Adaptable to many commonly used flow rate sensors
- Cascades of up to 6 DHW exchange controllers or stations
- Numerous check measurements run by our laboratories

RESOL develop and produce the right controller to suit your DHW exchange module, PLEASE CONTACT US!

Article no.

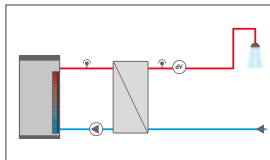
Article

Price bracket

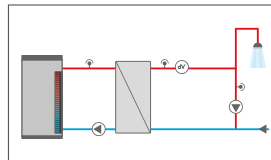
DeltaSol® Fresh – DHW exchange controller (solutions for the control of OEM DHW exchange modules)

A

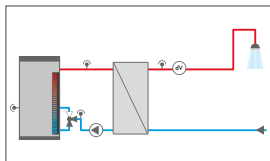
EXAMPLES



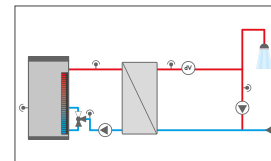
DHW heating



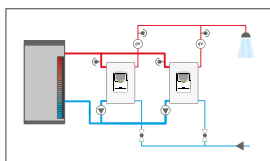
with circulation



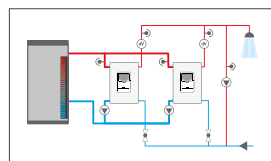
with stratified return



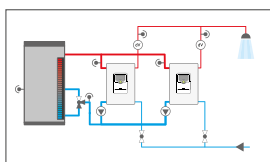
with circulation and stratified return



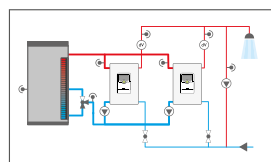
Cascade – DHW heating



Cascade – with circulation



Cascade – with stratified return



Cascade – with circulation and stratified return

TECHNICAL DATA (EXAMPLE)

Inputs:

6 Pt1000 temperature sensors, 1 flow rate sensor (0-500 Hz interface or Grundfos Direct Sensor™ analogue (depending on the product version))

Outputs:

3 semiconductor relays, 2 PWM outputs,

1 potential-free extra-low voltage relay

PWM frequency: 512 Hz

PWM voltage: 11 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

1 (1) A 30 V== (potential-free relay)

Total switching capacity: 4 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.97 W

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, cascade bus, LIN bus interface, MicroSD card slot

VBus® current supply: 60 mA

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display:

full graphic display, operating control LED (Lightwheel®)

Operation: 4 buttons and 1 adjustment dial (Lightwheel®)

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

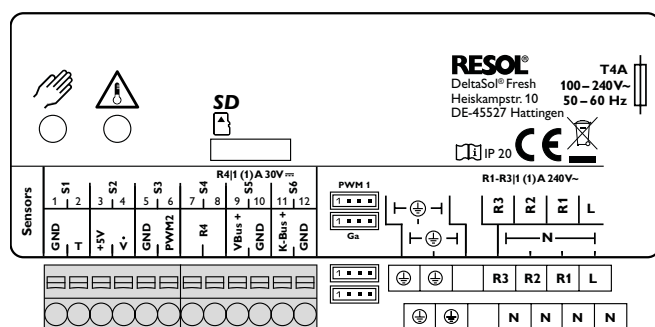
Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 110 x 166 x 47 mm

ELECTRICAL CONNECTION (EXAMPLE)



FURTHER POSSIBLE SENSOR TYPES:

- Ultrasonic sensors
- Vortex sensors
- Turbine sensors

(On request)

ACCESSORIES

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

DL2 Plus Datalogger



For remote access to 2 controllers, integrated data logging and connection to a BMS

(see page 85)

AM1



Alarm module for signalling system failures

(see page 89)



Heating controllers



Survey of heating controllers



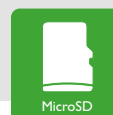
DeltaTherm®	FK	HC mini	HC	HC MAX	HC Plus
Temperature sensor inputs	4	5	8 (9 ²)	12 (15 ²)	10
Sensor type	Pt1000	Pt1000	Pt1000, Pt500, KTY	Pt1000, Pt500, KTY	Pt1000, Pt500, KTY
Semiconductor relays	2	3	4	13	4
Electromechanical relays	-	-	-	-	2
Potential-free relays	-	1	1	1	1
PWM/0-10 V outputs	2	2	2	4	4
Software					
Pre-configured systems	8	14	34	36	36
Operating modes	-	5	6	6	6
Mixed heating circuits	-	1	1 (6 ¹)	4 (7 ¹)	2 (7 ¹)
■ Weather-compensated	-	✓	✓	✓	✓
■ Target temperature	✓	✓	✓	✓	✓
■ Room control	-	✓	✓	✓	✓
■ Room thermostats	-	3	5 (30 ¹)	20 (35 ¹)	10 (35 ¹)
Weather-compensated backup heating	-	✓	✓	✓	✓
0-10 V boiler control	-	✓	✓	✓	✓
Boiler protection	✓	✓	✓	✓	✓
Start-up/Overrun	-	-	✓	✓	✓
Backup heating suppression	-	-	✓	✓	✓
Night correction	-	✓	✓	✓	✓
Antifreeze function	-	✓	✓	✓	✓
Chimney sweeper function	-	✓	✓	✓	✓
Screed drying function	-	✓	✓	✓	✓
Cooling over the heating circuit	-	-	-	✓	✓
Remote access with RCP12	-	✓	✓	✓	✓
Remote access with VBus®Touch HC	-	✓	✓	✓	✓
Remote display via VBus®Touch FK	✓	-	✓	✓	✓
Thermal disinfection	-	-	✓ ¹	✓	✓
DHW heating	✓	-	✓	✓	✓
Circulation	-	-	✓ ¹	✓	✓
Solid fuel boiler	✓	-	✓	✓	✓
Heating circuit return preheating	✓	-	✓ ¹	✓	✓
Return mixing function	✓	-	-	✓	-
Heat exchange	✓	-	✓ ¹	✓	✓
Mixer	✓	-	✓ ¹	✓	✓
Parallel relay	-	-	✓ ¹	✓	✓
Error relay	-	-	✓ ¹	✓	✓
Function block	-	-	✓ ¹	✓	✓
HQM	-	-	✓	✓	✓

¹ via EM Extension module(s)

² via convertible impulse inputs



rosenthal design 



DeltaTherm® HC mini

The **DeltaTherm® HC mini** offers a compact and user-friendly solution for simple heating systems. It can control a weather-compensated heating circuit and its backup heating demand. Additionally, there's a choice of 5 different operating modes, a boiler protection option and a night correction.

Due to the commissioning menu and the 4 pre-configured basic systems, configuration is quick and easy.

The chimney sweeper function and the holiday mode can be activated by pressing a single button.



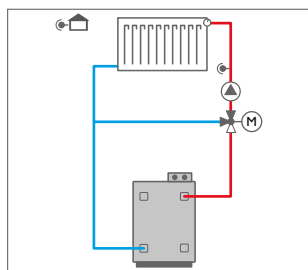
Temperature controls class VIII

Heating control, simple and efficient

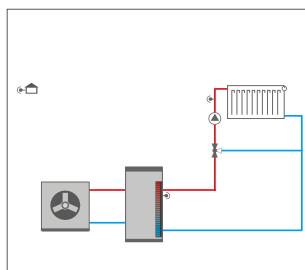
- 4 pre-configured basic systems
- 12 pre-programmed schemes for the temperature controls classes II, III, V, VI, VII and VIII
- 4 relay outputs (incl. 1 potential-free extra-low voltage relay)
- 5 inputs for Pt1000 temperature sensors
- 5 operating modes, boiler protection, room thermostat and night correction
- Holiday mode, chimney sweeper function and screed drying function via microbuttons
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card
- Modulating heating control with 0-10V boiler control
- Weather-compensated control with room influence or demand-based room control with up to 3 room temperature sensors
- Remote access with a room control unit or the VBus®Touch HC App
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 005 23	DeltaTherm® HC mini – Heating controller	A
115 005 13	DeltaTherm® HC mini – Full kit » incl. 3 Pt1000 sensors (1 x FAP13, 1 x FKP23, 1 x FRP6)	A

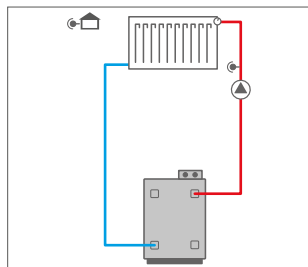
EXAMPLES



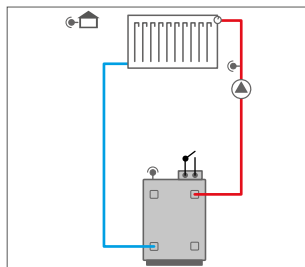
1 mixed heating circuit



1 mixed heating circuit with 1 store and heat pump (demand)

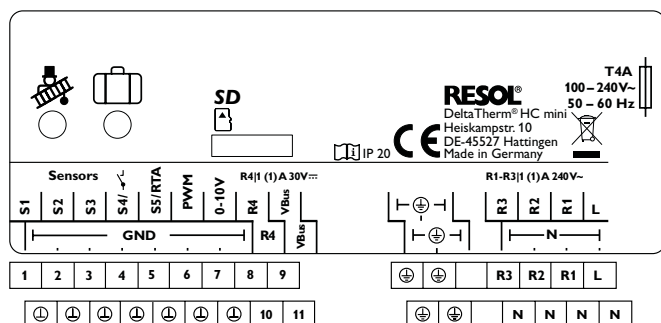


1 static heating circuit



1 static heating circuit with backup heating (demand)

ELECTRICAL CONNECTION



TECHNICAL DATA

Inputs: 5 inputs for Pt1000 temperature sensors (1 of them can be converted to switch and one of them to RTA remote control or BAS operating mode switch)

Outputs: 3 semiconductor relays, 1 potential-free extra-low voltage relay, 1 PWM output, 1 0-10V output

PWM frequency: 512 Hz

PWM voltage: 10.8 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

1 (1) A 30 V== (potential-free relay)

Total switching capacity: 3 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.62 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, MicroSD card slot

VBus® current supply: 60 mA

Functions: weather-compensated heating circuit control, backup heating, room thermostat, chimney sweeper function, screed drying function

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: full graphic display, operating control LED (Lightwheel®)

Operation:

4 buttons and 1 adjustment dial (Lightwheel®)

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0...40 °C

Degree of pollution: 2

Relative humidity: 10...90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 110×166×47 mm

ACCESSORIES

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

RTA12 Remote control



The heating curve can be comfortably adjusted from the living area

(see page 112)

RCP12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

FRP12 temperature sensor



Used for measuring the indoor temperature with a Pt1000 measuring element

(see page 112)

AM1



Alarm module for signalling system failures

(see page 89)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaTherm® HC

The DeltaTherm® HC can control a weather-compensated heating circuit, the DHW loading and the backup heating demand for both.

With up to five extension modules, further heating circuits, additional DHW functions such as circulation or thermal disinfection, and the efficient implementation of further heat sources can be controlled.

Due to the flexible application and extension possibilities, the heating controller is also ideal for larger objects such as apartment houses, residential homes and industrial buildings.



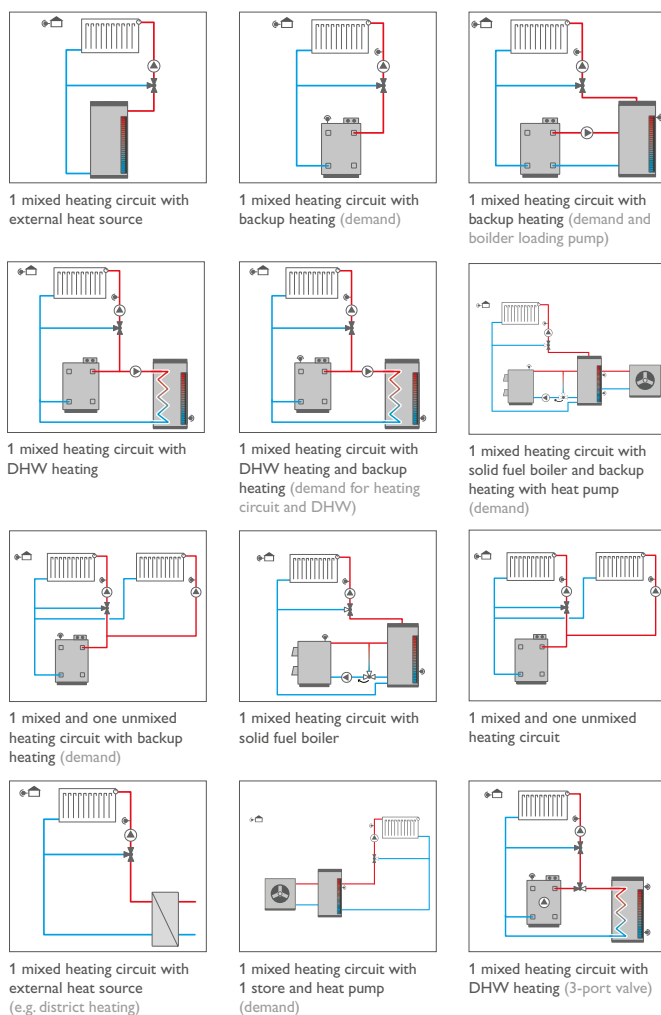
Temperature controls class VIII

Heat upon request!

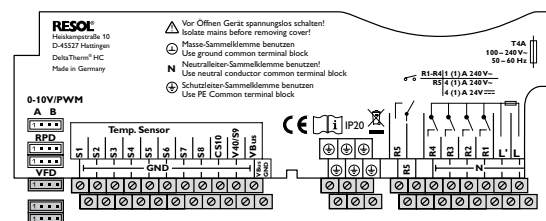
- 9 pre-configured basic systems and numerous pre-programmed optional functions
- 30 pre-programmed schemes for the temperature controls classes II, III, V, VI, VII and VIII
- Up to 5 EM extension modules can be connected via the RESOL VBus® (39 sensors and 30 relays in total), up to 6 weather-compensated heating circuits
- 2 inputs for digital Grundfos Direct Sensors™
- Screed drying function
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card
- Modulating heating control with 0-10V boiler control
- Weather-compensated control with room influence or demand-based room control with up to 5 room temperature sensors
- Remote access with a room control unit or the VBus®Touch HC App
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 002 53	DeltaTherm® HC – Heating controller	A
115 002 63	DeltaTherm® HC – Full kit » incl. 5 Pt1000 sensors (1 x FAP13, 1 x FKP23, 3 x FRP6)	A
115 005 73	DeltaTherm® HC – ErP 6 kit » incl. 1 x FAP13, 1 x RCP12, 1 x FKP23, 1 x FRP6	A
115 005 83	DeltaTherm® HC – ErP 8 kit » incl. 1 x FKP23, 1 x FRP6, 1 x RCP12, 2 x FRP12	A

EXAMPLES



ELECTRICAL CONNECTION



TECHNICAL DATA

Inputs: 8 (9) inputs for Pt500, Pt1000 or KTY temperature sensors, 1 V40 impulse input, inputs for 2 digital Grundfos Direct Sensors™*, 1 input for a CS10 irradiation sensor

Outputs:

4 semiconductor relays, 1 potential-free relay, 2 PWM outputs

PWM frequency: 512 Hz

PWM voltage: 10.5 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

4 (1) A 24 V~/240 V~ (potential-free relay)

Total switching capacity: 4 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.94 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, SD card slot

VBus® current supply: 60 mA

Functions: screed drying, weather-compensated heating circuit control, backup heating, DHW heating with priority logic, circulation, thermal disinfection, heat quantity measurement, optional functions such as solid fuel boiler, return preheating, etc.

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: full graphic display, operating control LED (directional pad) and background illumination

Operation: 7 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 198 x 170 x 43 mm

* For the digital inputs, the following sensor combinations are possible:

- 1 x RPD, 1 x VFD

- 2 x VFD, but with different measuring ranges only

ACCESSORIES

A 0-10V adapter cable and an SD card are included with the controller.

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

EM Extension module



Sensor and relay extension module with 5 outputs and 6 inputs

(see page 57)

RCP12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

FRP12 Indoor temperature sensor



Used for measuring the indoor temperature with a Pt1000 measuring element

(see page 112)

A table with the current consumption values of all VBus® accessories can be found on page 90.



Certified for the
North American
market!

The cLCus certification confirms that the controller is
conform to UL 60730-2-9 and CSA - E60730-2-9-01.

rosenthal design



DeltaTherm® HC MAX

The **DeltaTherm® HC MAX** can control up to 4 weather-compensated heating circuits, the DHW loading and the backup heating demand for both.

Additional DHW functions such as circulation or thermal disinfection, and the efficient implementation of further heat sources are possible. With extension modules, further heating circuits can be controlled.

Due to the flexible application and extension possibilities, the heating controller is also ideal for larger properties such as apartment houses, residential homes and industrial buildings.



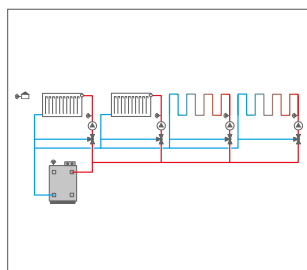
Temperature controls class VIII

Ideal for larger properties

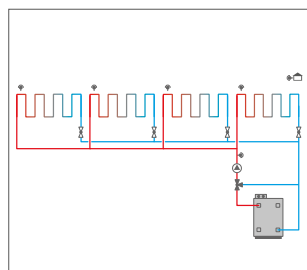
- Up to 5 EM extension modules can be connected via the RESOL VBus® (45 sensors and 39 relays in total), up to 7 weather-compensated heating circuits
- Inputs for analogue and digital Grundfos Direct Sensors™ as well as for FRH and FRHd humidity sensors
- Screed drying function
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card
- Cooling over the heating circuit with condensation detection
- Dew point calculation by means of the FRH(d) humidity sensor to avoid condensation
- Modulating heating control with 0-10V boiler control
- Weather-compensated control with room influence or demand-based room control with up to 5 room temperature sensors
- Remote access with a room control unit or the VBus®Touch HC App
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 006 73	DeltaTherm® HC MAX – Heating controller	A
115 006 83	DeltaTherm® HC MAX – Full kit » incl. 5 Pt1000 sensors (1 x FAP13, 1 x FKP23, 3 x FRP6)	A
115 006 93	DeltaTherm® HC MAX – ErP 6 kit » incl. 1 x FAP13, 1 x RCP12, 1 x FKP23, 1 x FRP6	A
115 007 03	DeltaTherm® HC MAX – ErP 8 kit » incl. 1 x FKP23, 1 x FRP6, 1 x RCP12, 2 x FRP12	A

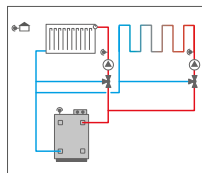
EXAMPLES



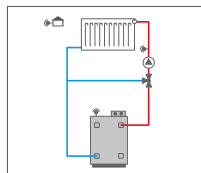
4 mixed heating circuits with backup heating (demand)



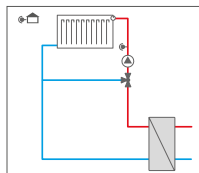
1 mixed heating circuit with 4 zones



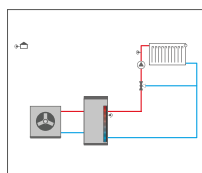
2 mixed heating circuits with backup heating (demand)



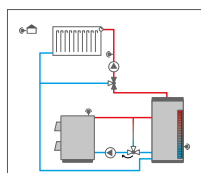
1 mixed heating circuit with backup heating (demand)



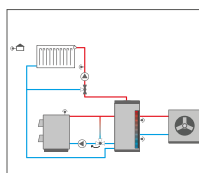
1 mixed heating circuit with external heat source (e.g. district heating)



1 mixed heating circuit with 1 store and heat pump (demand)

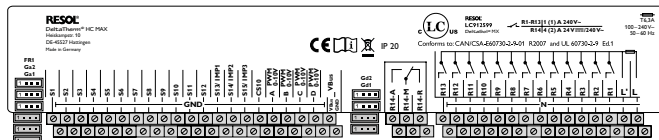


1 mixed heating circuit with solid fuel boiler



1 mixed heating circuit with solid fuel boiler and backup heating with heat pump (demand)

ELECTRICAL CONNECTION



Inputs: 12 Pt1000, Pt500 or KTY temperature sensor inputs (can optionally be used for remote controls, operating mode switches or potential-free switches), 3 impulse inputs for V40 flowmeters (can optionally be used for Pt1000, Pt500 or KTY temperature sensors, remote controls, operating mode switches or potential-free switches), 1 frequency input, 1 CS10 solar cell, 2 analogue inputs for VFS/RPS Grundfos Direct Sensors™ or FRH humidity sensors, 2 digital inputs* for VFD/RPD Grundfos Direct Sensors™ or FRHd humidity sensors

Outputs: 14 relays, 13 of them semiconductor relays for pump speed control, 1 potential-free relay and 4 PWM outputs (convertible to 0-10 V signal outputs)

PWM frequency: 512 Hz

PWM voltage: 10.5 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

4 (2) A 24 V~ / 240 V~ (potential-free relay)

Total switching capacity: 6.3 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.91 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, SD card slot

VBus® current supply: 35 mA

Functions: screed drying, weather-compensated heating circuit control, backup heating, DHW heating with priority logic, circulation, thermal disinfection, heat quantity measurement, optional functions such as solid fuel boiler, return preheating, etc.

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication/Display: full graphic display, operating control LED (directional pad) and background illumination

Operation: 7 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0...40 °C

Degree of pollution: 2

Relative humidity: 10...90 %

Fuse: T6.3A

Maximum altitude: 2000 m above MSL

Dimensions: 253 x 200 x 47 mm

* For the inputs Gd1 and Gd2, the following sensor combinations are possible:
1 x RPD, 1 x VFD / 2 x VFD, but with different measuring ranges only
/ 1 x VFD, 1 x FRHd / 1 x RPD, 1 x FRHd

ACCESSORIES

An SD card is included with the controller.

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

EM Extension module



Sensor and relay extension module with 5 outputs and 6 inputs

(see page 57)

FRH (analogue) and FRHd (digital)



For measuring the relative humidity and the room temperature

(see page 111)

RCP12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

RTA12 Remote control



The heating curve can be comfortably adjusted from the living area

(see page 112)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaTherm® HC Plus

The DeltaTherm® HC Plus can control 2 weather-compensated heating circuits and their backup heating demands.

Additional DHW functions such as circulation or thermal disinfection, and the efficient implementation of further heat sources are possible. With extension modules, further heating circuits can be controlled.

In summer, the heating circuits take over the demand-based cooling by means of a humidity sensor for dew point calculation.

VIII

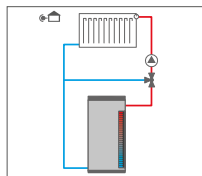
Temperature controls class VIII

Cool in summer – warm in winter!

