Manual
for the assembly and use
of the solar storage tank with
additional heating by the gas
condensing boiler

Regulus®

Thermona®

SOLARTHERM
17 KDZ 25
28 KDZ 25

CONTENTS:

1.USE:

The SOLARTHERM 17, 28 KDZ 25 unit is a modern compact consumer appliance which ensures the heating of premises and, at the same time, the heating of utility water (hereinafter referred to as TUV) using a condensing boiler. The complete set consists of a well-established Therm 17 or 28 KDZ condensing boiler, TUV accumulation storage tank with a volume of 250 l, solar system pumping group, solar regulator, expansion tank, thermostatic mixing valve and all other parts necessary for the correct and problem-free operation of the whole system. The condensing filter ensures the supply of heating water for objects with a thermal loss of up to 17 kW (28kW for version 28 KDZ 25) and, at the same time, it ensures additional heating of the solar accumulation storage tank for TUV at times of insufficient solar energy.

The complete SOLARTHERM compact set is constructed as one unit which significantly simplifies and speeds up the assembly.

2. GENERAL DESCRIPTION OF THE COMPACT SOLARTHERM UNIT

The basis of the set is the THERM 17 or 28 KDZ condensing boiler. The boiler is constructed as a consumer appliance using condensed water steam in the combustion process with high efficiency and minimum emissions into the open air. This ensures economical operation and that no strain is placed on the environment. The output of the boiler can be regulated within the range 20 – 100 % and is automatically adapted to the demands of the object.

Only top components from leading global producers ensure the high technical standard of the boiler. In the upper part of the boiler is a compact condensing body which associates the combustion chamber with the torch and the two-chamber stainless exchanger. The shell of the condensing body consists of an external thermoplastic shell reinforced by an internal stainless wall which significantly restricts the passage of heat into the surroundings. **The heat transfer areas in the exchanger consist of round tubes which must be protected against blocking by dirt from the heating system.** For this reason it is necessary to fit the heating system with a filter on the input for the return water into the boiler. The collector on the output for the heating water from the body is fitted with a de-aerating valve. The removable front wall of the body is fitted with two electrodes (ignition and ionizing), a tube torch and shaped piping for the supply of gas mixture with air. A suitable ratio of gas mixture with air and its mixing is ensured by the mixer in cooperation with a special gas fitting. It consists of gas pressure regulator, two solenoid blocking valves and ratio regulation of the output volume of gas with elements for mechanical setting. **The ratio regulation can be set by using a special device.** The whole system operates so that the volume of added gas is directly proportional to the volume of air through the mixer delivered with the ventilator. Therefore it can be stated that the output on the boiler depends on the volume of the air flow