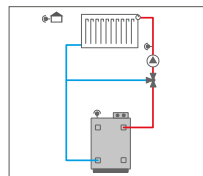
- 2 mixed heating circuits with backup heating
- Cooling over the heating circuit with humidity sensor
- 9 pre-configured basic systems and numerous pre-programmed schemes and optional functions
- Up to 5 EM extension modules can be connected via the RESOL VBus®, up to 7 weather-compensated heating circuits
- Screed drying function
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card
- Modulating heating control with 0-10 V boiler demand
- Weather-compensated control with room influence or demand-based room control with up to 5 room temperature sensors
- Remote access with a room control unit
- Heat pump demand (optional)

Article no.	Article	Price bracket
115 007 43	DeltaTherm® HC Plus – Heating controller	A
115 007 53	DeltaTherm® HC Plus – Full kit » incl. 5 Pt1000 sensors (1 x FAP13, 1 x FKP23, 3 x FRP6)	A

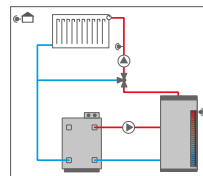
EXAMPLES



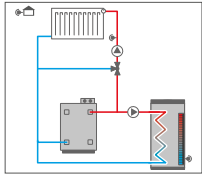
1 mixed heating circuit with external heat source



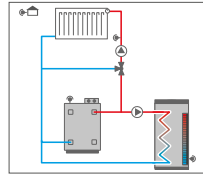
1 mixed heating circuit with backup heating (demand)



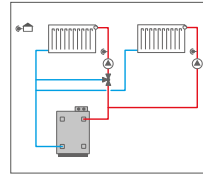
1 mixed heating circuit with backup heating (demand) and boiler loading pump



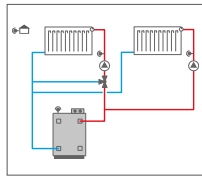
1 mixed heating circuit with DHW heating



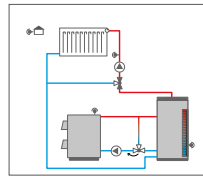
1 mixed heating circuit with DHW heating and backup heating (demand for heating circuit and DHW)



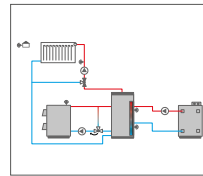
1 mixed and one unmixed heating circuit



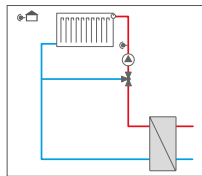
1 mixed and one unmixed heating circuit with backup heating (demand)



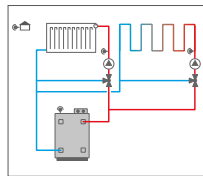
1 mixed heating circuit with solid fuel boiler



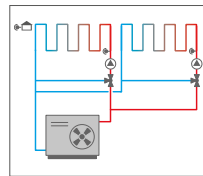
1 mixed heating circuit with solid fuel boiler and backup heating (demand)



1 mixed heating circuit with external heat source (e.g. district heating)

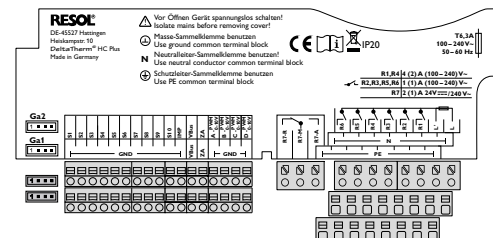


2 mixed heating circuits with backup heating (demand)



2 mixed heating circuits for heating and cooling

ELECTRICAL CONNECTION



TECHNICAL DATA

Inputs: 10 inputs for Pt500, Pt1000 or KTY temperature sensors, 1 V40 impulse input, inputs for 2 analogue Grundfos Direct Sensors™ or FRH humidity sensors

Outputs: 4 semiconductor relays, 2 electromechanical relays, 1 potential-free relay and 4 PWM/0-10 V outputs

PWM frequency: 512 Hz

PWM voltage: 10.5 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

4 (2) A 240 V~ (electromechanical relay)

2 (1) A 24 V~ / 240 V~ (potential-free relay)

Total switching capacity: 6.3 A 240 V~

Power supply: 100 – 240 V~ (50 – 60 Hz)

Supply connection: type X attachment

Standby: approx. 1 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: RESOL VBus®, SD card slot

VBus® current supply: 60 mA

Functions: screed drying, weather-compensated heating circuit control, backup heating, DHW heating with priority logic, circulation, thermal disinfection, heat quantity measurement, optional functions such as solid fuel boiler, return preheating, etc.

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication/Display: full graphic display, operating control LED (directional pad) and background illumination

Operation: 7 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T6.3A

Maximum altitude: 2000 m above MSL

Dimensions: 198 x 170 x 43 mm

ACCESSORIES

An SD card is included with the controller.

For a survey of accessories see page 60!

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

EM Extension module



Sensor and relay extension module with 5 outputs and 6 inputs

(see page 57)

RCP12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

RTS room control unit



For measuring the relative humidity and the room temperature as well as for adjusting the set room temperature

(see page 112)

FRH (analog)



For measuring the relative humidity and the room temperature

(see page 111)

TS10 Dew point switch



Designed for condensation detection in a heating circuit used for cooling

(see page 111)

A table with the current consumption values of all VBus® accessories can be found on page 90.



rosenthal design 



DeltaTherm® FK

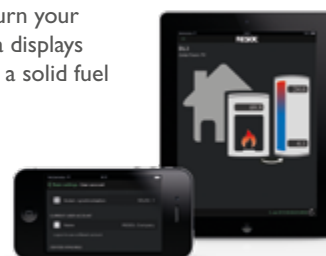
The **DeltaTherm® FK** solid fuel boiler controller has been especially developed for systems with solid fuel boilers, water heating stoves or pellet stove heating systems. With the integrated PWM outputs, the FK can manage the speed control of 2 high-efficiency pumps.

With its easily configurable optional functions, the versatile software allows for the control of an electronic mixer for the return mixing function, a thermostatic backup heating, a target temperature control function and many more.

VBus®Touch FK

With **VBus®Touch FK** you can turn your mobile devices into remote data displays for your RESOL controller with a solid fuel boiler function.

(see page 80)



The biomass specialist!

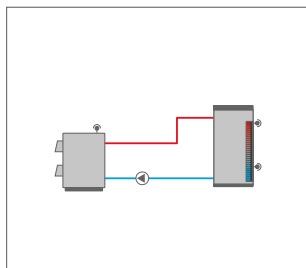
- 2 relay outputs, 4 temperature sensor inputs
- 2 PWM outputs for the speed control of high-efficiency pumps
- Control of an electronic mixer for the return mixing function
- Heating backup
- Heat exchange function
- Thermostatic backup heating
- Heat pump demand (optional)

In order to connect sensor 4 to the controller, a sensor adapter cable is required, see page 58.

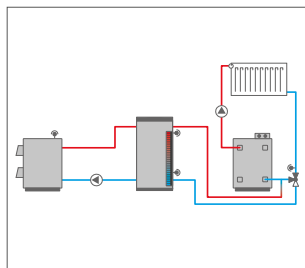
High-temperature sensors can be found on page 108.

Article no.	Article	Price bracket
115 002 83	DeltaTherm® FK – Solid fuel boiler controller	A
115 002 93	DeltaTherm® FK – Full kit » incl. 3 Pt1000 sensors (1 x FKP6, 2 x FRP6)	A

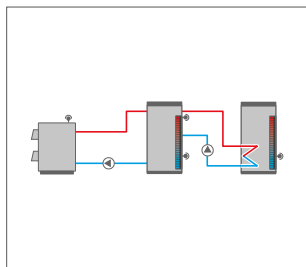
EXAMPLES



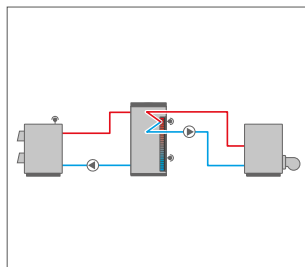
Solid fuel boiler



Solid fuel boiler with heating circuit return preheating



Solid fuel boiler with heat exchange control



Solid fuel boiler with thermostatic backup heating

TECHNICAL DATA

Inputs: 4 Pt1000 temperature sensors

Outputs: 2 semiconductor relays, 2 PWM outputs

PWM frequency: 1000 Hz

PWM voltage: 10.5 V

Switching capacity: 1 (1) A 240 V~ (semiconductor relay)

Total switching capacity: 2 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.46 W

Mode of operation: type 1.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®

VBus® current supply: 35 mA

Functions: minimum and maximum temperature limitation, mixer control for the return mixing function, target temperature control, speed control, heating circuit backup, thermostatic backup heating, heat exchange, PWM pump control, operating hours counter

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: full graphic display

Operation: 3 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

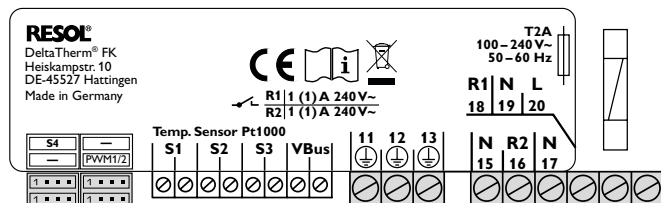
Relative humidity: 10 ... 90 %

Fuse: T2A

Maximum altitude: 2000 m above MSL

Dimensions: 172 x 110 x 46 mm

ELECTRICAL CONNECTION



ACCESSORIES

For a survey of accessories see page 60!

DL2 Plus Datalogger



For remote access to 2 controllers, integrated data logging and connection to a BMS

(see page 85)

VBus®/USB interface adapter



PC connection kit for RESOL controllers with VBus® incl. Service CD

(see page 87)

SDFK Smart Display



Display module with 3 displays for biomass boiler temperature and store temperature as well as for the pump status

(see page 88)

AM1



Alarm module for signalling system failures

(see page 89)

Sensor adapter cable



JST adapter cable for systems in which the 4th sensor is required

(see page 58)

FAP13



Outdoor temperature sensor

(see page 113)

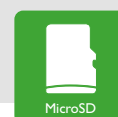
A table with the current consumption values of all VBus® accessories can be found on page 90.



Heat transfer



rosenthal design 



DeltaTherm® HT

The **DeltaTherm® HT** is a compact and user-friendly solution for simple heating systems and offers weather-compensated control with room influence or demand-based room control with 1 room temperature sensor. If a central outdoor sensor unit is used, several controllers can use the outdoor temperature value – this requires the installation of only 1 outdoor temperature sensor.

Additionally, there is a choice of 5 different operating modes and a night correction.

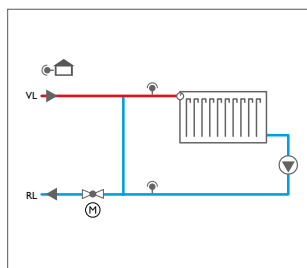
RESOL develop and produce the right OEM controller to meet your requirements, CONTACT US!

Heating circuit controller for heat interface units

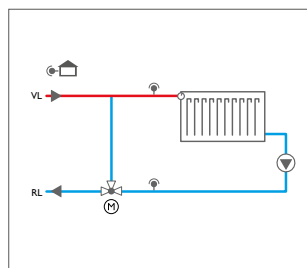
- Pre-programmed basic system
- 4 relay outputs (incl. 1 potential-free extra-low voltage relay)
- 4 inputs for Pt1000 temperature sensors
- 5 operating modes, room thermostat and night correction
- Chimney sweeper function, screed drying function and holiday mode via microbuttons
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via MicroSD card
- Weather-compensated control with room influence or demand-based room control with 1 room temperature sensor
- Remote access with a room control unit
- Function for using a central outdoor sensor unit

Article no.	Article	Price bracket
115 006 03	DeltaTherm® HT – Heating circuit controller for heat interface units	A
115 006 13	DeltaTherm® HT – Full kit » incl. 3 Pt1000 sensors (2 x FKP23, 1 x FAP13)	A

EXAMPLES



Basic system



Basic system with mixer

TECHNICAL DATA

Inputs: 4 inputs for Pt1000 temperature sensors (1 of them can be converted to room thermostat (switch)), 1 input for remote control (RTA) or operating mode switch (BAS)

Outputs:

3 semiconductor relays, 1 potential-free extra-low voltage relay, 1 PWM output, 1 0-10V output

PWM frequency: 512 Hz

PWM voltage: 10.8 V

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

1 (1) A 30 V = (potential-free relay)

Total switching capacity: 3 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.63 W

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, MicroSD card slot

Functions:

weather-compensated heating circuit control, room thermostat, chimney sweeper function, screed drying function, holiday mode

Housing: plastic, PC-ABS and PMMA

Mounting:

wall mounting, also suitable for mounting into patch panels

Indication / Display:

full graphic display, operating control LED (Lightwheel®)

Operation: 4 buttons and 1 Lightwheel®

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

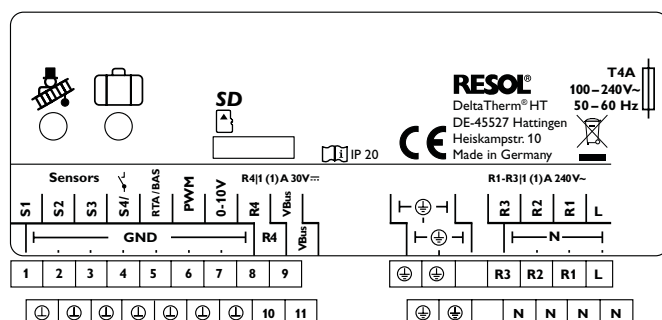
Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 110×166×47 mm

ELECTRICAL CONNECTION



ACCESSORIES

For a survey of accessories see page 60!

Central outdoor sensor unit



Measures the outdoor temperature and transmits this value to the controllers connected

(see page 113)

FAP13



Outdoor temperature sensor

(see page 113)

SP10



Sensor overvoltage protection

(see page 113)

RTA12 Remote control



The heating curve can be comfortably adjusted from the living area

(see page 112)

RCP12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

A table with the current consumption values of all VBus® accessories can be found on page 90.



DeltaTherm® HIU

RESOL offers individual solutions for the control of OEM heat interface units.

The **DeltaTherm® HIU** is a controller for heat interface units and can be used for heating circuit control as well as for DHW heating.

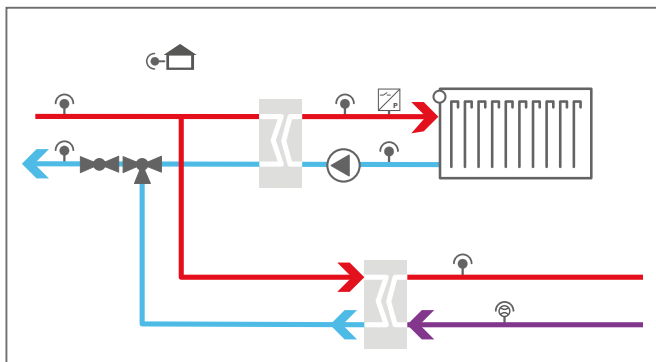
The controller concept enables adaptation to the individual requirements. Pre-programmed functions ensure a high operating comfort.

RESOL develop and produce the right OEM controller to meet your requirements, CONTACT US!

Controller concept for heat interface units

- Heating circuit control with DHW exchange switchover
- Return limitation, night correction, summer operation, etc.
- DHW with standby function
- Weather-compensated control or demand-based room control
- Control of PWM pumps and valves
- Adaptable to many commonly used flow rate sensors
- Remote access with a room control unit
- Data logging and firmware updates via SD card

APPLICATION EXAMPLE



TECHNICAL DATA

Inputs: 10 Pt1000 temperature sensors, 3 flow rate sensors (2 analogue Grundfos Direct Sensors™ and 1 frequency input 0-500 Hz)

Outputs: 4 semiconductor relays / electromechanical relays (depending on the product version), 4 PWM outputs (convertible to 0-10 V), 2 x 24 V ==

PWM frequency: 1024 Hz

PWM voltage: 11.2 V

Switching capacity: 1 (1) A 240 V~ (semiconductor relay/electromechanical relay)

Total switching capacity: 4 A 240 V~

Power supply: 100 – 240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: < 1 W

Temperature controls class: V

Energy efficiency contribution: 3 %

Data interface: VBus®, SD card slot, central outdoor sensor unit

Overvoltage category: 2

VBus® current supply: 60 mA

Mode of operation: type 1.B action

Housing: plastic, PC-ABS and PMMA

Mounting: integrated into the station

Indication/Display: full graphic display, operating control LED (directional pad) and background illumination

Operation: 7 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

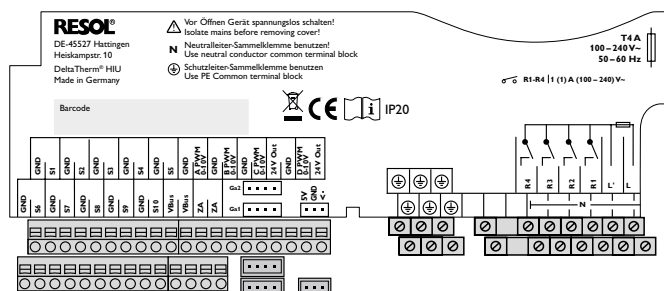
Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 198 x 170 x 43 mm

ELECTRICAL CONNECTION



ACCESSORIES

For a survey of accessories see page 60!

DL2 Plus Datalogger



For remote access to 2 controllers, integrated data logging and connection to a BMS

(see page 85)

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

Central outdoor sensor unit



Measures the outdoor temperature and transmits this value to the controllers connected

(see page 113)

RTA12 Remote control



The heating curve can be comfortably adjusted from the living area

(see page 112)

RCP12 Room control unit



The heating curve can be comfortably adjusted, incl. operating mode switch

(see page 112)

FAP13



Outdoor temperature sensor

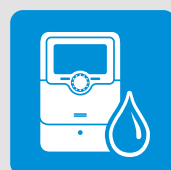
(see page 113)



THERE ARE MANY WAYS TO USE
THE ENERGY OF THE SUN!



WE ARE YOUR PARTNER IN SOLAR
AND HEATING CONTROLLERS





The devices are connected over the RESOL VBus® to enable data communication.

EM Extension module

The EM Extension module provides 5 additional relays and 6 additional sensor inputs for the *DeltaSol*® MX, MX Plus, BX Plus, SLT, *DeltaTherm*® HC, HC Plus, HC MAX and PV MAX

The Extension module can be used for all optional functions of the above-mentioned controllers and can also control a heating circuit.

- Usable for all optional functions of the *DeltaSol*® MX, MX Plus, BX Plus, SLT and *DeltaTherm*® HC, HC Plus, HC MAX and PV MAX
- 7-segment LC display

- Function control
- Slide switch 0 Auto I
- Easy to install, configurable over the controller menu

TECHNICAL DATA

Inputs: 6 Pt1000, Pt500 or KTY temperature sensors

Outputs: 4 semiconductor relays and 1 potential-free relay

Switching capacity:

1 (1) A 240 V~ (semiconductor relay)

4 (1) A 24 V~ / 240 V~ (potential-free relay)

Total switching capacity: 4 A 240 V~

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.53 W

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting

Indication / Display: LC display, 7-segment display

Operation: 3 buttons and 1 slide switch

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

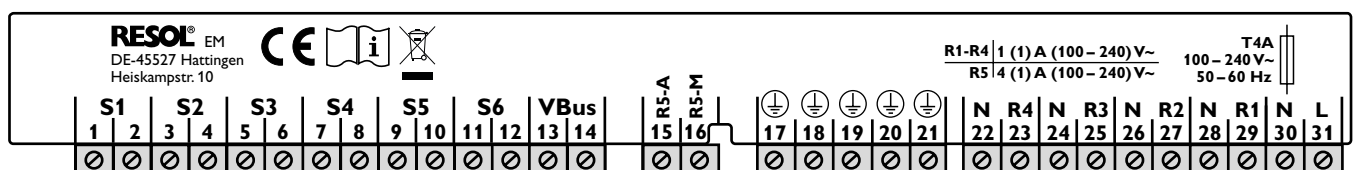
Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 144 × 208 × 43 mm

ELECTRICAL CONNECTION



RTA12 and FAP13 for connection to the extension module can be found on page 112.

Article no.	Article	Price bracket
145 440 80	EM Extension module	A



Ceramic fuses (5x20mm)

Controller	T0.2 A	T1 A	T2 A	T4 A	T6.3 A	T4 A
DeltaSol® A/AX/AX HE				✓		
DeltaSol® AL E / AL E HE			✓			
DeltaSol® BS series						✓
DeltaSol® BX series				✓		
DeltaSol® CS series			✓			
DeltaSol® MX					✓	
DeltaSol® MX Plus					✓	
DeltaSol® SL / SLT				✓		
DeltaSol® SLL			✓			
DeltaSol® FK			✓			
DeltaSol® HC mini				✓		
DeltaSol® HC				✓		
DeltaSol® HC MAX					✓	
DeltaSol® HC Plus					✓	
EM Extension module				✓		
DeltaSol® Pool						✓
PSW Basic	✓					
PSW Premium		✓				
PSW Universal			✓			
TT2 Thermostat controller		✓				
DeltaSol Fresh®				✓		

Article no.	Article	Price bracket
290 018 30	Spare ceramic fuses T4 A – bag with fuses 10 x T4 A	C
290 029 90	Spare ceramic fuses T6.3 A – bag with fuses 10 x T6.3 A	C
290 030 60	Spare ceramic fuses T0.2 A – bag with fuses 10 x T0.2 A	C
290 030 50	Spare ceramic fuses T1.0 A – bag with fuses 10 x T1.0 A	C
290 030 20	Spare ceramic fuses T0.8 A – bag with fuses 10 x T0.8 A	C
290 030 00	Spare ceramic fuses T2.0 A – bag with fuses 10 x T2.0 A	C
280 001 20	Spare can fuses T4 A – bag with fuses 10 x T4 A	C
290 004 70	Spare can fuses T6.3 A – bag with fuses 10 x T6.3 A	C

58



HRG2 Housing
– For up to 2 HR230 Auxiliary relays

HR230 Auxiliary relay

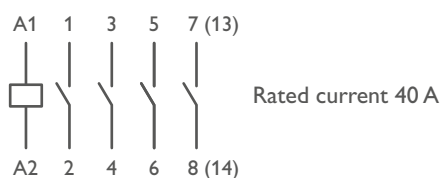


Article no.	Article	Price bracket
280 002 60	HR230 Auxiliary relay – single-phase, suitable for all RESOL controllers	A
280 003 10	HRG2 Housing – for up to 2 HR230 Auxiliary relays	A



HRG3 Housing
– For 1 HR230/3 Auxiliary relay

HR230/3 Auxiliary relay



Article no.	Article	Price bracket
280 033 50	HR230/3 Auxiliary relay – three-phase / four-pole	A
280 033 60	HRG3 Housing – for 1 HR230/3 Auxiliary relay	A



MicroSD card (16 GB)

Article no.	Article	Price bracket
180 007 41	MicroSD card – 16 GB memory capacity » incl. adapter	C

Calorimeter extension kits



For use with:
WMZ Plus, *DeltaSol*® SL series, *DeltaSol*® BX, BX Plus, MX, MX Plus
DeltaTherm® HC, HC Plus, HC MAX

Article no.	Article	Price bracket
290 006 20	Calorimeter extension kit 2 » consisting of 2 x FRP30, 1 x V40-15 flowmeter	B
290 006 30	Calorimeter extension kit 3 » consisting of 2 x FRP30, 1 x V40-25 flowmeter	B
290 013 60	Calorimeter extension kit 4 » consisting of 2 x FRP30, 1 x V40-35 flowmeter	B
290 013 70	Calorimeter extension kit 5 » consisting of 2 x FRP30, 1 x V40-60 flowmeter	B
290 013 90	Calorimeter extension kit 7 » consisting of 2 x FRP30, 1 x V40-150 flowmeter	B



Spare parts & accessories

Find the right accessories for your controller!

		DeltaSol® AL E HE	DeltaSol® BX	DeltaSol® BX Plus	DeltaSol® CS-Serie	DeltaSol® MX	DeltaSol® MX Plus	DeltaSol® SLT	DeltaSol® SL /SLL	DeltaTherm® HC mini	DeltaTherm® HC	DeltaTherm® HC MAX	DeltaTherm® HC Plus	DeltaTherm® FK	DeltaTherm® HT	DeltaTherm® HIU	DeltaSol® Fresh
	AM1 (Page 89)	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	-	✓**	✓
	CS10 (Page 113)	-	-	✓	-	✓	✓	-	-	-	✓	✓	-	-	-	-	-
	DL2 Plus (Page 85)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
	KM2 (Page 84)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
	EM (Page 57)	-	-	✓	-	✓	✓	✓	-	-	✓	✓	✓	-	-	-	-
	RTA12/ RCP12 (Page 112)	-	-	✓	-	✓*	✓*	-	-	✓*	✓*	✓*	✓	-	✓	✓	-
	RTS (Page 112)	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-
	SD3/SDFK (Page 88)	✓ (SD3)	✓ (SD3)	✓ (SD3)	✓ (SD3)	✓ (SD3)	✓ (SD3)	✓ (SD3)	✓ (SD3)	-	-	✓ (SD3)	✓ (SD3)	✓ (SDFK)	-	-	-
	SP10 (Page 113)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	FAP13 (Page 113)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
	Central outdoor sensor unit (Page 113)	-	-	-	-	-	-	-	-	-	-	-	✓	-	✓	✓	-

* RCP12 for controller version 2.0 (DeltaSol® MX, DeltaSol® BX Plus)/1.09 (DeltaTherm® HC) /1.01 (DeltaTherm® HC mini)

**system-dependent

		DeltaSol® AL E HE	DeltaSol® BX	DeltaSol® BX Plus	DeltaSol® CS-Serie	DeltaSol® MX	DeltaSol® MX Plus	DeltaSol® SLT	DeltaSol® SL /SLL	DeltaTherm® HC mini	DeltaTherm® HC	DeltaTherm® HC MAX	DeltaTherm® HC Plus	DeltaTherm® FK	DeltaTherm® HT	DeltaTherm® HIU	DeltaSol® Fresh
	FRH / FRHd (Page 111)	-	-	✓ (FRHd)	-	✓	✓	-	-	-	-	✓	✓ (FRH)	-	-	-	-
	TS10	-	-	✓	-	✓	✓	-	-	-	-	✓***	✓	-	-	-	-
Interface adapters (Page 87)																	
	VBus®/USB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
	VBus®/ CANopen	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓



Pump stations & accessories



Survey of pump stations



FlowSol® S HE

FlowSol® B HE

FlowSol® XL

Wilo PARA ST 15/7.0-PWM2	✓	✓	—
Wilo Stratos PARA 15/1-9			✓
Air separator	—	✓	✓
Flowmeter	1 ... 13 l/min	1 ... 13 l/min	5 ... 35 l/min
DeltaSol® BX, BX Plus	—	✓	✓ (BX Plus)
DeltaSol® CS/2, CS/4, CS Plus	✓	✓	—
DeltaSol® SL, SLL, SLT	—	✓	—
Metric thread / 230 V~ pump	✓	✓	✓
NPT thread / 115 V~ pump (optional)	✓	✓	—

Further combinations of pumps and threads are available on request!



EEI < 0,23



FlowSol® S HE

The FlowSol® S/S HE pump station is a single-line pump station and is used in the solar return. The station is available with a choice of controllers from the popular DeltaSol® CS series.

The pump station is pre-assembled and contains all the vital hydraulic components for operating a solar thermal system and is particularly easy to install.

- Safety assembly with connection for the diaphragm-type expansion vessel, safety valve and pressure gauge
- Fill and drain valves
- Wall mounting bracket with fastening material
- Insulated design casing
- Integrated standard or high-efficiency pump

TECHNICAL DATA

Circulating pump:

FlowSol® S HE:

Wilo PARA ST 15/7.0-PWM2 (Maximum power consumption: 45 W)

Safety valve: 6 bar

Pressure gauge: 0 ... 10 bar

Flowmeter: 1 ... 13 l/min

Non-return valves: opening pressure 40 mbar, openable

Connection to diaphragm-type expansion vessel:

¾" ET, flat sealing

Outlet safety valve: ¾" IT

Connections to the solar pipes: ¾" IT

Maximum temperature: 95 °C

Maximum pressure: 6 bar

Medium: water with max. 50 % glycol

Dimensions: approx. 430 x 223 x 193 mm (with insulation)

Distance centre/wall: 67 mm

Material:

fittings: brass

seals: EPDM/AFM 34

insulation: EPP foam

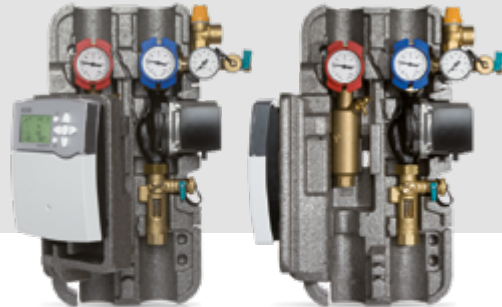
ErP data overview

Solar controller	CS/2	CS/4	CS Plus
Standby [W]	0.86	0.86	0.86
Auxiliary electricity consumption [kWh/a]			
Wilo PARA ST 15/7.0-PWM2	53.6	53.6	53.6

Optionally available with a Grundfos pump!

On request, all stations are available without controller!

Article no.	Article	Price bracket
290 028 43	FlowSol® S HE – DeltaSol® CS/2 – Single-line pump station » incl. 3 sensors (1 x FKP6, 2 x FRP6)	A
290 028 53	FlowSol® S HE – DeltaSol® CS/4 – Single-line pump station » incl. 3 sensors (1 x FKP6, 2 x FRP6)	A
290 028 63	FlowSol® S HE – DeltaSol® CS Plus – Single-line pump station » incl. 4 sensors (2 x FKP6, 2 x FRP6)	A



EEI < 0,23



FlowSol® B HE

The FlowSol® B/B HE is a pre-assembled twin-line pump station and contains all the vital hydraulic components for operating a solar thermal system and is particularly easy to install.

- Integrated controller
- Integrated standard or high-efficiency pump
- Fill and drain valves
- Safety assembly with connection for the diaphragm-type expansion vessel, safety valve and pressure gauge
- Wall mounting bracket with mounting material
- Air separator with manual air vent for the solar thermal system

TECHNICAL DATA

Circulating pump:

Wilo PARA ST 15/7.0-PWM2 (Maximum power consumption: 45 W)

Safety valve: 6 bar

Pressure gauge: 0 ... 10 bar

Flowmeter: 1 ... 13 l/min

Non-return valves: opening pressure 20 mbar; openable

Connection to diaphragm-type expansion vessel:

¾" ET, flat sealing

Outlet safety valve: ¾" IT

Connections to the solar pipes: ¾" IT

Maximum temperature flow/return: 120 °C/95 °C

Maximum pressure: 6 bar

Medium: water with max. 50% glycol

Dimensions: approx. 481 × 320 × 190 mm (with insulation)

Distance centres: 100 mm

Distance centre/wall: 67 mm

Material:

fittings: brass

seals: AFM 34

insulation: EPP foam

ErP data overview

Solar controller	CS/2	CS/4	CS Plus	BX	BX Plus	SL	SLL	SLT
Standby [W]	0.86	0.86	0.86	0.58	0.91	0.77	0.69	0.75
Auxiliary electricity consumption [kWh/a]								
Wilo PARA ST 15/7.0-PWM2	53.6	53.6	53.6	51.1	54.0	52.8	52.1	52.6

Optionally available with a Grundfos pump!

On request, all stations are available without controller!

Article no.	Article	Price bracket
290 028 13	FlowSol® B HE – DeltaSol® CS/2 – Twin-line pump station » incl. 3 sensors (1 × FKP6, 2 × FRP6)	A
290 028 23	FlowSol® B HE – DeltaSol® CS/4 – Twin-line pump station » incl. 3 sensors (1 × FKP6, 2 × FRP6)	A
290 028 33	FlowSol® B HE – DeltaSol® CS Plus – Twin-line pump station » incl. 4 sensors (2 × FKP6, 2 × FRP6)	A
290 022 63	FlowSol® B HE – DeltaSol® BX – Twin-line pump station » incl. 5 sensors (2 × FKP6, 3 × FRP6)	A
290 022 83	FlowSol® B HE – DeltaSol® BX Plus – Twin-line pump station » incl. 5 sensors (2 × FKP6, 3 × FRP6)	A
290 029 03	FlowSol® B HE – DeltaSol® SL – Twin-line pump station » incl. 4 sensors (2 × FKP6, 2 × FRP6)	A
290 029 23	FlowSol® B HE – DeltaSol® SLL – Twin-line pump station » incl. 3 sensors (1 × FKP6, 2 × FRP6)	A
290 029 63	FlowSol® B HE – DeltaSol® SLT – Twin-line pump station » incl. 4 sensors (2 × FKP6, 2 × FRP6)	A



FlowSol® XL

The FlowSol® XL is a pre-assembled twin-line pump station especially developed for systems with high flow rates. Equipment and nominal width are designed to meet the demands of large collector fields.

For collector fields of
up to 100 m²

- Integrated DeltaSol® BX Plus controller
- Integrated energy-saving high-efficiency pump
- Safety assembly with connection for the diaphragm-type expansion vessel, safety valve and pressure gauge
- Ball valves in flow and return with non-return valves and thermometer handles
- Flowmeter
- Air separator with manual air vent for the solar thermal system
- Fill and drain valves

TECHNICAL DATA

Circulating pump: Wilo Stratos PARA 15/1-9
(maximum power consumption: 88 W)

Safety valve: 6 bar

Pressure gauge: 0 ... 10 bar

Flowmeter: 5 ... 35 l/min
for low-flow systems (0.2 l/min/m²) with collector fields
of up to 100 m²
for high-flow systems (0.5 l/min/m²) with collector fields
of up to 50 m²

Ball valves in flow and return with non-return valves and thermometer handles:

non-return valves: opening pressure 20 mbar; openable
thermometer: 0 ... 160 °C

Connection to diaphragm-type expansion vessel:
1" ET, flat sealing

Outlet safety valve: 1" IT

Connections to the solar pipes: 1" IT

Maximum temperature flow/return: 120 °C/95 °C

Maximum pressure: 6 bar

Medium: water with max. 50 % glycol

Dimensions:

approx. 470 x 380 x 220 mm (with insulation)
distance centres: 125 mm
distance centre/wall: 73 mm

Material:

fittings: brass
seals: AFM 34
o-ring: FKM
insulation: EPP foam

ErP data overview

Solar controller	BX Plus
Standby [W]	0.91
Auxiliary electricity consumption [kWh/a]	
Wilo PARA ST 15/1-p-RKA-130-6H	96.0

Article no.	Article	Price bracket
290 023 93	FlowSol® XL – DeltaSol® BX Plus – Twin-line pump station » incl. 5 sensors (2 x FKP6, 3 x FRP6)	A
290 026 83	FlowSol® XL – without controller – Wilo Stratos PARA 15/1-9	A

Accessories for pump stations

Wall mounting for diaphragm-type expansion vessel



Wall mounting for diaphragm-type expansion vessel with screws and wall plugs, high-grade steel corrugated tube and connection thread $\frac{3}{4}$ ". Including quick release valve coupling enabling removal of expansion without draining down of the system.

Article no.	Article	Price bracket
280 004 60	Wall mounting for diaphragm-type expansion vessel	B

Filling and injection pump



Filling and injection pump with non-return valve for pressure increase and refilling of heat transfer fluids. $\frac{1}{2}$ " ET self-sealing with O-ring, 15 mm tube connection.

Pump output 2 l/min, 4.5 bar max.

Article no.	Article	Price bracket
280 005 40	Filling and injection pump with non-return valve	B

Self-sealing double nipples



Article no.	Article	Price bracket
280 008 90	Self-sealing double nipples $\frac{3}{4}$ " ET	B

Fittings



Article no.	Article	Price bracket
280 014 50	Cutting ring fitting $\frac{3}{4}$ " to 15 mm	B
280 014 80	Cutting ring fitting $\frac{3}{4}$ " to 18 mm	B
280 014 60	Cutting ring fitting $\frac{3}{4}$ " to 22 mm	B



Accessories for pump stations

ALS15 discharge hose



At the safety valve outlet of a solar thermal or heating system, it can get pretty hot at times. The RESOL ALS15 sees to it that no-one gets hurt and nothing gets soiled when that happens.

The robust, heat resistant EPDM hose fits all common $\frac{3}{4}$ " safety valve outlets, can be individually shortened and is easy and effortless to install.

TECHNICAL DATA

Material: EPDM
Length: 150 cm
Weight: ~ 0,49 kg
Opening: Ø 30 mm
Colour: black
Max. temperature: 120 °C

Article no.	Article	Price bracket
280 004 92	ALS15 discharge hose	B

LT20 air separator



A solar thermal system has to be vented regularly in order to function efficiently. The RESOL LT20 air separator, installed in the solar flow line, permanently separates the air from the heat transfer fluid.

With the air vent valve and the hose included, the collected air can be discharged manually.

TECHNICAL DATA

Nominal size: DN 15
Max. pressure: 6 bar
Max. operation temperature: 140 °C
Fittings:
upper connection thread: 1" union nut, flat sealing
lower connection thread: $\frac{3}{4}$ " IT

Article no.	Article	Price bracket
280 004 91	LT20 air separator	B

VM1020 flowmeter



A correct flow rate is vital for the function of a solar thermal system. The RESOL VM1020 flowmeter indicates flow rates from 1 ... 13 litres per minute, with the integrated flow rate limiter; the value can be throttled.

With the also integrated fill/drain valve, flushing and draining processes can be carried out; an opening for the immersion sensor enables an easy return temperature measurement.

TECHNICAL DATA

Nominal size: DN 15
Max. pressure: 6 bar
Max. operation temperature: 120 °C
Fittings:
upper connection thread: 1" union nut, flat sealing
lower connection thread: $\frac{3}{4}$ " IT
Indication range: 1 ... 13 l/min

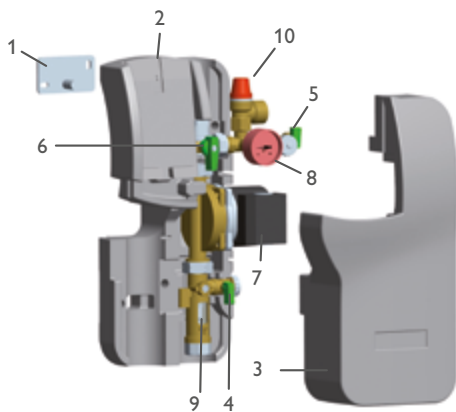
Article no.	Article	Price bracket
280 004 90	VM1020 flowmeter	B

Spare pumps



Article no.	Article	Price bracket
112 041 95	WILO Para ST 15/7 HE pump » incl. connection cable and 2 seals	B

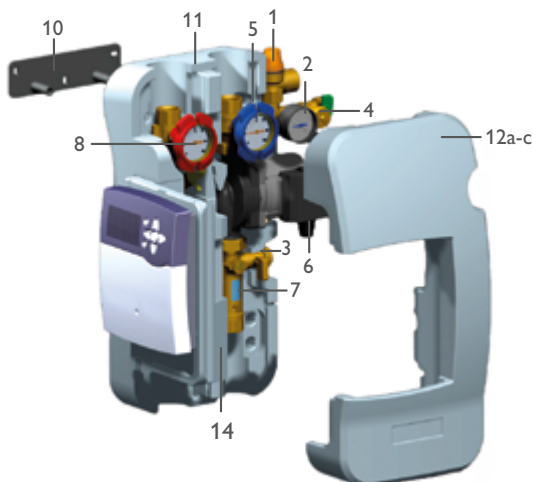
FlowSol® S HE



Pos.	Art. no.:	Article
1	112 000 52	Wall mounting bracket
2	700 015 12	Back half of the insulation
3	700 015 11	Front half of the insulation
4/5	112 000 58	Fill / drain valve
6	112 000 60	Ball valve with integrated non-return valve
7	112 041 95	Pumpe Wilo Para ST 15/7 (HE pump)
8	112 000 39	Pressure gauge
9	280 004 90	Flowmeter
10	112 000 54	Safety valve 6 bar
11	700 015 14	Controller housing blank (not shown)

(Prices on request)

FlowSol® B HE



Pos.	Art. no.:	Article
1	112 000 54	Safety valve 6 bar
2	112 000 39	Pressure gauge
3/4	112 000 58	Fill / drain valve
5	112 000 69	Ball valve (return) with thermometer and integrated non-return valve
6	112 041 95	Pump Wilo Para ST 15/7 (HE pumpe)
7	280 004 90	Flowmeter
8	112 000 62	Ball valve (flow) with thermometer and integrated non-return valve
9	280 004 91	Air separator (not shown)
10	112 000 71	Wall mounting bracket
11	700 016 11	Back half of the insulation
12a	700 016 14	Front half of the insulation <i>DeltaSol</i> ® BX series
12b	700 016 13	Front half of the insulation <i>DeltaSol</i> ® BS/CS series (not shown)
12c	700 015 16	Front half of the insulation <i>DeltaSol</i> ® SL series (not shown)
13	700 015 14	Controller housing blank (not shown)
14	700 016 12	Hinged controller panel

(Prices on request)



PV heating





DeltaTherm® PHM

Intelligent distribution of excess PV current to different loads

DeltaTherm® PV / PV MAX

Direct control of 1 / up to 3 electric immersion heaters in the store

FlowSol® E

Optimum store stratification and energy use

The products from our "PV heating" category enable you to use your PV current e.g. by converting excess current into thermal energy.

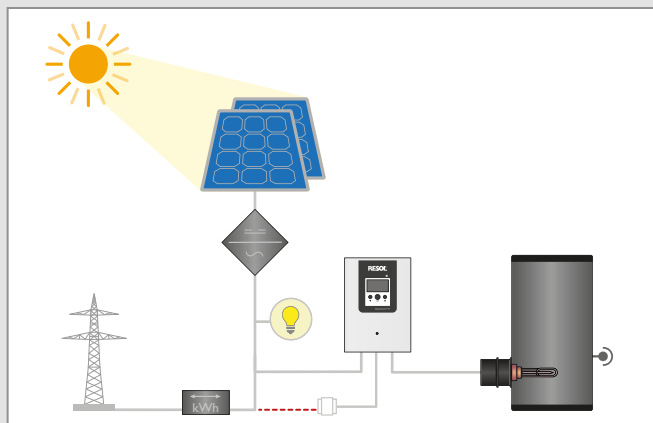
They form the missing link between the photovoltaic system and the heat generator – for more independence, decreased heating costs and less CO₂ emissions.

	DeltaTherm® PHM	DeltaTherm® PV	DeltaTherm® PV MAX	FlowSol® E
Electric immersion heater, stepless variable	-	✓ up to 3 kW	✓ up to 9 kW	✓ up to 3 kW
Electric immersion heater, constant power stage	3 x via auxiliary relays	-	-	-
Control of a heat pump	✓	-	✓	-
Control of a wallbox	✓	-	✓	-
Control of external loads	-	-	✓*	2 x via auxiliary relays
Backup heating with mains current (optional, time-controlled)	✓	✓	✓	✓
SmartRemote access	✓ (on/off)	✓	✓	✓
0-10V power control	-	✓	✓*	✓
Inverter power limitation	-	✓	-	✓
Suitable for all grid-connected systems	✓	✓	✓	✓
Can be easily fitted to existing systems	✓	✓	✓	✓
Household current priority	✓	✓	✓	✓
Visualisation via VBus.net	✓	✓	✓	✓
MircoSD card slot	✓	inside the housing	inside the housing	✓
Optional functions	✓	-	✓	-
Mixed heating circuits	-	-	✓*	-

* in preparation



EXAMPLE



DeltaTherm® PV

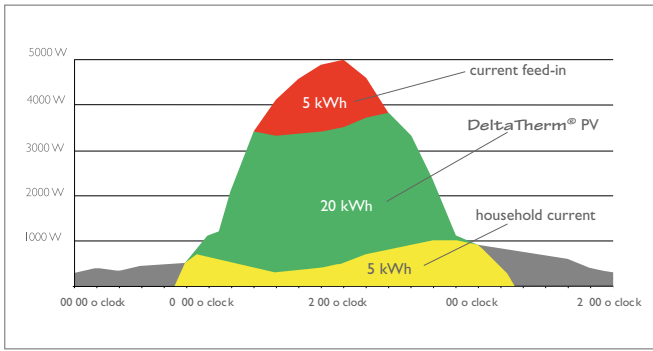
The **DeltaTherm® PV** detects excess current, e.g. produced by PV systems, calculates the power available and redirects it to an electric heater. Thus, excess PV current can be directly converted into thermal energy and stored.

By means of a Datalogger or the Communication module, the self-generated current can be visualised via the www.VBus.net Internet portal.

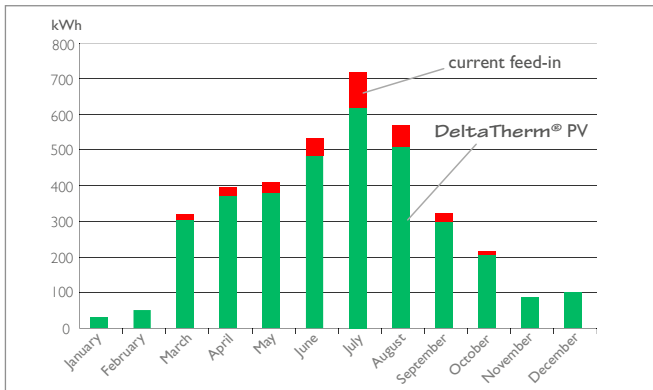
- Increase in self-consumption
- Stepless control of an electric immersion heater
- Household current priority
- Suitable for all grid-connected PV systems
- 0-10 V power control (optional)
- Internal backup heating with mains current (optional)
- Smart Remote access (optional)
- Inverter power limitation (optional)

Article no.	Article	Price bracket
115 006 43	DeltaTherm® PV – Power-to-Heat controller » incl. 1 Pt1000 sensor (FRP6)	B
115 006 53	DeltaTherm® PV – Power-to-Heat controller – Full kit » incl. sensor module, 3 current sensors (SW16) and 1 Pt1000 sensor (FRP6)	B
115 006 63	DeltaTherm® PV – Full kit Immersion heater » incl. sensor module, 3 current sensors (SW16) and 1 Pt1000 sensor (FRP6) and electric immersion heater 3 kW	B
290 030 80	Spare fuses DeltaTherm® PV – 3 x T16A and 3 x F16 A	C

TECHNICAL DATA

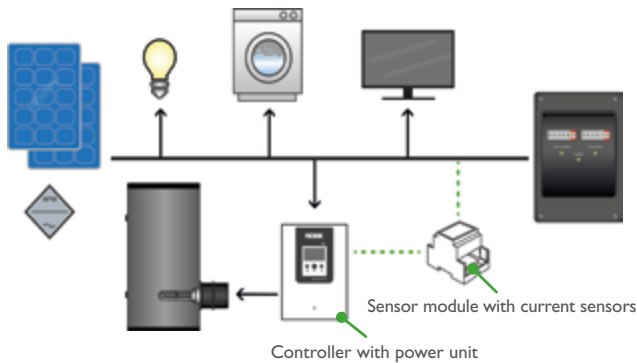


Daily profile of a 5 kWp PV system (example) with heat storage via the DeltaTherm® PV power-to-heat controller



Annual profile of a 5 kWp PV system (example, without household current)

EXAMPLE



Inputs: 3 Pt1000 temperature sensors, 2 digital switching inputs, 0-10V control input

Outputs: 2 digital switching outputs, variable power control up to 3 kW (electric immersion heater)

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 1.43 W

Rated impulse voltage: 2.5 kV

Data interface: VBus®, MicroSD card slot

VBus® current supply: 35 mA

Functions: controller and power controller, backup heating internal, 0-10V power control, Smart Remote, inverter power limitation

Housing: sheet metal, powder-coated

Mounting: wall mounting

Indication / Display: full graphic display

Operation: 3 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: F16A, T16A

Overvoltage category: 2

Maximum altitude: 2000 m above MSL

Dimensions: approx. 226 x 302 x 84 mm



Sensor module DeltaTherm® E sensor

Inputs:

3 voltage inputs and 3 current inputs for SW16 (Ø 16 mm) current sensors

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type Y attachment

Standby: < 1W

Rated impulse voltage: 1.0 kV

Data interface: VBus®

Functions: energy measuring unit

Housing: plastic, PC (UL 94 V-0)

Mounting: DIN rail in the domestic distribution board

Indication / Display: 2 operating control LEDs

Protection type: IP 20/EN 60529

Protection class: II

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Dimensions: 71 x 90 x 58 mm

ACCESSORIES

Electric immersion heater



Electric immersion heater
3 kW 230V~ (1½")

(see page 79)

DeltaTherm® E sensor XL



Sensor module for power
measurement up to approx.
200 kW, SW24 current sen-
sors included

(see page 79)

KM2 Communication module



For remote access to the
controller via VBus.net

(see page 84)

DL2 Plus Datalogger

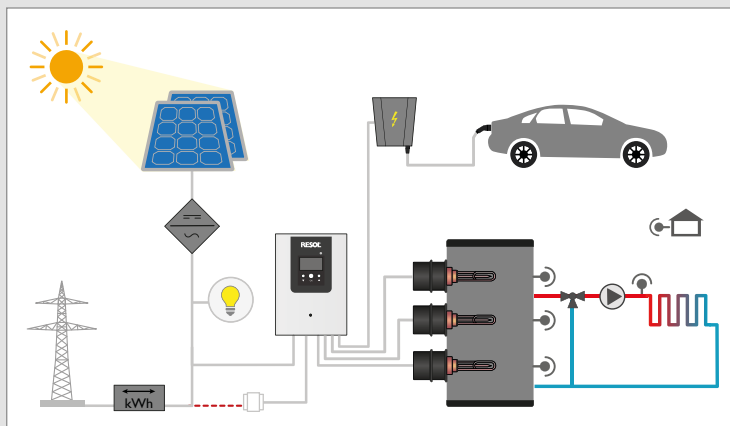


For remote access to 2
controllers, integrated data
logging and connection to
a BMS

(see page 85)



EXAMPLE



DeltaTherm® PV MAX

For maximum self-consumption

Whether in new or existing buildings, the **DeltaTherm® PV MAX** combines Power-to-Heat and heating control. It detects excess PV current reliably and calculates the power available. Furthermore, it distributes the current available in a modulating manner to up to 3 electric immersion heaters with a total power of 9000 W, controls an SG-ready heat

pump and a charging station for electric vehicles as needed. Numerous optional functions can be activated and heating circuits* controlled with extension modules.

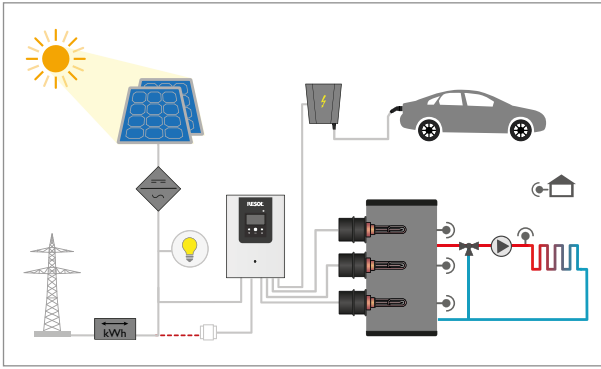
- Suitable for all grid-connected PV systems
- Maximisation of self-consumption
- Household current priority
- Stepless control of up to 3 electric immersion heaters
- Control of a heat pump
- Control of a wallbox
- Time-controlled backup heating (with mains current)

- Optional functions via extension modules: 5 mixed heating circuits*, DHW heating*, circulation* and thermal disinfection*, solid fuel boiler, heat exchange
- 0-10 V control* (optional)
- Smart Remote access (optional)
- Access to the VBus.net visualisation portal via LAN

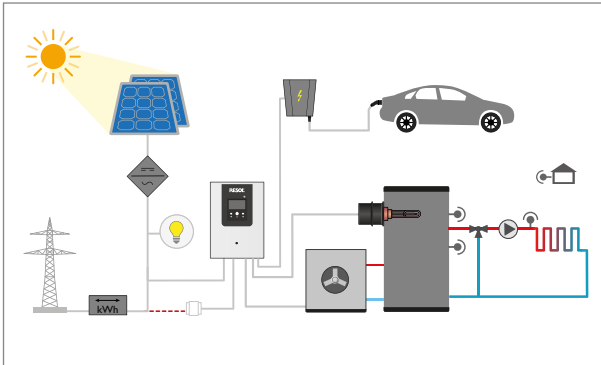
* from version 2

Article no.	Article	Price bracket
115 007 33	DeltaTherm® PV MAX – Power-to-Heat controller » incl. 3 Pt1000 sensors (3x FRP6)	B
115 007 23	DeltaTherm® PV MAX – Power-to-Heat controller – Full kit » incl. sensor module, 3 current sensors (SW16) and 3 Pt1000 sensors (3x FRP6)	B

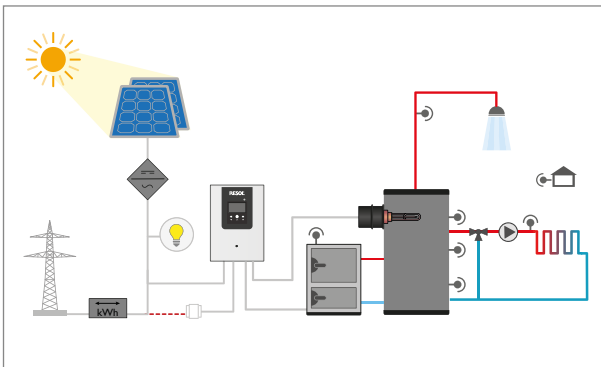
APPLICATION EXAMPLES



Control of 3 electric immersion heaters and of a wallbox, control of a mixed heating circuit* (via extension module)



Control of an electric immersion heater, control of a heat pump and a wallbox, control of a mixed heating circuit* (via extension module)



Control of an electric immersion heater and of a solid fuel boiler, control of a mixed heating circuit* and DWH heating* (via extension module)

TECHNICAL DATA

Inputs: 5 Pt1000 temperature sensors (2 of them convertible to switch), 1 analogue input for Grundfos Direct Sensor™ or FRH humidity sensor
Outputs: 3 outputs for electric immersion heaters (variable power control up to 9 kW), 2 potential-free extra-low voltage relays and 2 PWM outputs (convertible to 0-10V)

Switching capacity:

13 A 240 V~ (output for electric immersion heater)

1 A 30 V = (potential-free relay)

Total switching capacity: 3 x 13 A 240 V~

Power supply:

3-phase with PE and neutral conductor (100 – 240 V~/50 – 60 Hz)

Supply connection: type X attachment

Standby: approx. 1 W

Mode of operation: type 1.B.C. action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, MicroSD card slot, LAN

VBus® current supply: 35 mA

Functions: control of 3 electric immersion heaters, backup heating with mains current, control of a heat pump / wallbox, control of mixed heating circuits*, DHW heating*, numerous optional functions, 0-10 V control*, Smart Remote

Housing: sheet metal, powder-coated

Mounting: wall mounting

Indication / Display: full graphic display, operating control LED

Operation: 3 buttons

Ingress protection: IP 20 / EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Maximum altitude: 2000 m above MSL

Relative humidity: 10 ... 90 %

Dimensions: 226 x 302 x 84 mm

Sensor module DeltaTherm® E sensor

Inputs:

3 voltage inputs and 3 current inputs for SW16 (Ø 16 mm) current sensors

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type Y attachment

Standby: < 1 W

Rated impulse voltage: 1.0 kV

Data interface: VBus®

Functions: energy measuring unit

Housing: plastic, PC (UL 94V-0)

Mounting: DIN rail in the domestic distribution board

Indication / Display: 2 operating control LEDs

Protection type: IP 20 / EN 60529

Protection class: II

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Dimensions: 71 x 90 x 58 mm



* from version 2

ACCESSORIES

Electric immersion heater



Electric immersion heater
3 kW 230V~ (1½")

(see page 79)

DeltaTherm® E sensor XL



Sensor module for power
measurement up to approx.
200 kW, SW24 current sen-
sors included

(see page 79)

DL2 Plus Datalogger



For remote access to 2
controllers, integrated data
logging and connection to
a BMS

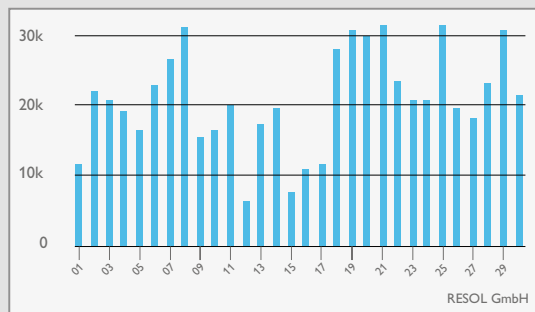
(see page 85)

EM Extension module



Sensor and relay extension
module with 5 outputs and
6 inputs

(see page 57)



DeltaTherm® PHM

Power-to-Heat manager

The **DeltaTherm® PHM** is the ideal solution for using excess PV current for the control of different loads. Heat pumps, electric immersion heaters, and charging stations for electric vehicles can be controlled as needed. All the while household power has absolute priority.

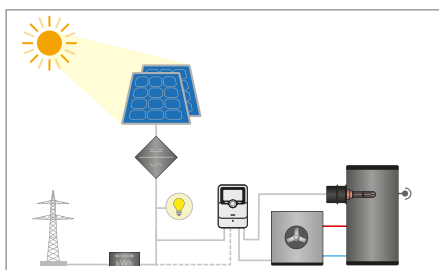
Each load can also be supplied with mains current on a time-controlled basis. Furthermore, the **DeltaTherm® PHM** measures the electric loads at the energy meter which can be visualised via VBus.net.

Intelligent distribution of excess PV current

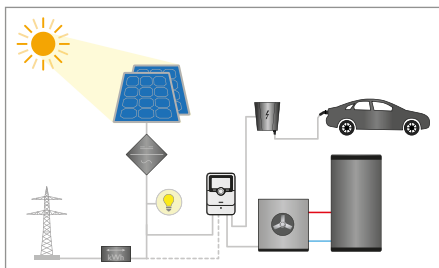
- Increase in self-consumption
- Reduction of heating costs
- Control of a heat pump
- Control of a wallbox
- Control of up to 3 electric immersion heaters (via auxiliary relays)
- Household current priority
- Can be used with all PV systems
- Time-controlled backup heating (with mains current)

Article no.	Article	Price bracket
115 100 73	DeltaTherm® PHM – Power-to-Heat manager » incl. 3 Pt1000 sensors (FRP6)	A
115 007 13	DeltaTherm® PHM – Full kit » incl. sensor module, 3 current sensors (SW16) and 3 Pt1000 sensors (FRP6)	A

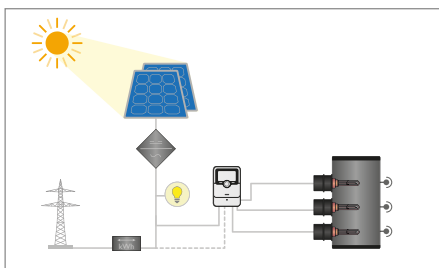
EXAMPLES



Control of an electric immersion heater* and of a heat pump



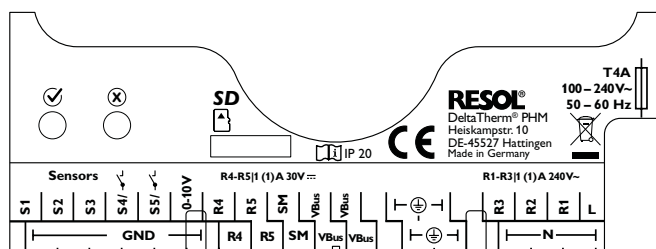
Control of a heat pump and of a wallbox



Control of 3 electric immersion heaters*

* via auxiliary relay(s) (not included with the controller)

ELECTRICAL CONNECTION



TECHNICAL DATA

DeltaTherm® PHM

Inputs: 5 Pt1000 temperature sensors
(2 of them convertible to switch)

Outputs: 3 electromechanical relays, 2 potential-free extra-low voltage relays and 1 PWM output (convertible to 0-10 V)

Switching capacity:

1 (1) A 240 V~ (electromechanical relay)

1 (1) A 30 V= (potential-free relay)

Total switching capacity: 3 A 240 V~

Power supply: 100 – 240 V~ (50 – 60 Hz)

Supply connection: type X attachment

Standby: 1.25 W

Mode of operation: type 1.B.C. action

Rated impulse voltage: 2,5 kV

Data interface: VBus®, MicroSD card slot

VBus® current supply: 35 mA

Functions: measurement and balancing of the current flow at the energy meter; control of a heat pump; control of up to 3 electric loads (e.g. immersion heaters); control of a wallbox

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, mounting into patch panels is possible

Indication / Display: full graphic display, operating control LED (Lightwheel®) and background illumination

Operation: 4 buttons and 1 adjustment dial (Lightwheel®)

Ingress protection: IP 20 / EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Relative humidity: 10 ... 90 %

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 110 x 166 x 47 mm

Sensor module DeltaTherm® E sensor

Inputs:

3 voltage inputs and 3 current inputs for SW16 (Ø 16 mm) current sensors

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type Y attachment

Standby: < 1W

Rated impulse voltage: 1.0 kV

Data interface: VBus®

Functions: energy measuring unit

Housing: plastic, PC (UL 94 V-0)

Mounting: DIN rail in the domestic distribution board

Indication / Display: 2 operating control LEDs

Protection type: IP 20/EN 60529

Protection class: II

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Dimensions: 71 x 90 x 58 mm



ACCESSORIES

Electric immersion heater



Electric immersion heater
3 kW 230V~ (1½")

(see page 79)

DeltaTherm® E sensor XL



Sensor module for power
measurement up to approx.
200 kW, SW24 current sen-
sors included

(see page 79)

KM2 Communication module



For remote access to the
controller via VBus.net

(see page 84)

DL2 Plus Datalogger



For remote access to 2
controllers, integrated data
logging and connection to
a BMS

(see page 85)

Auxiliary relay HR230



Single-phase, suitable for
all RESOL controllers

(see page 59)

HR230/3 Auxiliary relay

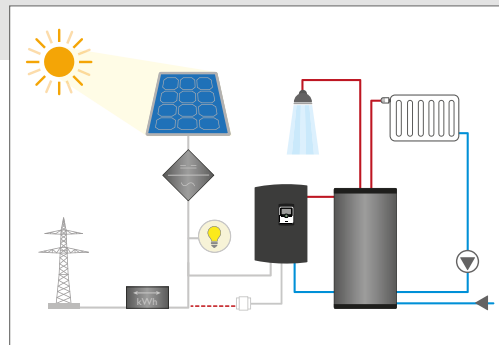


Three-phase, suitable for all
RESOL controllers

(see page 59)



EXAMPLE



FlowSol® E electrothermal station

The RESOL FlowSol® E has been especially designed for using excess power produced by PV systems.

The sensor module reliably detects excess current and the integrated controller redirects it to a stepless variable electric heater for heating a water store. Thus, excess power can be stored as regenerative heat, self consumption can be increased while decreasing conventional heating costs.

- ❶ Power unit
- ❷ Sensor module *DeltaTherm® E* sensor

- Integrated high-efficiency pump and *DeltaTherm® E* controller
- Integrated electric heater of up to 3 kW, stepless variable and grid compliant, up to 12 kW with external loads
- Can be easily fitted to all heating systems
- Reliable household power priority
- External backup heating demand (optional)
- Internal backup heating with mains current (optional)
- 0-10V power control
- Inverter power limitation
- Smart remote access

TECHNICAL DATA

Circulating pump:
Wilo PARA 15/7.0-PWM2
(power consumption of the pump: 3 ... 45 W)
Power supply: 220–240V~ (50–60 Hz)
Cable cross section required: 2.5 mm²
Heater: 0.8 kW/0.8 kW/1.4 kW
Nominal power/current: 0 ... 3 kW (13 A)
Safety valve: 3 bar
Connections: Rp ¾" IT
Maximum temperature: 95 °C
Maximum pressure: 3 bar
Medium: heating water
Dimensions: approx. 605 x 400 x 240 mm (with insulation)
distance centre/wall: 76 mm
Weight: 14 kg
Material:
fittings: brass
seals: EPDM
insulation: EPP foam

TECHNICAL DATA – CONTROLLER (*DeltaTherm® E*)

Inputs: 4 Pt1000 temperature sensors, 2 digital switching inputs
Outputs: 3 semiconductor relays, 1 potential-free extra-low voltage relay, 1 PWM output
Switching capacity: 1 (1) A 240V~ (semiconductor relay)
1 (1) A 30V== (potential-free relay)
Total switching capacity: 3 A 240V~
Power supply: 100–240V~ (50–60 Hz)
Supply connection: type X attachment
Standby: 0.96 W
Mode of operation: type 1.B.C.Y action
Rated impulse voltage: 2.5 kV
Data interface: VBus®, MicroSD card slot

VBus® current supply: 60 mA
Housing: plastic, PC-ABS and PMMA
Indication/Display: full graphic display, operating control LED (Lightwheel®) and background illumination
Operation: 2 buttons and 1 adjustment dial (Lightwheel®)
Ingress protection: IP 20/EN 60529
Protection class: I
Ambient temperature: 0 ... 40 °C
Degree of pollution: 2
Relative humidity: 10 ... 90 %
Fuse: T4A
Maximum altitude: 2000 m above MSL

Article no.	Article	Price bracket
112 199 33	FlowSol® E – DeltaTherm® E – Electrothermal station (heating) – Full kit » incl. DeltaTherm® E controller, power unit, sensor module and current sensors (SW16)	A
290 040 00	Spare fuses FlowSol® E – 3 x T16A, 3 x F5A, 3 x T4A (from version 2.00)	C



Power-to-Heat accessories



Sensor module **DeltaTherm® E sensor XL**

Sensor module for power measurement up to approx. 200 kW,
SW24 current sensors included

TECHNICAL DATA

Inputs: 3 voltage inputs and 3 current inputs
for SW24 (Ø 24 mm) current sensors
Power supply: 100–240 V~ (50–60 Hz)
Supply connection: Y
Standby: < 1W
Rated impulse voltage: 1.0 kV
Data interface: VBus®
Functions: energy measuring unit
Housing: plastic, PC (UL 94 V-0)
Mounting: DIN rail in the domestic distribution board
Indication / Display: 2 operating control LEDs
Ingress protection: IP20/EN 60529
Protection class: II
Ambient temperature: 0 ... 40 °C
Degree of pollution: 2
Dimensions: 71 x 90 x 58 mm

Article no.	Article	Price bracket
112 145 50	DeltaTherm® E sensor XL – Full kit » incl. 3 current sensors (SW24)	B



Electric immersion heater

The electric immersion heater is designed for installation into a hot water store and can be used for heating as well as for DHW heating. In combination with the **DeltaTherm® PV / PV MAX / PHM** it converts excess PV current into thermal energy.

- Single-phase electric immersion heater up to 3 kW, grid compliant
- Stepless control (e.g. via the **DeltaTherm® PV**)
- Thermal cut-out at 95 °C
- Using excess current for heating a water store

TECHNICAL DATA

Material: heating element: 2.4858, INCOLOY® 825
Operating pressure: max. 10 bar
Maximum temperature seal pipe end: 120 °C
Maximum temperature pipe surface: 120 °C
Operating voltage: 230 V~
Power: 3 kW
Immersion depth: 250 mm
Unheated length: 95 mm
Thermal cut-out: 95 °C

Article no.	Article	Price bracket
180 112 00	Electric immersion heater 3 kW 230V~ (1½") » incl. connection cable	B



Visualisation & remote access



VBus®Touch Trainer



VBus®Touch



VBus®Touch FK



VBus®Touch HC

Description				
	VBus®Touch Trainer	VBus®Touch	VBus®Touch FK	VBus®Touch HC
	RESOL controller operation training and simulation	Mobile remote display and monitoring of simple solar systems	Mobile remote display and monitoring of solid fuel boiler / biomass systems	Remote parameterisation, mobile remote display and monitoring of heating systems
	Simulate controller software Use operating elements like on the real controller Freely adjust sensor values Relay outputs will be displayed with the corresponding status and/or the pump speed Adjustments can be sent via e-mail in order to be transferred to an actual controller via SD / MicroSD card Controller adjustments can be transmitted to the VBus®Touch Trainer	Display live data in a pre-defined system graphic Display system status and/or yield balances Display temperature progress in detail	Display live data in an animated system graphic	Display live data Display heating circuit status and outdoor temperature Use the app as remote control and operating mode switch Adjust time frames for the correction timer Rename heating circuits

Requirements				
	VBus®Touch Trainer	VBus®Touch	VBus®Touch FK	VBus®Touch HC
		All controllers with solid fuel boiler function	All controllers with solid fuel boiler function	DeltaTherm® HC mini / HC / HC MAX / HC Plus, DeltaSol® MX / MX Plus
		DL2 / DL2 Plus / DL3 Datalogger Network connection (VBus.net or port forwarding)	DL2 / DL2 Plus / DL3 Datalogger or KM1 / KM2 Communication module VBus.net	DL2 / DL2 Plus / DL3 Datalogger or KM1 / KM2 Communication module VBus.net
Availability				
App Store		App Store	App Store, Google Play™	App Store, Google Play™
iPad		iPad, iPhone, iPod touch	iPad, iPhone, iPod touch, Android smartphones and tablets	iPad, iPhone, iPod touch, Apple Watch, Android smartphones and tablets

Costs				
	VBus®Touch Trainer	VBus®Touch	VBus®Touch FK	VBus®Touch HC
	Basic version with DeltaTherm® HC mini free of charge	Free of charge	4.99 EUR (incl.VAT)	Basic version with DeltaTherm® HC mini free of charge
	More controllers available via in-app purchases			More controllers available via in-app purchases

VBus® is a registered trademark of RESOL GmbH | Google Play is a trademark of Google Inc.

Apple, the Apple logo, iPad, iPhone and Apple Watch are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.



VBus.net



RPT

Description	System data visualisation, mobile remote display and system monitoring of any number of however complex solar thermal, heating or combined systems	Remote parameterisation of RESOL controllers
	Display live data and error messages	Remote parameterisation of RESOL controllers
	Create customised data filters and diagrams	
	Download data packets	
	Automatic e-mail reports (PRO*)	
	Save and restore visualisation settings (PRO*)	
	Remote parameterisation via Internet browser (PRO*)	
Requirements	All controllers equipped with a VBus®	All controllers supported
	DL2/DL2 Plus/DL3 Datalogger or KM1 / KM2 Communication module	DL2/DL2 Plus/DL3 Datalogger or KM1/KM2 Communication module or VBus®/USB interface adapter
	Availability www.VBus.net (web-based application)	RESOL website (software application)
	All devices with a browser and an Internet connection (platform-independent)	PC with MS Windows 7 or higher
Costs	Basic access free of charge	Free of charge
	PRO access with an extended range of functions: EUR 39/year (incl.VAT)	

* Please see page 82 for further information



Visualise your system data

VBus.net is all about the data of your RESOL controller. Live data of your system, customised filter settings and much more await you.

VBus.net is available in 2 different versions: Basic and PRO. Easily usable with a DL2 Plus or KM2 Communication module.

Remote parameterisation
via Internet browser (PRO)

- Visualisation also for many mobile devices
- System access via the Internet browser
- Data progress charts as live data displays or diagrams
- Optional publication of system data with only one click
- Personalised filters for customised data displays, downloads and reports
- VBus® Data Viewer – a plug-in for making diagrams out of externally stored data sets (also possible without a datalogger/communication module)
- Save, distribute and restore your visualisation settings
- Display your daily yield as a bar diagram

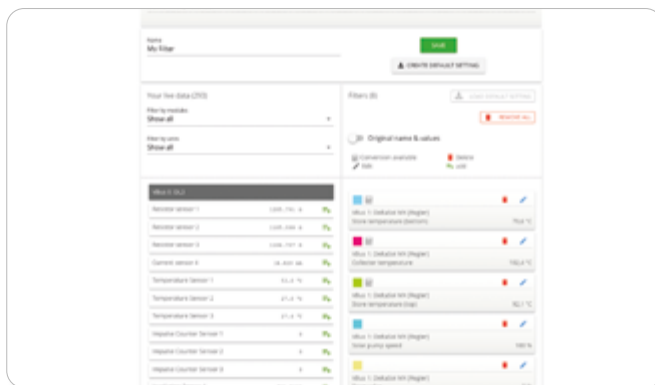
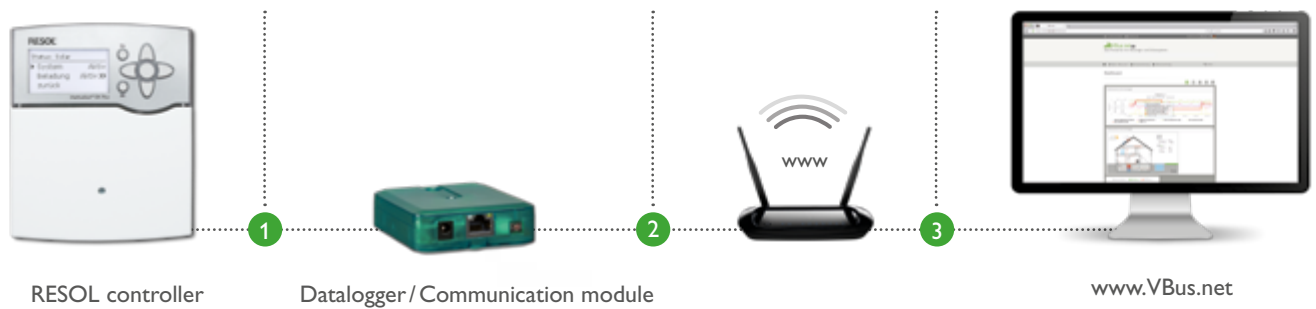
Functions	Basic	PRO
Price	0€	39€/year
Data refresh	5 minutes	1 minute
Data storage	90 days	1 year
Custom system images	3	10
Weather data	-	✓
Advanced system editor	-	✓
Error protocol	-	✓
E-mail notifications	-	✓
Share device	-	✓
Reports	-	✓
Default filter settings	-	✓
Visualisation data backup	-	✓
Remote parameterisation	-	✓

How to:

Establish VBus® connection

Establish (W)LAN connection

Visit website www.VBus.net



Simplified **filter** creation – define data points via Drag&Drop and configure them for further use.

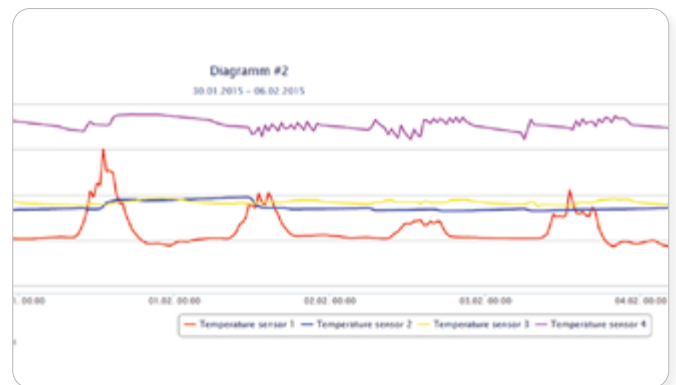
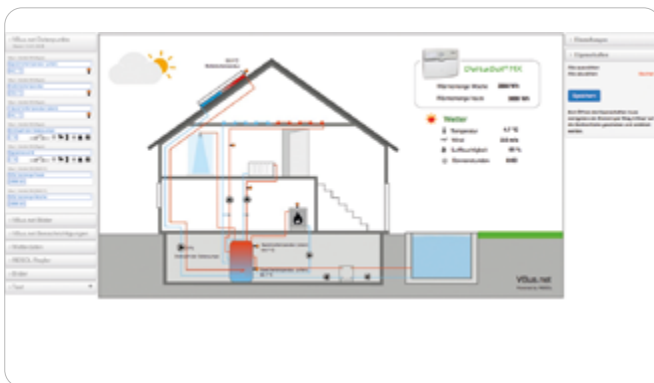
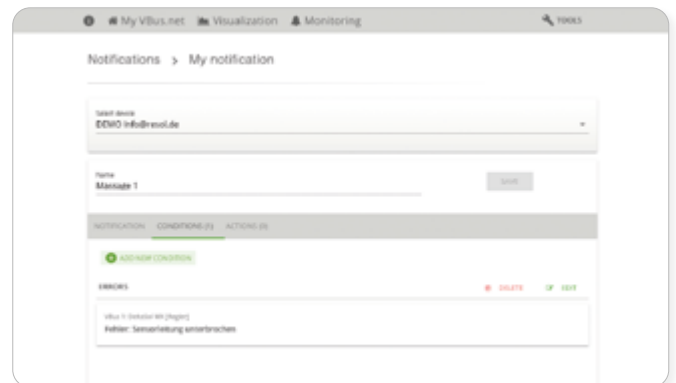


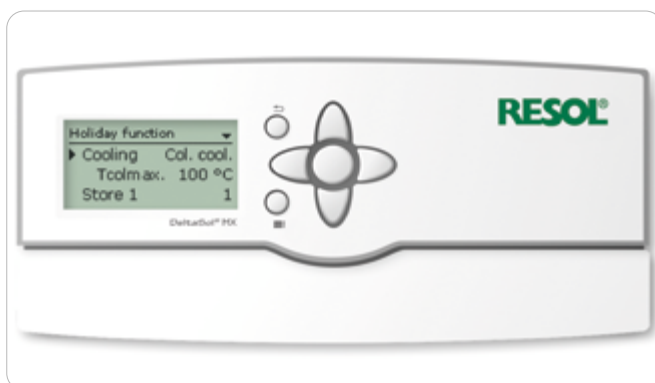
Diagram function with freely positionable legend.



Advanced **live system editor** with extended format and layout functions.



Freely configurable **e-mail notifications** to recipients of your choice, e.g. in the case of error messages, temperature deviations, etc.



Remote parameterisation via Internet browser.



rosenthal design 



KM2 Communication module

Economical solution for remote controller access

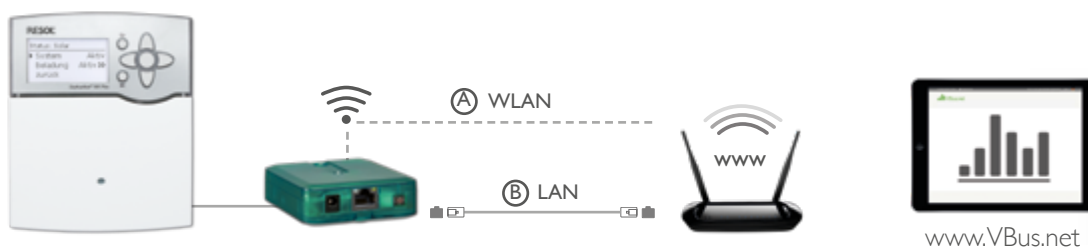
The KM2 Communication module is the ideal interface between a solar or heating controller and the Internet. In only a few steps, the RESOL controller can be connected to the VBus.net visualisation portal.

The communication module is suitable for all controllers with VBus® and enables the easy and secure access to system data via VBus.net. Remote access to your RESOL controller is also possible, of course, via the RPT Parameterisation Tool.

- Internet access to the system data via VBus.net
- Comfortable system parameterisation via the RPT Parameterisation Tool possible
- Suitable for all RESOL controllers with VBus®
- WLAN functionality

TECHNICAL DATA

Housing: plastic
Ingress protection: IP 20/EN 60529
Protection class: III
Ambient temperature: 0 ... 40 °C
Maximum altitude: 2000 m above MSL
Relative humidity: 10 ... 90 %
Dimensions: 95 x 70 x 25 mm
Mounting: wall mounting (optional)
Display: operating control LED
Interfaces: RESOL VBus® for the connection to the controller, 10/100 Base TX Ethernet, Auto MDIX, WLAN 2.4~2.4835 GHz
WLAN encryption: WPA / PSK, WPA2 / PSK
Transmit power limit (e.i.r.p.) : < 100 mW
Standby: 0.92 W
Power supply:
 Mains adapter: 100 – 240 V~, 1 A / 12 V=, 1 A (Level 6)
 Communication module: 12 V=, 120 mA
 Electrical energy source: ES1 (EN 62368-1)
 Electrical power source: PS1 (EN 62368-1)
 Thermal energy source: TS1 (EN 62368-1)
 Mechanical energy source: MS1 (EN 62368-1)



Article no.	Article	Price bracket
180 012 10	KM2 Communication module » incl. network cable and mains adapter; VBus® cable pre-connected	A
112 091 99	Spare part / Mains adapter » incl. interchangeable mains adapter plugs	C



DL2 Plus Datalogger

Remote access to up to 2 controllers and integrated data logging

The DL2 Plus Datalogger is the interface between 2 RESOL controllers and the Internet and additionally permits logging of system data. It offers WLAN functionality and enables the easy and secure access to the system data via www.VBus.net. For the connection of one controller to a building management system, the DL2 Plus is also equipped with a VBus® channel with BACnet or Modbus functionality.

- Internet access to the system via VBus.net
- Connection to a building management system via BACnet/IP or Modbus/TCP
- Comfortable system parameterisation via the RESOL RPT Parameterisation Tool
- 2 controllers can be connected
- Internal memory for data logging
- Automatic firmware updates via Internet
- Suitable for all RESOL controllers with VBus®
- WLAN functionality

TECHNICAL DATA

Housing: plastic

Ingress protection: IP 20 / EN 60529

Protection class: III

Ambient temperature: 0 ... 40 °C

Maximum altitude: 2000 m above MSL

Relative humidity: 10 ... 90 %

Dimensions: 95 x 70 x 25 mm

Mounting: wall mounting (optional)

Display: operating control LED

Interfaces: 2 x VBus® for the connection to RESOL controllers (1 of them can be used for BACnet/IP or Modbus/TCP), 10/100 Base TX Ethernet, Auto MDIX, WLAN 2.4~2.4835 GHz

WLAN encryption: WPA / PSK, WPA2 / PSK

Transmit power limit (e.i.r.p.): < 100 mW

Standby: 0.92 W

Power supply:

Mains adapter: 100 – 240 V~, 1 A / 12 V=, 1 A (Level 6)

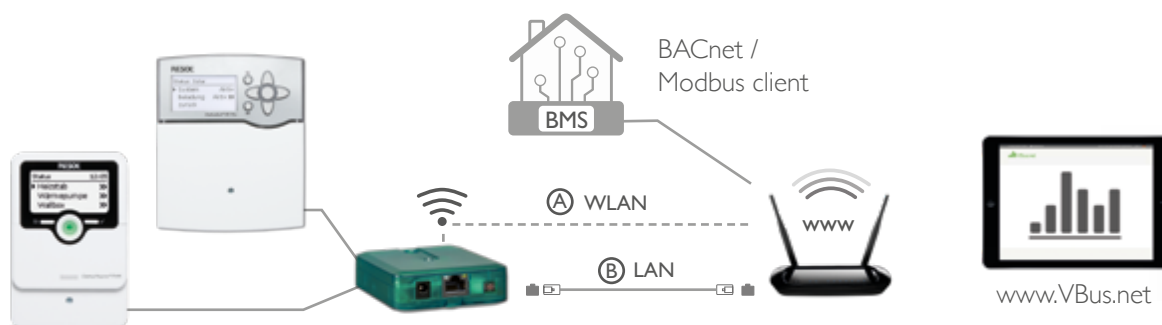
Datalogger: 12 V=, 120 mA

Electrical energy source: ES1 (EN 62368-1)

Electrical power source: PS1 (EN 62368-1)

Thermal energy source: TS1 (EN 62368-1)

Mechanical energy source: MS1 (EN 62368-1)



Article no.	Article	Price bracket
180 009 70	DL2 Plus Datalogger » incl. network cable and mains adapter, VBus® cable pre-connected	B
112 091 99	Spare part / Mains adapter » incl. interchangeable mains adapter plugs	C



Survey of communication module/datalogger

	KM2	DL2 Plus
Interface between controller and Internet	✓	✓ (2)
Remote access via VBus.net	✓	✓
System parameterisation via RPT possible	✓	✓
Connection for RESOL controllers with VBus®	1	2
Internal memory for datalogging	-	14 GB
Firmware update via Internet	✓	✓
Display	Operating control LED	Operating control LED
LAN connector	✓	✓
WLAN functionality	✓	✓
BACnet or Modbus functionality	-	✓

Interface adapters



TECHNICAL DATA

Housing: plastic

Ingress protection: IP 20/EN 60529

Dimensions: 95 x 70 x 25 mm

Interface adapter	Function		Interfaces	Power supply
VBus®/USB	With the VBus®/USB interface adapter, the controller can be connected to the USB port of a PC via the VBus®.	■ USB 2.0 full speed compatible ■ With mini USB-B port ■ Remote parameterisation of the controller via VBus® ■ Including standard USB/mini USB adapter cable	VBus® for the connection to the controller, mini USB-B	via USB
VBus®/CANopen	The interface adapter is designed for the connection of the controller to a CAN bus device.	■ Communication between CAN bus devices	VBus® for the connection to the controller, CAN bus and MicroSD card	Mains adapter input voltage: 100–240 V~ (50–60 Hz) Adapter input voltage: 5V==
VBus®-Repeater	The VBus®-Repeater amplifies the VBus® signal of a controller and supplies a current of 200 mA in total to modules connected.	■ Connect multiple modules to one controller ■ Maximum current supply of 200 mA ■ VBus® cable extension of up to 150 m in total possible	Inputs: 1 VBus® master (controller) Outputs: 3 VBus® devices (modules, e.g. AM1, SD3, 200 mA in total)	Mains adapter input voltage: 100–240 V~ (50–60 Hz) Repeater input voltage: 12V==/0.5 A 5.5 x 2.5 mm

ⓘ For connecting a controller to a building management system via BACnet or Modbus, the DL2 Plus Datalogger is required, see page 85.

Article no.	Article	Price bracket
180 008 50	VBus®/USB interface adapter – PC connection kit for controllers with VBus®» incl. Service CD	B
180 012 60	VBus®/CANopen interface adapter – for connection of the controller to a CAN bus device	B
180 010 40	VBus®-Repeater – VBus® signal amplifier	B



SD3/SDFK Smart Display

The RESOL SD3 and SDFK Smart Displays are used for visualising data issued by the controller.

- Simple connection and power supply via RESOL VBus®
- °F version and customised sensor and relay allocation possible for a surcharge (software adaptation)

SD3 Smart Display

The SD3 Smart Display indicates the collector temperature (S1), the store temperature (S2) and the energy yield of the solar thermal system.

- Visualisation of collector and store temperature as well as heat quantity
- One 6-digit and two 4-digit 7-segment LED displays

SDFK Smart Display

In the heating area, the SDFK Smart Display indicates the solid fuel boiler temperature and the bottom/top store temperatures as well as the pump status.

- Visualisation of solid fuel boiler temperature and bottom/top store temperature as well as pump status
- Three 4-digit 7-segment LED displays as well as one bicoloured LED red/green
- Pre-programmed for *DeltaTherm*® FK – adaptation to all standard RESOL controllers possible for a surcharge (software adaptation)

TECHNICAL DATA

Housing: high-grade steel frame with wood elements

Dimensions: 150 x 165 x 24 mm

Ingress protection: IP 20 (suitable for dry rooms)

Protection class: III

Display: numerical 7-segment LED display, bicoloured LED red/green (SDFK)

Segment size: 7.5 x 10 mm, 10° digit inclination

Ambient temperature: 0...40 °C

Relative humidity: 10...90 %

Power supply: VBus®

Data interface: VBus®

Article no.	Article	Price bracket
180 004 90	SD3 Smart Display – Display module for the living area	A
180 010 80	SDFK Smart Display – Display module for the living area	A
112 112 12	SDFK Smart Display – Software adaptation	C



AM1 Alarm module

The AM1 Alarm module is designed to signal system failures. It is to be connected to the VBus® of the controller and issues an optical signal via the red LED if a failure has occurred.

The AM1 also has a potential-free relay output, which can be connected to a building management system (BMS), so that a collective error message can be issued in the case of a system failure. Thus, the reliability and the stable yield of the system are ensured.

- Reliable failure signal by LED
- Connection to a building management system (BMS) possible
- Supply and control via VBus®

TECHNICAL DATA

Housing: plastic (PC 2207 UV); base part: Karilen E 42 D - H201

Ingress protection: IP 54

Dimensions: 111 x 68 x 40 mm

Mounting: wall mounting

Ambient temperature: -25 ... +70 °C

Relative humidity: 10 ... 90 %

Display: 1 LED

Power supply: VBus®

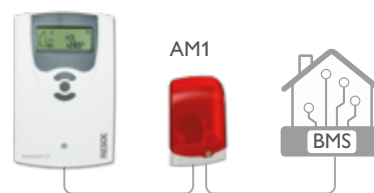
Interface: VBus®

Output: 1 potential-free relay

Switching capacity: max. 30 V $\overline{\text{=}}$, 1A; 125 V~, 0.5 A

Example illustrations, further configurations are possible. Data communication between the devices takes place via the RESOL VBus®.

DeltaSol® CS



DeltaSol® MX

EM Extension module



Article no.	Article	Price bracket
180 008 70	AM1 – Alarm module for signalling system failures	B

Application examples of the VBus®

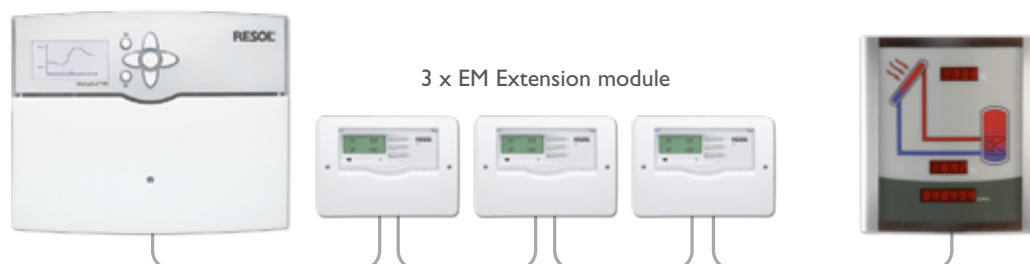
The VBus® is a two-wire bus, which allows RESOL controllers and additional modules to interchange data.

In addition to that, it is possible to power VBus® modules without external power supply – the number of VBus® accessories that can

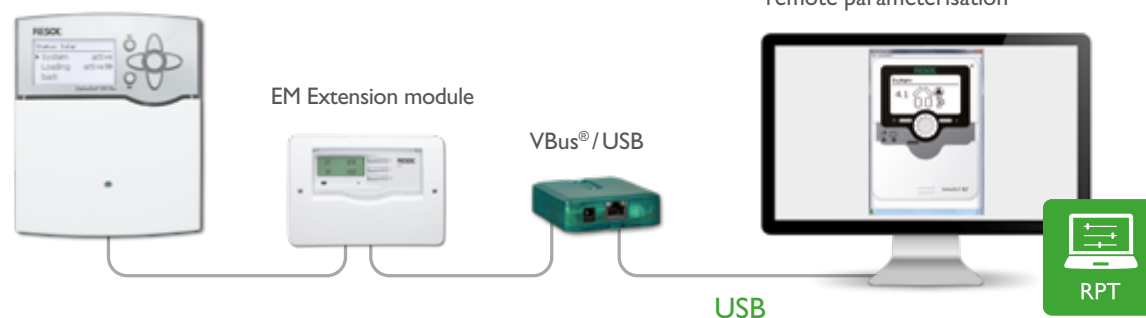
be connected to one controller depends on the sum of their current consumption and on the current supply of the controller VBus®.

All RESOL controllers are equipped with a VBus® interface (except the *DeltaSol® A/AX/AX HE*).

DeltaSol® MX



DeltaSol® BX Plus



Current consumption of the VBus® devices

The number of VBus® accessories that can be connected to one controller depends on the sum of their current consumption and on the current supply of the controller VBus®.

The VBus®-Repeater amplifies the VBus® signal such that modules with a combined current consumption of up to 200 mA can be connected. (see page 87)

Device	Maximum current consumption
VBus®/USB interface adapter	6.5 mA
DL2 Plus Datalogger	6.5 mA
KM2 Communication module	6.5 mA
SD3 Smart Display	17.5 mA
SDFK Smart Display	25 mA
AM1 Alarm module	16.5 mA
EM	1 mA
WMZ Plus Calorimeter	35 mA
Central outdoor sensor unit	60 mA



Tools and HE accessories





Customised versions possible!

Ask our sales team for the price of your personal customisation!

SBS 2000 filling and flushing station

For solar thermal professionals, filling and flushing solar thermal systems is a day-to-day business.

The SBS 2000 is the ideal companion for that – lots of thoughtful details help to make this quicker, easier and cleaner.



Visit www.resol.de/videos for a product video

TECHNICAL DATA

Dimensions: 1000 × 400 × 530 mm

Weight: 21 kg

Tank: 30 litres, PE, with dirt filter and fill level control

Delivery flow: 5 ... 47 l/min

Delivery height: 42 m

Pressure: 4.2 bar

Drain valve: ½"

Medium: water, glycol mixtures

Medium temperature: max. 65 °C

- Easy handling and cleaning
- Pictorial instructions on the station
- Powerful pump
- Dirt filter at the pump inlet
- Additional handles for easy transport
- Filling level control

ACCESSORIES



Set of 2 ball valves with butterfly handles for pressure and flushing hose



Extension cable, 5 m (black)
With safety connection, suitable for 280 010 90 only

Version	DE	AUS	UK 230 V~
Pump	230 V~ / 50 Hz	230 V~ / 50 Hz	230 V~ / 50 Hz
Pump power	550 W	550 W	550 W
Connection	CEE 7/4 socket	AUS plug	UK plug
Pump pressure	4.2 bar	4.2 bar	4.2 bar

Article no.	Article	Price bracket
280 010 90	SBS 2000 filling and flushing station	B
280 012 93	SBS 2000 filling and flushing station – 230 V~ AUS Plug	B
280 010 93	SBS 2000 filling and flushing station – 230 V~ UK Plug	B
280 050 60	Set of 2 ball valves with butterfly handles for pressure and flushing hose (2 pieces)	C
280 050 70	Extension cable 5 m (black) (suitable for 280 010 90 only)	C
280 044 20	SBS 2000 wheel kit (2 x wheel, 1 x axle)	C
280 050 30	Spare part / Tank lid	C
280 050 40	Spare part / Drain valve for the tank	C
280 050 50	Spare part / Dirt filter	C
280 050 10	Spare part / Hose set	C



Heat transfer fluids

Propylene-glycol-water mixtures are commonly used as the heat transfer fluid. An antifreeze concentration of about 40 % of glycol in the mixture prevents the system from damage.

Even at temperatures of -21 °C, the system remains in an operable state. Temperatures below this protection point will cause the formation of ice pulp, which however is not able to destroy tubes and piping.

However, today's high-end flat collectors and direct-flow vacuum tube collectors may cause the premature degrading of conventional heat transfer fluid at high stagnation temperatures. In order to prevent this process, the operating pressure of the system can be limited to 4 bar or a high-temperature-resistant heat transfer fluid can be used.

Data sheets can be downloaded from our website.

Important notice about the use of heat transfer fluids:

- Only use heat transfer fluid which is suitable for the system it is used in
- All parts of the system that come into contact with fluids must be glycol-resistant
- Concentrations of more than 50 % of glycol are to be avoided in order to achieve optimum efficiency
- At a pH value of 7.5 or less, the heat transfer fluid should be replaced
- Do not dilute readymix fluids!

PHYSICAL AND CHEMICAL CHARACTERISTICS

	Tyfocor® L	Tyfocor® LS
	Canister of 11 kg concentrate	Canister of 10 l readymix
Form	liquid	liquid
Colour	colourless	red fluorescent
Odour	nearly odourless	product-specific
Antifreeze temp.	< -50 °C (at 40 Vol-%: -23.7 °C)	-28 °C
Boiling point	> 150 °C	> 100 °C
Flashing point	> 100 °C	none
Density at 20 °C	1.054 ... 1.058 g/cm ³	1.032 ... 1.035 g/cm ³

Tyfocor® L mixing ratio example:
 1 canister Tyfocor® L + 15.
 6 l of water =
 26 l of readymix with 40 Vol % (-23.7 °C)

Article no.	Article	Price bracket
290 000 10	Tyfocor® L – Heat transfer fluid	B
290 000 20	Tyfocor® LS – Heat transfer fluid	B



HE-Check

Testing device for PWM and 0-10 V signals

With the HE-Check, the function of the pump and the signals of the controller can be checked quickly and easily.

- Measures and generates PWM signals in a frequency range from 40 to 2000 Hz
- Intuitive operating concept
- Ergonomic design
- Easy fault diagnostics
- Including a set of measuring and signal cables for different pumps and controllers
- Including a practical storage bag

TECHNICAL DATA

Inputs: PWM/0-10 V
Outputs: PWM/0-10 V
PWM frequency: 40 ... 2000 Hz
Measuring range: 0 ... 15 V
Power supply: 3 type AAA batteries (included), typical battery life: 2 years
Functions: measuring and generating a PWM or 0-10V signal
Housing: plastic, ABS and TPE
Indication/Display: full graphic display
Operation: 6 buttons
Ingress protection: IP 54/EN 60529
Overvoltage category: CAT I 18V / EN 61010-1
Ambient temperature: 0 ... 40 °C
Degree of pollution: 2
Maximum altitude: 2000 m above MSL
Relative humidity: 10 ... 90 %
Dimensions: 120 x 65 x 27 mm

HE-Check – Calibration service

Calibration of your RESOL HE-Check device will take 3 working days. The device will be completely calibrated and set back to factory settings.

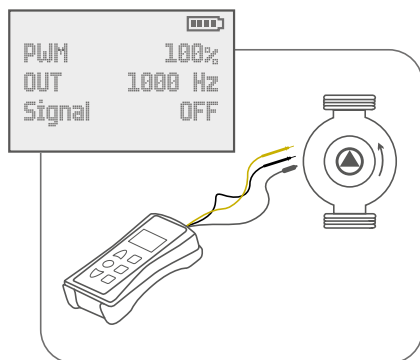
Advantages and service offer at a glance

- Complete calibration of the device
- Traceable calibration according to ISO 9001
- Software updates free of charge
- Battery change

Article no.	Article	Price bracket
280 016 50	HE-Check – Testing device for PWM and 0-10 V signals	B
112 122 02	HE-Check – Calibration service	C

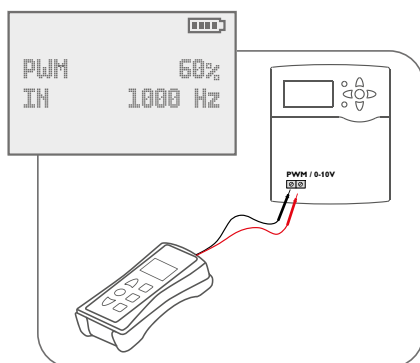


Generates and measures PWM and 0-10V signals



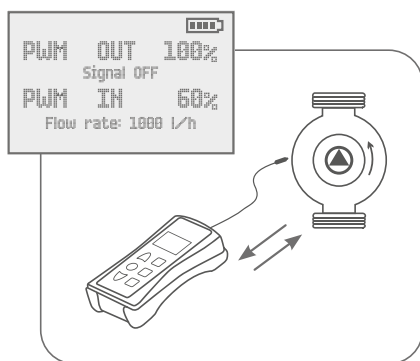
Simulating PWM/0-10V signals

- Suitable for all devices with PWM/0-10V inputs
- Generating speed control signals from 0-100 %
- Adjustable frequency and voltage
- Checking pump function



Testing PWM/0-10V signals

- Suitable for all devices with PWM/0-10V outputs
- Precise measuring of:
 - PWM voltage
 - PWM frequency
- Easy fault diagnostics



Bidirectional pumps

- Simultaneous generating and measuring of PWM signals
- Flow rate indication
- Pump status display:
 - No PWM signal
 - Standby
 - Normal operation
 - Error



LIN-Check

Testing device for LIN bus pumps

The LIN-Check testing device is used for controlling a LIN bus pump and reading out data. Thus, the LIN bus connection can be tested.

- Intuitive operating concept
- Ergonomic design
- Easy error readout
- Including a connection cable
- Including a practical storage bag

TECHNICAL DATA

Power supply: 3 AAA batteries, included with the device, typical battery life: 2 years

Data interface: LIN bus

Functions: control of a LIN bus pump, readout of data

Housing: plastic, ABS and TPE

Indication / Display: full graphic display

Operation: 6 buttons

Ingress protection: IP 54 / DIN EN 60529

Overvoltage category: CAT I 18V / EN 61010-1

Protection class: III

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Maximum altitude: 2000 m above MSL

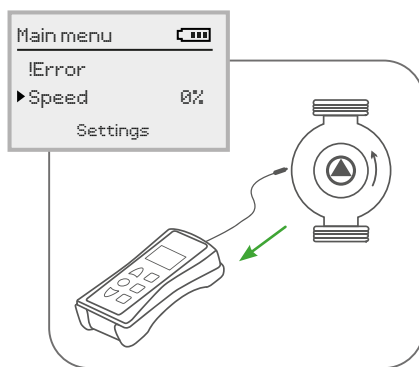
Relative humidity: 10 ... 90 %

Dimensions: 120 x 65 x 27 mm

Article no.	Article	Price bracket
280 016 70	LIN-Check – Testing device for LIN bus pumps	B

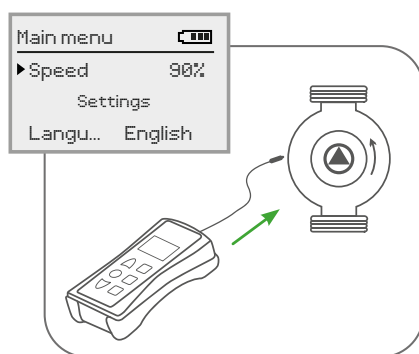


Controlling LIN bus pumps, reading out data



Reading out pump data

- For all LIN bus pumps
- Reading out error codes



Controlling a pump

- Checking pump function
- Carrying out adjustments:
 - Speed from 0 ... 100 %



PSW Basic



PSW Premium



PSW Universal

The PSW Pump signal converter series

The PSW Pump signal converter series translates the speed control signal of the controller into an input signal suitable for a HE pump.



- The existing controller can still be used
- Controller adjustments do not have to be changed

- All PSW models can be used with any pump and controller brand
- This will save you time and money

TECHNICAL DATA

PSW Basic

Inputs: On/Off, bursts/wave packets, phase cutting
Outputs: PWM/0-10V
PWM frequency: 625 Hz ± 15 %
PWM voltage: 11 V
Power supply: 230V~ (50Hz)
Supply connection: type X attachment
Power consumption: max. 1.5 VA
Mode of operation: 1
Rated impulse voltage: 2.5 kV
Functions: signal converter, converting a speed-controlled 230V signal into a PWM or 0-10V signal
Housing: plastic, PC-ABS and PMMA
Mounting: wall mounting
Ingress protection: IP 65/EN 60529
Protection class: II
Ambient temperature: 0 ... 40 °C
Degree of pollution: 2
Relative humidity: 10 ... 90 %
Overvoltage category: 2
Fuse: T0.2A
Maximum altitude: 2000 m above MSL
Dimensions: 80 x 80 x 53 mm

TECHNICAL DATA

PSW Premium

Inputs: On/Off, bursts/wave packets, phase cutting
Outputs: 1 semiconductor relay, 1 PWM, 1 0-10V
PWM frequency: 625 Hz ± 2.5 %
PWM voltage: 11 V
Switching capacity: 1A/230V~ (semiconductor relay)
Power supply: 230V~ (50 Hz)
Supply connection: type X attachment
Power consumption: max. 1.7 VA
Mode of operation: 1.Y
Rated impulse voltage: 2.5 kV
Functions: signal converter, converting a speed-controlled 230V signal into a PWM or 0-10V signal.
Housing: plastic, PC-ABS and PMMA
Indication/Display: operating control LED
Mounting: wall mounting
Protection type: IP 20/EN 60529
Protection class: I
Ambient temperature: 0 ... 40 °C
Degree of pollution: 2
Relative humidity: 10 ... 90 %
Overvoltage category: 2
Fuse: T1A
Maximum altitude: 2000 m above MSL
Dimensions: Ø 139 mm, depth 45 mm

Article no.	Article	Price bracket
180 010 50	PSW Basic – Pump signal converter	B
180 010 90	PSW Premium – Pump signal converter	B
180 010 60	PSW Universal – Pump signal converter	B



PSW Basic Set

PSW Premium Set

TECHNICAL DATA

PSW Universal

Inputs: On / Off, PWM, 0-10 V, 0-20 mA, 4-20 mA, bursts / wave packet, leading-edge phase control, trailing-edge phase control
Outputs: 1 semiconductor relay, 1 PWM, other: 0-10 V, 0-20 mA, 4-20 mA
PWM frequency: 625 Hz $\pm$ 1 %
PWM voltage: 11 V
Switching capacity: 1 (1) A 240 V~ (semiconductor relay)
Total switching capacity: 1 A 240 V
Power supply: 100–240 V~ (50–60 Hz)
Supply connection: type X attachment
Power consumption: < 1 W
Mode of operation: 1.Y
Rated impulse voltage: 2.5 kV
Functions: signal converter
Housing: plastic, PC-ABS and PMMA
Indication/Display: operating control LED

Mounting: wall mounting
Operation: 1 DIP switch, 1 selector switch
Ingress protection: IP 20/EN 60529
Protection class: I
Ambient temperature: 0 ... 40 °C
Degree of pollution: 2
Relative humidity: 10... 90 %
Overvoltage category: 2
Fuse: T2A
Maximum altitude: 2000 m above MSL
Dimensions: 144 x 208 x 43 mm

	PSW Basic	PSW Premium	PSW Universal
PWM or 0-10V output signal	✓	✓	✓
Inversion of the output signal possible	✓	✓	✓
Pump status display		✓	✓
Outputs: 0-20 mA, 4-20 mA			✓

PSW in a set including a WILO Para HE pump

- Set at an attractive price
- Cables included with the device (Basic) or already pre-connected (Premium)
- Extra-quick mounting
- Harmonised system
- Available in DN15 and DN25
- Choice of different pumps
- OEM versions available
- Compatible with all makes and models of controllers

Article no.	Article	Price bracket
180 011 90	PSW Basic Set – incl. Wilo PARA ST 25/7 pump (130 mm)	B
180 011 80	PSW Basic Set – incl. Wilo PARA ST 15/7.0-PVM2 pump (130 mm)	B
180 012 00	PSW Basic Set – incl. Wilo PARA ST 25/7 pump (180 mm)	B
180 011 13	PSW Premium Set – incl. Wilo PARA ST 15/7.0-PVM2 pump (130 mm)	B
180 011 23	PSW Premium Set – incl. Wilo PARA ST 25/7 pump (130 mm)	B
180 011 53	PSW Premium Set – incl. Wilo PARA ST 25/7 pump (180 mm)	B



Test box

Solar systems reach an increasingly high degree of efficiency but in many cases they can still further increase their efficiency through regular and professional maintenance.

The test box is a professional service box for checking solar thermal systems quickly and easily. Problems affecting system operation can be detected reliably with the help of these measuring and testing devices.

CONTENTS OF THE TEST BOX

- Test and indication badges
- Compass
- pH test strips
- Screwdriver with voltage control
- Mini screwdriver
- Manometer
- Hand-held refractometer
- Digital multimeter

Article no.	Article	Price bracket
290 009 20	Test box	B
290 000 60	Test and indication badges (25 pieces)	C
290 001 10	pH test strips (84 pieces)	C

Refractometer



Test set with precise refractometer for exact determination of the antifreeze concentration or of the cloud point of the heat transfer fluid.

CONTENTS OF THE REFRACTOMETER SET

- Padded plastic box
- Pipet for sampling
- Mini screwdriver

Dimensions: 27 x 40 x 155 mm
Weight: 180 g

Article no.	Article	Price bracket
280 009 60	Refractometer set for exact determination of the antifreeze concentration	B
280 006 00	Refractometer set for exact determination of the cloud point	B



Thermostats, measuring instruments & calorimeters





For electric immersion heaters!

TT2 Thermostat controller

The TT2 Thermostat controller is equipped with two high-current relays to which an electric immersion heater of up to 3.6 kW (230 V~)/1.8 kW (115 V~) can be connected.

Thus, the TT2 manages the time and temperature control of the electric backup heating for a DHW store. The rapid heat-up function makes for extra comfort. A wireline remote control with an integrated LED enables a comfortable operation of the rapid heat-up function.

- Direct connection of an electric immersion heater up to 3.6 kW (230 V~)/1.8 kW (115 V~)
- Time and temperature control of the electric backup heating
- Rapid heat-up function with optional remote control activation
- Intuitive operating concept
- Energy-efficient switch-mode power supply
- For thermosiphon systems

TECHNICAL DATA

Inputs:

1 Pt1000 temperature sensor, 1 input for RCTT Remote control

Output: 2 high-current relays for electric immersion heater

Switching capacity: 16 (3) A 240 V~ (high-current relay)

Power supply: 100–240 V~ (50–60 Hz)

Supply connection: type X attachment

Standby: 0.44 W

Mode of operation: type 1.C action

Rated impulse voltage: 2.5 kV

Functions: time-controlled thermostat function, DHW heating with rapid heat-up function

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, also suitable for mounting into patch panels

Display: LC display, multi-functional combined display with pictograms, two 2-digit text fields and two 4-digit 7-segment displays

Operation: 3 buttons

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0...40 °C

Degree of pollution: 2

Relative humidity: 10...90 %

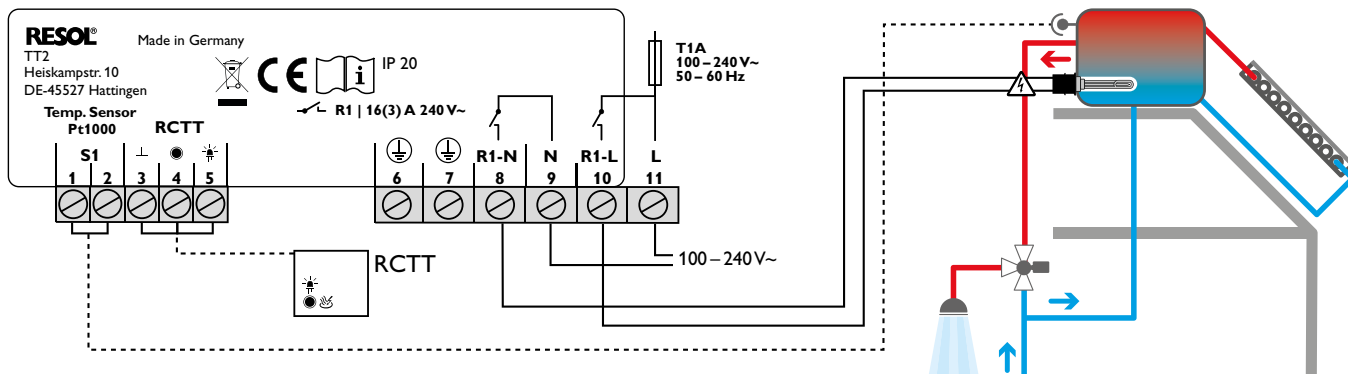
Fuse: T1A

Maximum altitude: 2000 m above MSL

Dimensions: 172 x 110 x 46 mm

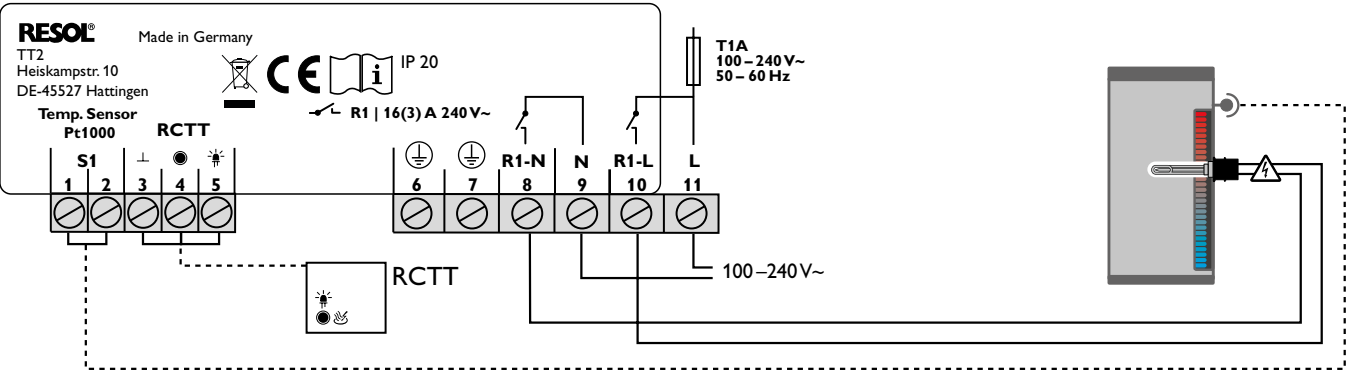
EXAMPLE

Thermosiphon system

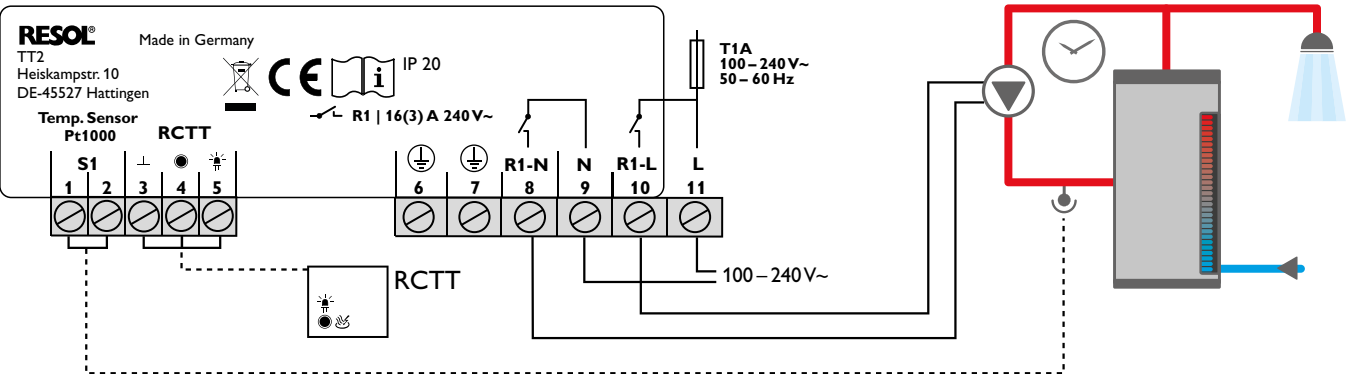


EXAMPLE

Direct connection of an electric backup heating



Circulation



Article no.	Article	Price bracket
125 111 03	TT2 Thermostat controller	A
125 111 13	TT2 Thermostat controller – Full kit » incl. 1 Pt1000 sensor (FKP6)	A
125 111 23	TT2 Thermostat controller – Full kit » incl. 1 Pt1000 sensor (FKP6) and RCTT Remote control	A

RCTT Remote control



- With status LED
- For connection to the TT2 or the DeltaSol® AL E HE

The RCTT Remote control is designed for activating the rapid heat-up function without accessing the controller menu.

TECHNICAL DATA

Housing: wall mounting, material ASA, colour: pure white, similar to RAL 9010
Ingress protection: IP 10
Ambient temperature: 0 ... 40 °C
Relative humidity: 10 ... 90 %
Dimensions: 84.5 x 84.5 x 25 mm

Article no.	Article	Price bracket
136 000 60	RCTT Remote control	A



FS07 / FS08 Flow switch

The FS07/FS08 Flow switch is used for flow detection and incorporates a reed contact, which will be closed as soon as the flow rate is larger than 1 litre/min.

TECHNICAL DATA

Housing: Brass

Dimensions: 102 mm x 36 mm

Temperature range: -30 °C ... +100 °C

Maximum pressure: 10 bar

Switching capacity:

FS07: 230 V~/3 A **FS08:** 300 V==/1 A

Switching point: 1 litre/min

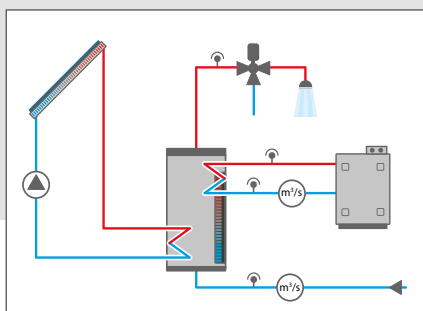
Upper connection thread: IT ¼"

Lower connection thread: ET 22 mm flat sealing

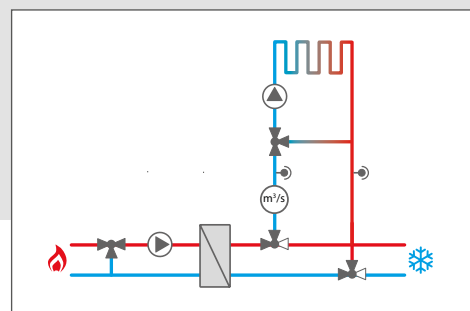
Note

Suitable for vertical installation only. Please pay attention to the flow direction indicated on the housing!

Article no.	Article	Price bracket
256 011 10	FS07 Flow switch (230 V~ version; not suitable for EC1)	A
256 011 00	FS08 Flow switch	A



EXAMPLE



EXAMPLE

WMZ Plus Calorimeter

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

- Single or combined measurement of heat and cold energy
- Two independent calorimeters
- Commissioning menu for easy configuration
- Conversion into selectable alternative units (€, kg CO₂, m³ gas, etc.)

TECHNICAL DATA

Inputs:

4 Pt1000 temperature sensors, 2 impulse inputs (adjustable), 2 4-20 mA inputs (convertible to 0-10 V), 2 analogue Grundfos Direct Sensors™ (VFS)

Outputs: 2 S0 outputs

Power supply: 100–240 V~ (50–60 Hz)

Standby: 0.99 W

Settings:

- **Volumetric content of glycol:** 0 ... 70 % (1- % steps)
- **Impulse rate of flow rate:** 0 ... 99 l/Imp (1- l/Imp steps) for V40 flowmeter

Temperature measurement: with Pt1000 sensors and Grundfos Direct Sensors™ (VFS)

Measuring accuracy: ± 0.3 K

Measuring range: -40 ... +120 °C

Data interface:

VBus®, MicroSD card slot

Indication / Display:

graphic display, operating control LED (Lightwheel®)

Operation: 2 buttons and 1 adjustment dial (Lightwheel®)

Ingress protection: IP 20/EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Relative humidity: 10 ... 90 %

Fuse: T200mA

Maximum altitude: 2000 m above MSL

Dimensions: 110 x 166 x 47 mm

Article no.	Article	Price bracket
135 307 23	WMZ Plus – Calorimeter module	B
135 307 43	WMZ Plus – Full kit » incl. 2 Pt1000 sensors (2 x FRP30) and V40-15 flowmeter	B
135 307 53	WMZ Plus – Full kit » incl. 2 Pt1000 sensors (2 x FRP30) and V40-25 flowmeter	B
135 307 63	WMZ Plus – Full kit » incl. 2 Pt1000 sensors (2 x FRP30) and V40-35 flowmeter	B
135 307 73	WMZ Plus – Full kit » incl. 2 Pt1000 sensors (2 x FRP30) and V40-60 flowmeter	B
135 307 93	WMZ Plus – Full kit » incl. 2 Pt1000 sensors (2 x FRP30) and V40-150 flowmeter	B

ACCESSORIES

V40



The RESOL V40 is a measuring instrument with a contactor for measuring the flow

(see page 106)

Calorimeter extension kits



Calorimeter extension kits (consisting of 2 x FRP30, 1 x flowmeter)

(see page 59)



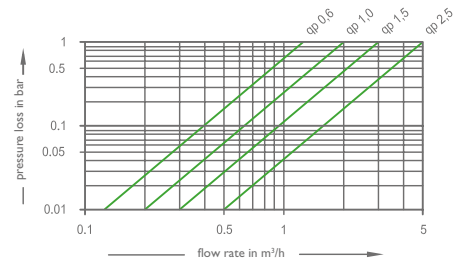
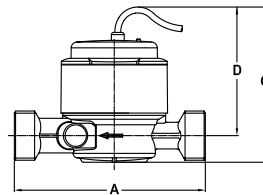
V40 Flowmeter

The RESOL V40 is a measuring instrument with a contactor for measuring the flow of water or water-glycol mixtures and can be connected directly to the controller or calorimeter for heat quantity measurement. After a specific volume has passed, the V40 reed switch sends an impulse to the calorimeter.

The heat quantity used is calculated by these impulses, the temperature difference and pre-defined parameters (glycol type, concentration, heat capacity etc.). Fitting included.

VERSION 1

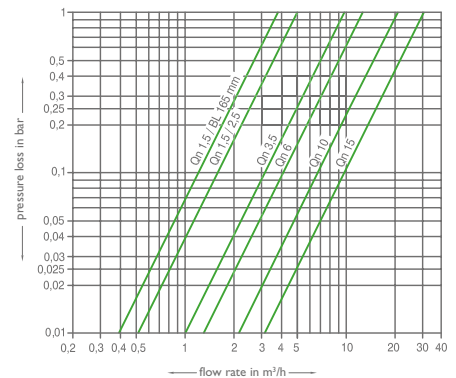
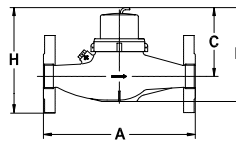
Irradiation impeller DN20	0.6; 1.5 m³/h	2.5 m³/h
A mounting length without fitting	110 mm	130 mm
mounting with fitting	208 mm	228 mm
C height with pulser	108 mm	
D height at centre of pipe	90 mm	
counter width	72 mm	
weight without fitting	0.7 kg	



Vertical and horizontal mounting is possible

VERSION 2

Irradiation impeller DN25/DN40/DN50	3.5 m³/h	6.0 m³/h	10 m³/h	15 m³/h
A mounting length without fitting	260 mm	300 mm		
B total height	143 mm	169 mm	183 mm	
C height at centre of pipe	100 mm	123 mm	126 mm	
H height with flange	152 mm	192 mm	204 mm	
weight with fitting	3.2 kg	6.4 kg	7.4 kg	
weight without fitting	2.7 kg	5.3 kg	5.8 kg	



Horizontal mounting is possible

Type		V40-15	V40-25	V40-35	V40-60	V40-150
Version		1	1	2	2	2
Impulse rate	I/Imp	1	25	25	25	25
Nominal width	DN	20	20	25	25	50
Connection thread at the counter	G...B "	1	1	1 ¼	1 ¼	2 ¾
Connection thread of the fitting	R... "	¾	¾	1	1	2
Max. operat. pressure	P _{max} bar	16	16	16	16	16
Max. operat. temperature	T _{max} °C	120	120	130	130	130
Nominal flow	Q _n m³/h	1.5	2.5	3.5	6	15
Maximum flow	Q _{max} m³/h	3	5	7	12	30
Insulation limit ± 3 %	Q _t l/h	120	200	280	480	1200
Minimum flow horizontal	Q _{min} l/h	30	50	70	120	300
Minimum flow vertical	Q _{min} l/h	60	100	-	-	-

Article no.	Article	Price bracket
280 016 80	V40-15 flowmeter	B
280 011 20	V40-25 flowmeter	B
280 013 60	V40-35 flowmeter	B
280 013 70	V40-60 flowmeter	B
280 013 90	V40-150 flowmeter	B



Sensors & accessories





Pt500 temperature sensors

(for installation into immersion sleeves)

Article no.	Article	Ø D	L1 (mm)	L2 (mm)	Material	Application	Temperature range	Price bracket
155 009 20	FKP6/500	6	45	2500	Silicone cable	Collector	-50°C...+180°C	A
155 006 80	FRP6/500	6	45	2500	PVC cable	Store	-5...+80°C	A

Pt1000 temperature sensors

(for installation into immersion sleeves)

The standard temperature sensors for collectors and stores are **printed in bold**.

Article no.	Article	Ø D	L1 (mm)	L2 (mm)	Material	Application	Temperature range	Price bracket
155 000 10	FKP4	4	40	1000	Silicone cable	Collector	-50°C...+180°C	A
155 003 10	FKP5,5	5.5	28	1500	Silicone cable	Collector	-50°C...+180°C	A
155 003 20	FRP5,5	5.5	28	2500	PVC cable	Store	-5°C...+80°C	A
155 000 80	FRP6	6	45	2500	PVC cable	Store	-5°C...+90°C	A
155 000 20	FKP6	6	45	1500	Silicone cable	Collector	-50°C...+180°C	A
155 004 40	FKP6	6	45	2500	Silicone cable	Collector	-50°C...+180°C	A
155 004 50	FKP6	6	45	5000	Silicone cable	Collector	-50°C...+180°C	A
155 006 10	FKP6	6	45	20000	Silicone cable	Collector	-50°C...+180°C	A

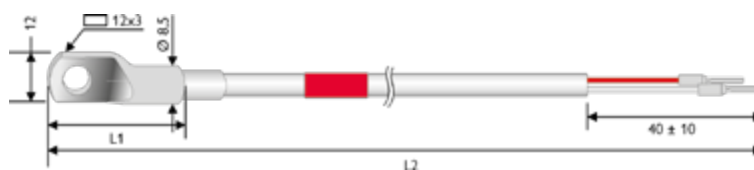
High-temperature sensors

(for temperatures up to 300°C) Pt1000 version

Article no.	Article	Ø D	L1 (mm)	L2 (mm)	Material	Application	Temperature range	Price bracket
155 001 10	FKP4/H	4	40	1000	PFA cable	Collector	-50°C...+ 250°C	A
155 001 20	FKP6/H	6	46	1500	Silicone cable	Collector	-50°C...230°C	A

Flatscrew sensors

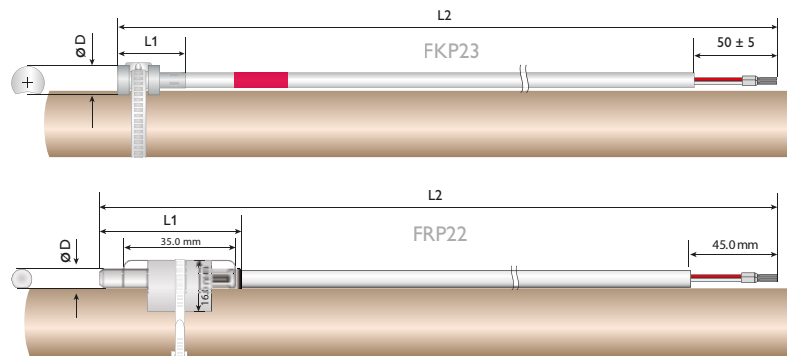
(for installation on plane surfaces) Pt1000 version



Article no.	Article	L1 (mm)	L2 (mm)	Material	Application	Temperature range	Price bracket
155 003 60	FKP9	32	1500	Silicone cable	Collector	-50°C...+180°C	A

Cylindrical clip-on sensors

(for surface mounting on tubes) Pt1000 version



Article no.	Article	Ø D	L1 (mm)	L2 (mm)	Material	Application	Temperature range	Price bracket
155 009 60	FKP23	15	30	2500	Silicone cable	Collector	-50°C ... +180°C	A
155 008 80	FRP22	6	39	2500	PVC cable	Store	-5°C ... + 80°C	A

FKP23 incl. 1 pipe clip and heat conductive paste

FRP22 incl. 1 bracket, 1 cable tie (up to 105 °C) and heat conductive paste

Complete sensors

(Temperature sensors complete with immersion sleeve and strain relief)

Article no.	Article	Sensor	Immersion depth (mm)	Material	Temperature range	Price bracket
155 001 90	FKP30	FKP5,5	30	Brass	-50°C ... +180°C	A
155 002 80	FRP30	FRP5,5	30	Brass	-5°C ... + 80°C	A
155 002 00	FKP45	FKP6	45	Brass	-50°C ... +180°C	A
155 002 10	FRP45	FRP6	45	Brass	-5°C ... + 80°C	A
155 002 20	FKP60	FKP6	60	Copper	-50°C ... +180°C	A
155 002 30	FRP60	FRP6	60	Copper	-5°C ... + 80°C	A
155 002 40	FKP100	FKP6	100	Copper	-50°C ... +180°C	A
155 002 50	FRP100	FRP6	100	Copper	-5°C ... + 80°C	A
155 002 60	FKP150	FKP6	150	Copper	-50°C ... +180°C	A
155 002 70	FRP150	FRP6	150	Copper	-5°C ... + 80°C	A
155 006 60	FKP30V	FKP6	30	Stainless steel	-50°C ... +180°C	A
155 006 70	FRP30V	FRP6	30	Stainless steel	-5°C ... + 80°C	A
155 003 80	FKP60V	FKP6	60	Stainless steel	-50°C ... +180°C	A
155 003 90	FRP60V	FRP6	60	Stainless steel	-5°C ... + 80°C	A
155 004 00	FKP100V	FKP6	100	Stainless steel	-50°C ... +180°C	A
155 004 10	FRP100V	FRP6	100	Stainless steel	-5°C ... + 80°C	A
155 004 20	FKP150V	FKP6	150	Stainless steel	-50°C ... +180°C	A
155 004 30	FRP150V	FRP6	150	Stainless steel	-5°C ... + 80°C	A

Sensor extension cable

Article no.	Article	Price bracket
280 051 00	Sensor extension cable PVC LIYY 2 x 0.5 mm ² (100 m cable coil)	C

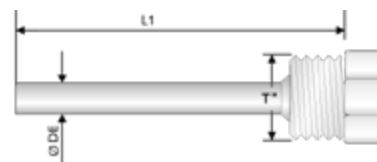
Note:

- The temperature range refers to the insulation of the sensor cable!
- All silicone cables are UV- and ozone-resistant!
- Further lengths are available on request!



Immersion sleeves

(NPT versions available on request!)



Article no.	Article	Ø DE	Ø DI	L1 (mm)	T"	Material	Price bracket
280 005 60	TH30	9	6.2	30	1/2	Nickel-plated brass	A
280 000 30	TH45	10	6.2	45	1/2	Nickel-plated brass	A
280 000 40	TH60	8	6.2	60	1/2	Nickel-plated copper/brass	A
280 000 50	TH100	8	6.2	100	1/2	Nickel-plated copper/brass	A
280 000 60	TH150	8	6.2	150	1/2	Nickel-plated copper/brass	A
280 000 70	TH200	8	6.2	200	1/2	Nickel-plated copper/brass	A
280 000 90	TH300	8	6.2	300	1/2	Nickel-plated copper/brass	A
280 012 30	TH30V	8	6.2	30	1/2	Stainless steel	A
280 010 20	TH45V	8	6.2	45	1/2	Stainless steel	A
280 001 00	TH60V	8	6.2	60	1/2	Stainless steel	A
290 002 20	TH60V/4 (for FKP4/H high-temperature sensor)	5	4.2	60	1/2	Stainless steel	A
280 002 10	TH100V	8	6.2	100	1/2	Stainless steel	A
290 002 30	TH100V/4 (for FKP4/H high-temperature sensor)	5	4.2	100	1/2	Stainless steel	A
280 002 20	TH150V	8	6.2	150	1/2	Stainless steel	A
280 002 30	TH200V	8	6.2	200	1/2	Stainless steel	A

Because of the short component length, it is recommended to use the TH30 immersion sleeve with the FKP5,5 or FRP5,5 temperature sensor.

Grundfos Direct Sensors™



TECHNICAL DATA

Length: 110 mm (VFS/VFD)

Connection thread: 3/4" ET (VFS/VFD), 1/2" ET (RPS/RPD)

Depth of thread engagement: 12 mm (RPS/RPD)

Max. operating temperature:

long-term: 100 °C

short-term: 120 °C

Material: stainless steel

A connection cable (3 m) with JST plug is included with each sensor.

Article no.	Article	Price bracket
130 000 20	VFS 1-12 l (Solar/DHW) – analogue sensor » incl. fitting, insert and connection cable	B
130 002 00	VFS 1-12 l (Heating) – analogue sensor » incl. fitting, insert and connection cable	B
130 000 30	VFS 2-40 l (Solar/DHW) – analogue sensor » incl. fitting, insert and connection cable	B
130 002 10	VFS 2-40 l (Heating) – analogue sensor » incl. fitting, insert and connection cable	B
130 000 40	RPS 0-10 bar (Solar/DHW) – analogue sensor » incl. fitting and connection cable	B
130 002 20	RPS 0-10 bar (Heating) – analogue sensor » incl. fitting and connection cable	B

For the **DeltaSol® AL E HE, BX Plus, MX, MX Plus** and **DeltaTherm® HC, HC MAX** only:

Article no.	Article	Price bracket
130 000 80	VFD 1-12 l (Solar/DHW) – digital sensor » incl. fitting, insert and connection cable	B
130 002 30	VFD 1-12 l (Heating) – digital sensor » incl. fitting, insert and connection cable	B
130 001 00	VFD 2-40 l (Solar/DHW) – digital sensor » incl. fitting, insert and connection cable	B
130 002 40	VFD 2-40 l (Heating) – digital sensor » incl. fitting, insert and connection cable	B

For the **DeltaSol® AL E HE, BX Plus, MX, MX Plus, CS series** and **DeltaTherm® HC, HC MAX** only:

130 000 90	RPD 0-10 bar (Solar/DHW) – digital sensor » incl. fitting and connection cable	B
130 002 50	RPD 0-10 bar (Heating) – digital sensor » incl. fitting and connection cable	B

Connection cables in different lengths:

Article no.	Article	Price bracket
280 040 40	Connection cable 0.4 m (for pressure and flow rate sensor)	B
280 040 66	Connection cable 0.65 m (for pressure and flow rate sensor)	B

Please note: if you wish to connect two digital sensors to a controller, only use Grundfos Direct Sensors™ with different measuring ranges.

FRH (analogue) and FRHd (digital) humidity sensor

For connection to the *DeltaSol*® MX and *DeltaTherm*® HC MAX from version 2.06 and *DeltaSol*® BX Plus (FRHd only) from version 2.06, *DeltaSol*® MX Plus and *DeltaTherm*® HC Plus (FRH only)



The FRH/FRHd is used for measuring the relative humidity and the room temperature.

TECHNICAL DATA

Housing: for on-wall mounting, material ASA, colour: pure white, similar to RAL 9010, cable gland: at the back of the housing

Ingress protection: IP 10 according to EN 60529

Dimensions: 84,5 x 84,5 x 25 mm

Measuring range:

Humidity: 0 ... 100 % RH

Temperature: 0 ... 40 °C

Ambient temperature: 0 ... 40 °C

Article no.	Article	Price bracket
130 003 00	FRH humidity sensor (analogue) » incl. JST connection cable	A
130 003 10	FRHd humidity sensor (digital) » incl. JST connection cable	A

TS10 Dew point switch

For connection to *DeltaSol*® MX, BX Plus and *DeltaTherm*® HC MAX from version 2.00, *DeltaTherm*® HC Plus and *DeltaSol*® MX Plus



The TS10 Dew point switch is designed for condensation detection in a heating circuit used for cooling purposes.

If the relative humidity falls below the adjusted set value, the TS10 will switch a potential-free contact.

Article no.	Article	Price bracket
155 009 00	TS10 Dew point switch	B

Heat conductive paste

For installing sensors as flatscrew or pipe sensors or into immersion sleeves, heat conductive paste should be used to ensure an optimum heat transfer.



Article no.	Article	Price bracket
280 000 10	Heat conductive paste (3.5 g)	A

FRP12 Indoor temperature sensor



The RESOL FRP12 is used for measuring the indoor temperature with a Pt1000 measuring element.

Article no.	Article	Price bracket
155 008 90	FRP12 Indoor temperature sensor	A

RTA12 Remote control



With the RTA12, the heating curve can be comfortably adjusted from the living area. Increasing the heating curve setting causes an increase in flow temperature, decreasing the setting causes a decrease.

The integrated Pt1000 sensor measures the ambient temperature.

Remote control for connection to the *DeltaSol*® MX, MX Plus, BX Plus, *DeltaTherm*® HC, HC mini, HC MAX, HC Plus

Article no.	Article	Price bracket
136 000 40	RTA12 Remote control	A

RCP12 Room control unit



With the RCP12, the heating curve can be comfortably adjusted from the living area. The integrated Pt1000 sensor measures the room temperature.

The additional operating mode switch enables a quick change of modes, e.g. from automatic to night mode.

Room control unit for connection to the *DeltaSol*® MX (from version 2.0), *DeltaSol*® MX Plus, *DeltaTherm*® HC mini (from version 1.01), *DeltaTherm*® HC (from version 1.09), *DeltaTherm*® HC MAX or HC Plus

Article no.	Article	Price bracket
136 000 50	RCP12 Room control unit	A

RTS Room control unit



The RTS room control unit is designed for measuring the relative humidity and the room temperature as well as for adjusting the set room temperature

Room control unit for connection to the *DeltaSol*® MX Plus and *DeltaTherm*® HC Plus

Article no.	Article	Price bracket
136 001 50	RTS Room control unit	A

FAP13 Outdoor temperature sensor



The FAP13 is used for measuring the outdoor temperature with a Pt1000 measuring element.

The FAP13 is placed in a weather-resistant housing and is designed for mounting outdoors. Cable glands for the sensor cables at the bottom of the housing allow easy installation.

Article no.	Article	Price bracket
155 008 10	FAP13 Outdoor temperature sensor	A

Central outdoor sensor unit

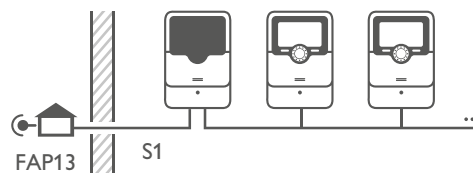
For use with the *DeltaSol*® MX Plus, *DeltaTherm*® HC Plus, *DeltaTherm*® HT/HIU and FAP13



The central outdoor sensor unit measures the outdoor temperature and transmits this value to the controllers connected.

Inputs: 1 Pt1000 temperature sensor

Outputs: 1 semiconductor relay,
1 potential-free extra-low voltage relay



Article no.	Article	Price bracket
112 127 96	Central outdoor sensor unit	A

SP10 Overvoltage protection



Overvoltage protection device placed in housing, suitable for mounting outdoors.

We generally recommend installing the overvoltage protection in order to avoid overvoltage damage at collector sensors, e.g. caused by local lightning storms.

Article no.	Article	Price bracket
180 110 70	SP10 Overvoltage protection	A

CS10 Solar cell



The solar cell is used for measuring the irradiation intensity. The short-circuit current rises with increasing irradiation intensity.

Depending on the controller, the sensor can also be used for additional plausibility control or direct control. The connecting cable can be extended to 100 m.

Article no.	Article	Price bracket
151 003 20	CS10 Solar cell	A



rosenthal design 



Radon FRn radon sensor

The radon sensor measures the radon concentration in residential buildings and calculates an average value over up to one year in its internal memory. This level of radon concentration is displayed by means of LED flashing codes. Additionally, the radon sensor measures the relative humidity and the room temperature.

- Radon concentration measurement
- Annual average value calculation
- Temperature and humidity measurement
- Data transfer via KM2 Communication module or DL2 Plus Datalogger
- Evaluation and visualisation via VBus.net
- Display of radon concentration by means of LED flashing codes



TECHNICAL DATA

Housing: plastic, PC-ABS and PMMA
Ingress protection: IP 20 / EN 60529
Protection class: III
Ambient temperature: 0 ... 40 °C
Measuring range:
 Temperature: 0 ... 40 °C
 Humidity: 0 ... 99% RH
Dimensions: Ø 139 mm, depth 45 mm
Mounting: wall mounting
Display: LED
Maximum altitude: 2000 m above MSL
Overvoltage category: I
Interface: VBus® for the connection to a KM2 or DL2, 1 digital output for the connection to a controller (in preparation)
Power supply:
 Mains adapter: 100–240 V~, 1 A / 12 V=, 1 A (Level 6)
 Radon sensor: 12 V=, 40 mA / 75 mA*
 Electrical energy source: ES1 (EN 62368-1)
 Electrical power source: PS1 (EN 62368-1)
 Thermal energy source: TS1 (EN 62368-1)
 Mechanical energy source: MS1 (EN 62368-1)
 * in combination with a KM2 or DL2 Plus

FLASHING CODES

1 x  up to 100 Bq/m³ 2 x  up to 200 Bq/m³ 3 x  up to 300 Bq/m³
 4 x  up to 400 Bq/m³ 5 x  up to 500 Bq/m³ ● over 500 Bq/m³

ACCESSORIES

KM2 Communication module



For remote access to the controller via VBus.net

(see page 84)

DL2 Plus Datalogger



For remote access to 2 controllers, integrated data logging and connection to a BMS

(see page 85)

Article no. Article

Price bracket

130 004 00 Radon FRn radon sensor » incl. mains adapter

A

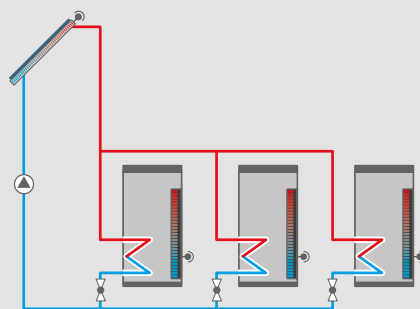


Valves





EXAMPLE

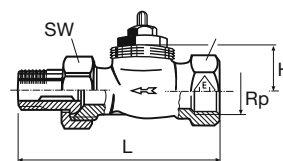


VA20 2-port valve

The RESOL VA20 2-port valve is used for switching flow rates in solar, heating and air conditioning systems.

The VA20 is a 2-port valve with an electrothermal actuator. The actuating time of approx. 3.5 minutes enables a flow rate regulation without water hammers. The VA20 comes with brass connection fittings.

DN	15	20	25	32
L	95	106	118	135
H	21.5	21.5	23	23
Rp	½	¾	1	1 ¼
SW	30	37	47	52



TECHNICAL DATA Valve

Valve housing: corrosion-resistant red brass

Internal parts: brass and stainless steel

Sealings: EPDM

Max. pressure: 10 bar

Connection thread: ½", ¾", 1" and 1 ¼"

Max. operating temperature:

long-term: up to 120 °C

short-term: 140 °C

TECHNICAL DATA Actuator



Power supply: 230 V~, 50–60 Hz

Current consumption (typical): 4.3 mA

Power consumption: 1 W

Switch-on current: max. 550 mA

Initial position:

NC: normally closed / NO: normally open

Operating temperature: 0–60 °C

Spring force: 100 N

Stroke: 4 mm

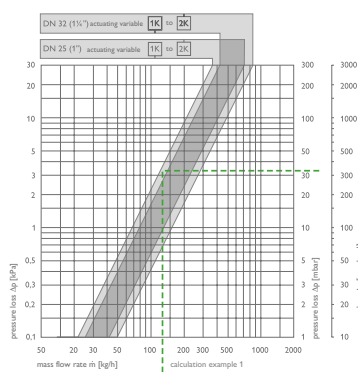
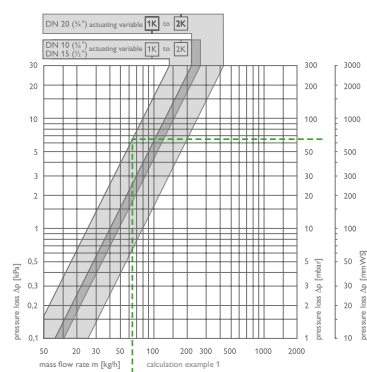
Protection type: IP 54

Protection class: II

Actuation time: ca. 3.5 min

Pollution degree: 2

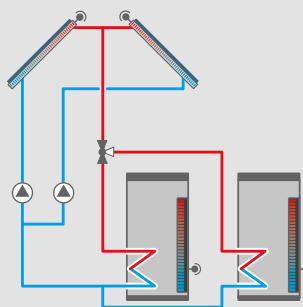
Connection cable: 2 x 0.75 mm²; 100 cm



Article no.	Article	Price bracket
270 007 40	VA20-NO/DN 15 R ½" with actuator NO 230 V~ (normally open)	B
270 007 60	VA20-NO/DN 20 R ¾" with actuator NO 230 V~ (normally open)	B
270 007 80	VA20-NO/DN 25 R 1" with actuator NO 230 V~ (normally open)	B
270 008 00	VA20-NO/DN 32 R 1 ¼" with actuator NO 230 V~ (normally open)	B
270 007 50	VA20-NC/DN 15 R ½" with actuator NC 230 V~ (normally closed)	B
270 007 70	VA20-NC/DN 20 R ¾" with actuator NC 230 V~ (normally closed)	B
270 007 90	VA20-NC/DN 25 R 1" with actuator NC 230 V~ (normally closed)	B
270 008 10	VA20-NC/DN 32 R 1 ¼" with actuator NC 230 V~ (normally closed)	B
270 007 20	SVA-NO actuator for VA20/VA300 (normally open)	B
270 007 30	SVA-NC actuator for VA20/VA300 (normally closed)	B



EXAMPLE

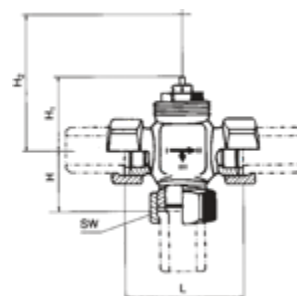


VA300 Changeover valve

The VA300 is a 3-port valve with an electrothermal actuator.

The actuating time of approx. 3.5 minutes enables a flow rate regulation without water hammers.

DN	25	32
L	84	115
H	46	106
H ₁	50	64
H ₂	98.5	-
SW	47	66



TECHNICAL DATA Valve

Max. operating temperature:

long-term: up to 120 °C, short-term: 140 °C

Valve housing: corrosion resistant red brass

Internal parts: brass and stainless steel

Sealings: EPDM

Max. pressure: 10 bar

Connection thread: 1", 1¼"

TECHNICAL DATA Actuator

Power supply: 230 V~, 50–60 Hz

Current consumption (typical): 4.3 mA

Power consumption: 1 W

Switch-on current: max. 550 mA

Initial position:

NC: normally closed (flow direction from I to III)

NO: normally open (flow direction from I to II)

Operating temperature: 0–60 °C

Spring force: 100 N

Stroke: 4 mm

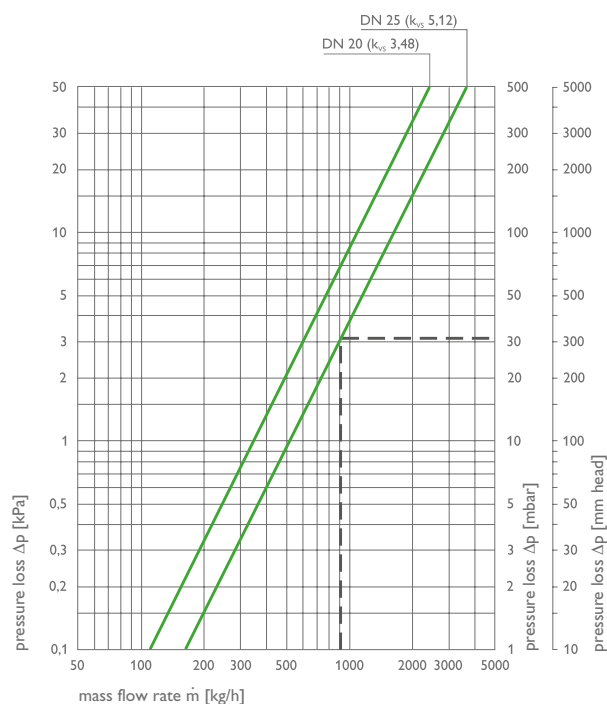
Protection type: IP 54

Protection class: II

Actuation time: approx. 3.5 min

Pollution degree: 2

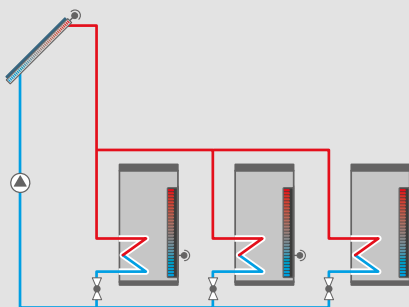
Connection cable: 2 x 0.75 mm²; 100 cm



Article no.	Article	Price bracket
270 008 40	VA300-NO/DN 25 R 1" with actuator NO 230V~ (normally open) and fittings	B
270 008 50	VA300-NC/DN 25 R 1" with actuator NC 230V~ (normally closed) and fittings	B
270 007 20	SVA-NO actuator for VA20/VA300 (normally open)	B
270 007 30	SVA-NC actuator for VA20/VA300 (normally closed)	B



EXAMPLE



VA23 motor-driven 2-port ball valve

The VA23 is a motor-driven 2-port ball valve for use in heating, cooling and DHW systems.

TECHNICAL DATA

Operating temperature: 2 ... 110°C

Ambient temperature: 1 ... 55°C

Max. operating pressure: 32 bar (3.2 MPa)

Max. differential pressure: 6 bar (600 kPa)

Medium: water with max. 50% glycol

Connection thread: IT Rp ½", ¾", 1", 1¼"

Actuator: 230 V~, 50 Hz

Actuation time: 30 s (90°)

Control: 2-point signal (on/off)

Standby:

rest position: 0 W

end position: 5 W

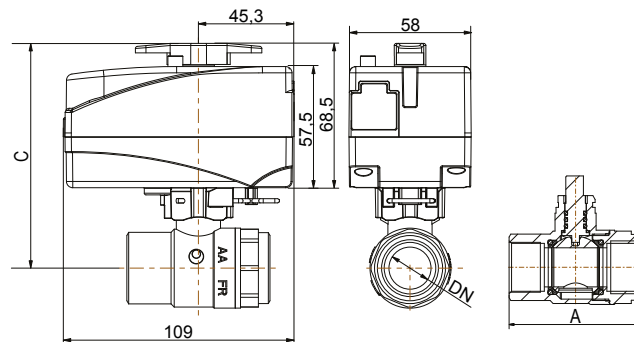
Ingress protection: IP 44

Material:

housing: brass EN 12165 CW617N

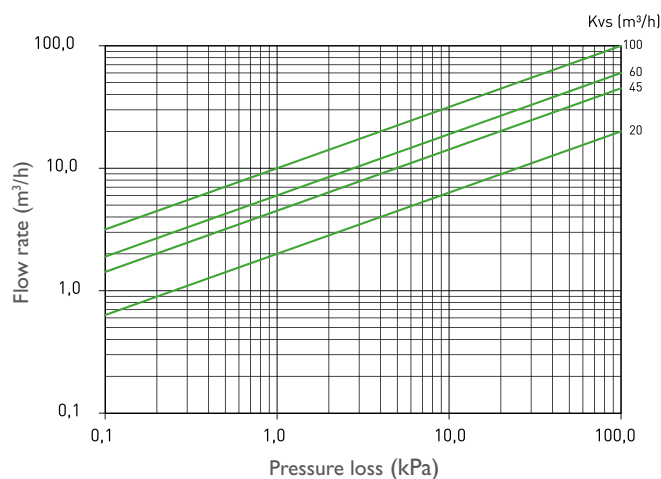
ball: brass CW617N

Cable: 3 x 0.75 mm² (insulation: PVC)



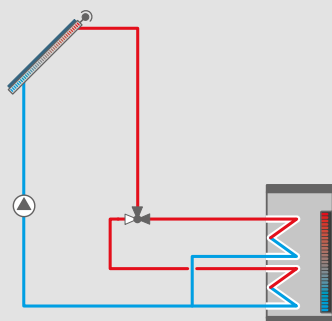
DN (Rp)	15 (½")	20 (¾")	25 (1")	32 (1¼")
A	62	68	74	84
C	104	107	112	117

(mm)



Article no.	Article	Price bracket
270 010 00	VA23-DN15 R ½" – motor-driven 2-port ball valve	B
270 010 10	VA23-DN20 R ¾" – motor-driven 2-port ball valve	B
270 010 20	VA23-DN25 R 1" – motor-driven 2-port ball valve	B
270 010 30	VA23-DN32 R 1¼" – motor-driven 2-port ball valve	B
270 010 40	Actuator for VA23	B

EXAMPLE



VA33 motor-driven 3-port valve

The VA33 is a motor-driven 3-port valve for use in heating, cooling and DHW systems. The indicator on the housing shows which port is open.

TECHNICAL DATA

Operating temperature: 5 ... 80°C (short-term 90°C)

Ambient temperature: 1 ... 60°C

Max. operating pressure: 10 bar (1.0 MPa)

Max. differential pressure: 1 bar (100 kPa)

Leakage: < 0.1 % of Kvs at 1 bar (100 kPa)

Angle of rotation: 60°/360°

Medium: water with max. 50 % glycol, max. 30 % ethanol

Connection thread: IT Rp ¾", 1", 1½"

Actuator: 230 V~, 50 Hz

Actuation time: 8 s (60°)

Control: 2-point signal (on/off)

Standby:

rest position: 0 W

end position: 5 W

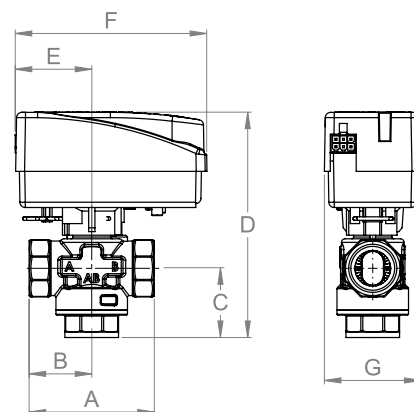
Ingress protection: IP 44

Material:

housing: brass EN 12165 CW617N

internal parts / spindle: PPS composite

Cable: 3 x 0.75 mm² (insulation: PVC)



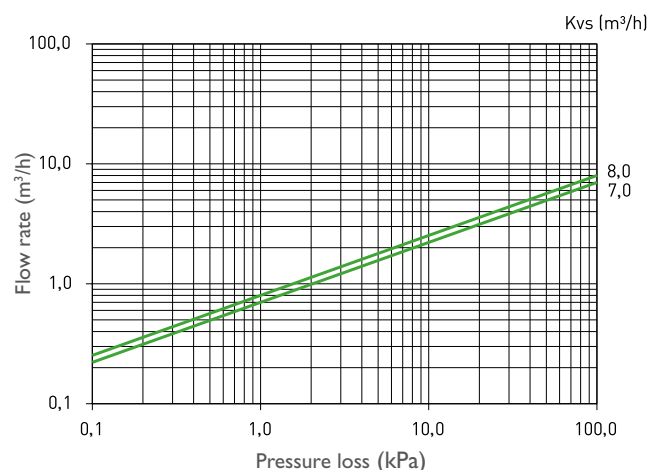
DN (Rp)	20 (¾")	25 (1")	32 (1½")
A	70	74	84
B	35	37	40
C	104	107	114
D	126	127	132
E	43	43	43
F	107	107	107
G	54	54	54

(mm)

ACCESSORIES

Solar adapter

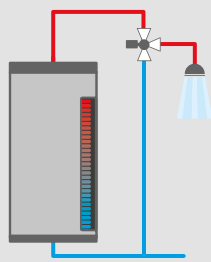
The adapter increases the distance between the valve body and the actuator, thus protecting the latter from overheating at high fluid temperatures.



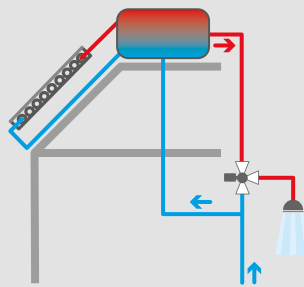
Article no.	Article	Price bracket
270 011 10	VA33-DN 20 R ¾" – motor-driven 3-port valve	B
270 011 20	VA33-DN 25 R 1" – motor-driven 3-port valve	B
270 011 30	VA33-DN 32 R 1½" – motor-driven 3-port valve	B
270 011 40	Actuator for VA33	B
270 011 00	Solar adapter	B



EXAMPLES



Solar thermal potable water system



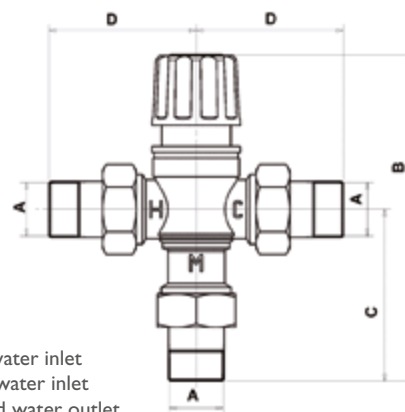
Thermosiphon system

MA10/MA25 DHW thermostatic mixing valve

For installation into hot water circuits as scald protection

The thermostatic mixing valve MA10/MA25 is used for limiting the hot water temperature, e.g. in thermosiphon systems or in solar potable water systems.

- No auxiliary electric energy required
- Continuously adjustable between 35 ... 65 °C
- Installation in the hot water flow, in systems with stub or circulation pipes
- Screwed or soldered connections possible
- Any installation position possible



MA	10*	10	25*	25
A	R ¾"	R 1"	R 1"	R 1 ¼"
B	149 mm	115 mm	161 mm	121.5 mm
C	81.5 mm	47.5 mm	89.5 mm	50 mm
D	70 mm	36 mm	78 mm	38.5 mm

* Dimensions incl. reducing bushes

TECHNICAL DATA

Housing: dezincification-resistant brass

Guide component: PTFE

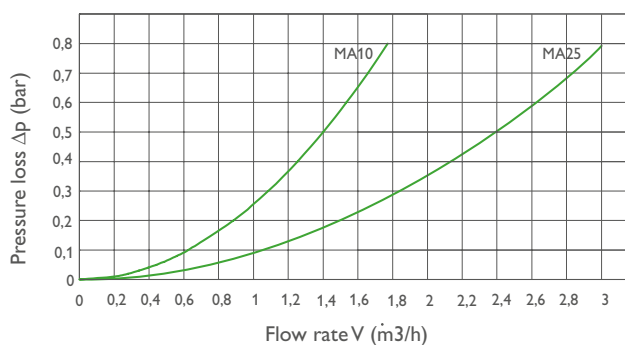
Internal seal: EPDM

External seal: asbestos-free, flat-sealing

Operating pressure: max. 10 bar

Max. temperature hot water inlet: max. 90 °C

Adjustment range mixed water outlet: 35 ... 65 °C



Article no.	Article	Price bracket
280 013 40	MA10 thermostatic mixing valve, ET R 1"	B
280 015 50	MA25 thermostatic mixing valve, ET R 1 ¼"	B

ACCESSORIES



Reducing bushes

Article no.	Article	Price bracket
280 013 50	Reducing bushes ET ¾" – Set of 3 units for MA10	B
280 015 60	Reducing bushes ET 1" – Set of 3 units for MA25	B

Larger quantity? Ask for an offer!



Training / Webinars

To our customers we offer customised trainings on our product portfolio. Our experts will be pleased to advise you in detail and respond to your individual requirements. You can also get an impression of our large laboratory and test fields as well as of our modern production lines.

The trainings take place in Hattingen, Germany, but can also be organised in the form of webinars.

[Contact us!](#)

Programming Service

Upon request RESOL offers a programming service for RESOL system and heating controllers.

Our Technical Support team will parameterise your system scheme on request and send you the SET file with the adjustment values, including an overview of all sensors and actuators used.

The adjustments can easily be transferred to the controller by means of an SD card and the connection be carried out.

The price of the programming service varies according to the time and effort spent.

Please send us a drawing of your system as well as a functional description and we will provide you with a non-binding offer.

[Contact us!](#)

Repair Service

State-of-the-art production lines and a sophisticated quality management guarantee optimum products. Controls after each individual manufacturing step warrant a 100 % quality assurance. The ISO:9001 certification and many awards confirm our way into the future.

However, if a defect occurs, our repair service will assist you and check if you should send us the device.

[The following information is required:](#)

- Device type
- Serial number
- Detailed error description

Defective devices will be repaired reliably and quickly.

We offer a large service package with many advantages:

- Advice by qualified personnel with many years of experience
- Repair of older devices also possible – saves resources and preserves the environment
- High-quality and fast repair using strict test methods
- Detailed error evaluation
- Estimate of costs upon request
- Software updates possible
- Offer of exchange devices during complex repairs

Repair Service Contact

service@resol.de

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Further information can be found at www.resol.com



If you are interested in RESOL products and are based outside Germany, you are welcome to contact RESOL Germany or our local distributors. We will gladly provide you with contact data of further distributors upon request.

In order to strengthen our international sales we are looking for strong partners all over the world who are interested in a long-term cooperation with RESOL.

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E-mail: support@solarnetix.com

Website: www.solarnetix.com

Contact person: Viktor Tchernikov



General Terms and Conditions

I. Scope

1. The following General Terms and Conditions apply to all supplies and services provided by RESOL – Elektronische Regelungen GmbH (referred to hereinafter as "RESOL").
2. Together with these General Terms and Conditions, all transactions are also subject to the supplementary clause "overall reservation of title" of the Central Association of the Electrical and Electronics Industry as amended. Together with these General Terms and Conditions, all foreign transactions are also subject to the interpretation rules of the Incoterms® 2010 on concluding the agreement.
3. Agreements that deviate from, contradict or supplement these general terms and conditions, even if known, are only binding for RESOL if they have been expressly recognised in writing for the relevant RESOL transaction.
4. The text of the currently valid version of these General Terms and Conditions can be downloaded free of charge on the Internet at www.resol.de.

II. Contract conclusion/offer and acceptance

1. Purchase orders/orders (offers) are binding on the purchaser for four weeks counting from receipt by RESOL. Purchase orders/orders become legally binding on being executed by RESOL, otherwise only with the contents of the written order confirmation from RESOL. Verbal agreements or those reached by phone only become part of the contract on being confirmed in writing by RESOL. The same applies to orders through the Internet or E-mail.
2. Cost estimates, drawings, technical documents, suggestions for solving problems and other documents received by the purchaser from RESOL before concluding the contract remain RESOL's property until the contract is concluded. At RESOL's request, these are to be returned to RESOL if no contract is concluded. The documents or parts thereof must not be duplicated in any manner or otherwise made accessible to third parties without explicit consent from RESOL.

III. Prices and conditions of payment

1. Prices are to be understood net "EXW Hattingen, Incoterms® 2010" and do not include packaging, statutory value added tax, freight with transport insurance, customs, postage or any other delivery costs. Deliveries within the EU single market (intra-trading) are only exempt from VAT if the consignee's valid value added tax identification number (VAT ID No.) is stated in the purchase order to RESOL.
2. Payments are due without deduction within 30 days from the date of the invoice. Payments by notes or cheques are ruled out. Punctual payment depends on the date of payment being received by RESOL. In the event of delayed payment, RESOL can claim default interest amounting to nine percentage points above the currently valid base rate. If several due receivables are still outstanding, RESOL is entitled to stipulate which individual invoices will be balanced by the incoming payment. The customer shall receive corresponding notification.
3. If RESOL should receive notification, after written order confirmation, with regard to material financial deterioration on the part of the customer or if there should be other justified doubts as to the customer's creditworthiness, RESOL is entitled to proceed with deliveries only against collateral security or prepayment. If the customer is in arrears, RESOL can postpone further deliveries and services until payment of the outstanding receivables, unless the customer makes prepayment.
4. RESOL reserves the right to make deliveries against prepayment in individual cases.
5. The purchaser is only entitled to offset with counter claims or withhold payments in cases that are undisputed or have been finally and conclusively established.

IV. Delivery and passage of risk

1. The goods shall be dispatched at the customer's risk, even if the freight order is issued by RESOL and at RESOL's costs. Fixed delivery deadlines are only binding if agreed by contract or confirmed by RESOL. A delivery is deemed to be punctual according to the point in time of handing the goods over to the forwarder or another company entrusted with transport/shipping.
2. Packaging is charged at cost price. On request, RESOL ships goods in environment-friendly returnable boxes, whereby return of the boxes must be free of charge for RESOL.

V. Reservation of title

1. RESOL reserves title of ownership to all delivered goods until complete payment of all invoices arising from the business relationship with the customer. This also applies when the purchase price has been paid for certain deliveries of goods determined by the customer, as the reservation of title acts as security for all RESOL's balance claims.
Processing of goods supplied by and still owned by RESOL shall always take place on behalf of RESOL without resulting in any obligations for RESOL. If the goods belonging to RESOL are mixed, blended or combined with other items, the customer already assigns resulting ownership or co-ownership rights to the new item to RESOL at this point in time and shall keep the item for RESOL with all due care. The customer is only allowed to resell the goods owned by RESOL in the course of regular business transactions insofar as the customer is not in arrears with payments.

2. The customer is not allowed to assign the goods as security or to pledge or sell them "en bloc" to third parties insofar as this is detrimental to RESOL's reservation of title. On concluding the purchase agreement with RESOL, the customer already assigns to RESOL all claims arising from the resale or claims based on other legal grounds against a purchaser including all ancillary rights as collateral security in the full amount, i.e. not just the proportional value. RESOL accepts such assignment. The customer is still entitled to collect the receivables insofar as the customer is not in arrears with payments to RESOL. If the value of the item acting as security under reservation of title exceeds RESOL's total claim by more than 20 %, RESOL is obliged to make corresponding re-assignment at the customer's request.
3. If RESOL takes goods back at the customer's request without entering into any legal obligation, this shall not constitute withdrawal from the contract. The acceptance of such returned goods is at RESOL's free discretion. Returned goods shall only be accepted if RESOL has issued written consent in advance. The approved return consignment must be made free house, stating the invoice or delivery note number. RESOL shall issue a test report for every return consignment. If the goods are found to be in perfect condition, RESOL shall issue the customer a credit note less 25 % handling fee of the net value of the goods but at least 25.00 €.

VI. Material defects and liability

1. The customer is obliged to inspect the goods delivered by RESOL straightaway for any signs of visible transport damage. Any faults detected on goods receipt shall be reported immediately in writing to RESOL. In the case of justified complaints, RESOL is obliged to proceed with reworking or replacement delivery, at RESOL's choice. If reworking or replacement delivery should be in vain, the customer can only demand redhibitory action; any reduction is excluded. Complaints whose return delivery has to take place free of charge and that require a detailed fault report will be inspected with the results documented in a test report. The customer retains ownership of the part subject to complaint; in the case of unjustified fault complaints, the test report includes an offer to the customer for return delivery free of charge, or scrapping free of charge.
2. Minor changes to the construction, form and design of the delivered goods are permitted and deemed to be contractual insofar as they are not detrimental to the intended purpose, quality and functionality. RESOL products are subject to constant technical progress and on-going development. RESOL therefore reserves the right to make modifications without special notification.
3. If the customer supplies RESOL with parts for the product being produced and supplied by RESOL in execution of an order issued by the customer, RESOL is indemnified from any liability for material defects insofar as the item supplied by RESOL is faulty on account of a fault in the part supplied by the customer. RESOL is not obliged to inspect the part delivered by the customer for execution of the order to see whether it is free of faults and functionally suitable for processing. The same applies to parts delivered to RESOL by third parties by order and for the account of the customer.
4. Any damages claims filed against RESOL for any legal reason whatsoever, also for breach of information, notification and care obligations prior and parallel to the contract and for positive contract violation and tortious action, are excluded insofar as the damage was not caused by wilful intent or gross negligence. The above liability disclaimer does not apply to the lack of properties warranted by RESOL explicitly or in writing and intending to protect the customer precisely from the damage that has occurred. Other claims from the customer on RESOL such as collateral damage, installation costs and lost profits are excluded.
5. RESOL's liability for faulty products pursuant to the product liability law shall not be affected by the above provisions. If RESOL receives third-party claims for damages under the product liability law or other statutory liability provisions or if RESOL suffers damage in any other way (e.g. through re-call actions), the customer shall indemnify RESOL from all third-party action insofar as the damage was caused by a fault for which the customer is accountable.

VII. Place of fulfilment and jurisdiction

The place of fulfilment and jurisdiction for all disputes arising from the contractual relationship between the customer and RESOL shall be RESOL's registered place of business, or the customer's registered place of business at RESOL's choice. The contractual relationships between RESOL and the customer shall be subject to German law.

Version: 02/2020

Note

All data mentioned in this catalogue correspond to the current standard of knowledge during printing, August 2024. The data are correct to the best of our knowledge. As faults can never be excluded, no liability is assumed for incorrect information. Subject to change of product range. The products shown represent some examples – the illustrations may differ from the original product in shape and colour.

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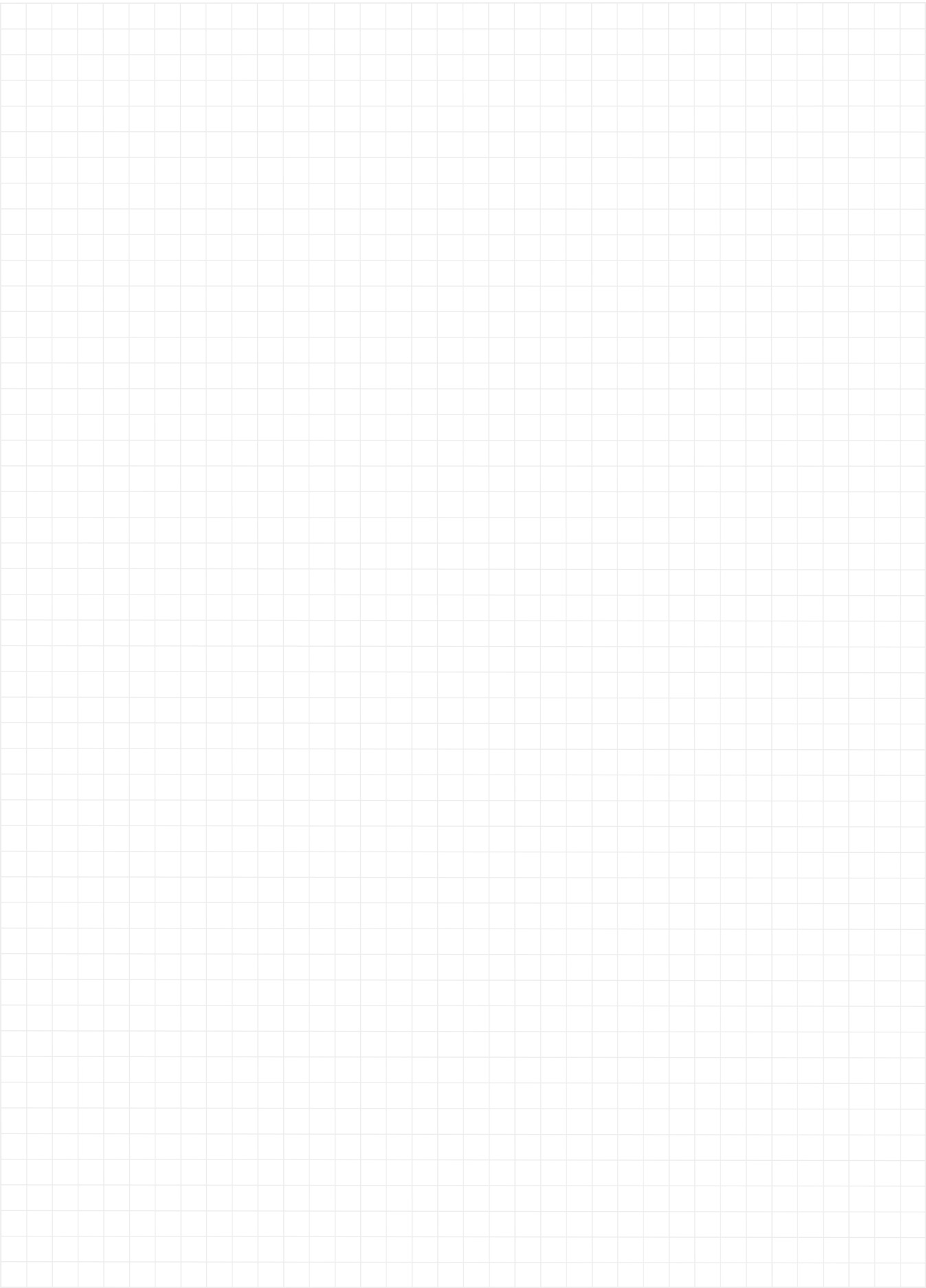
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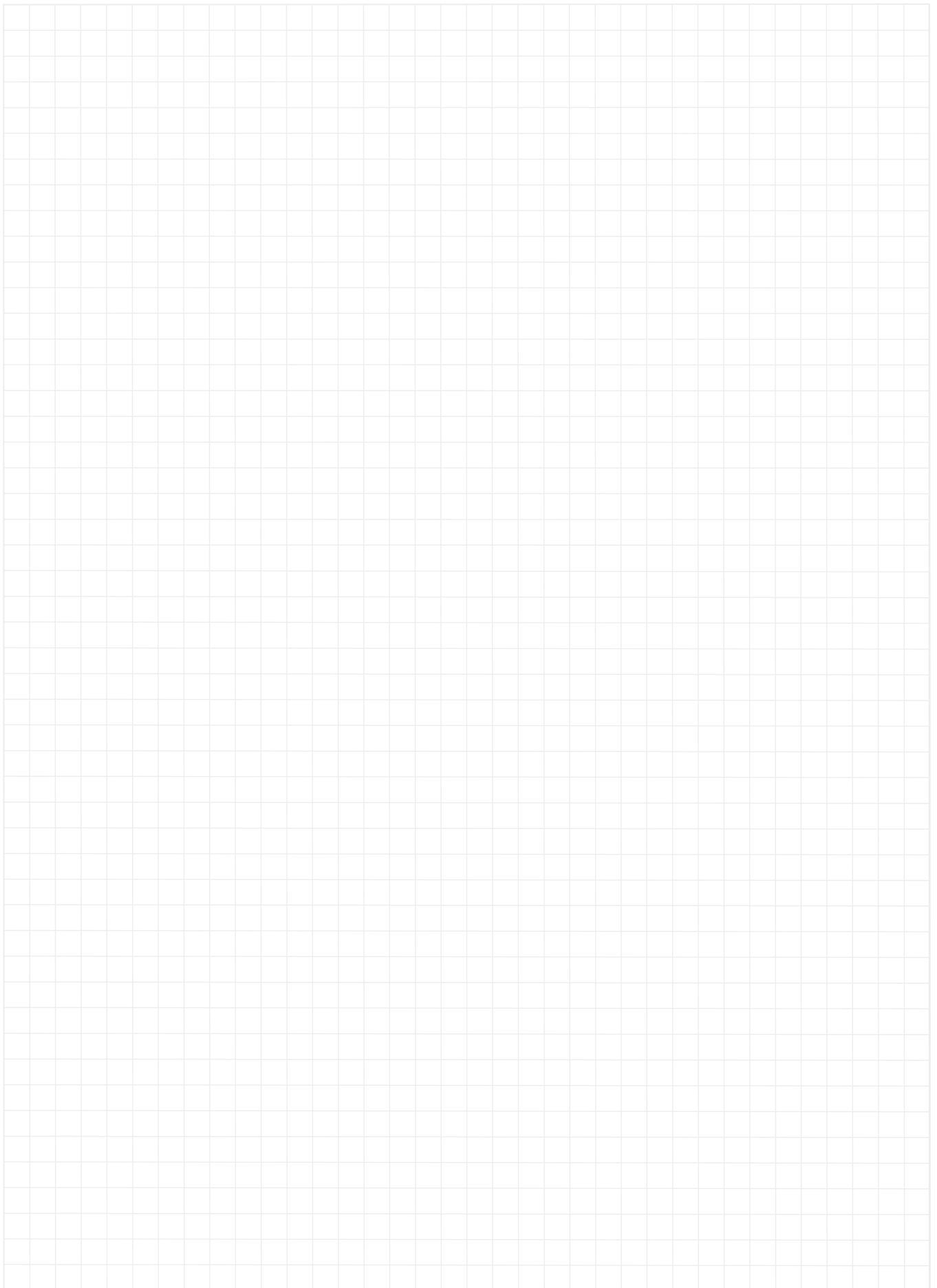
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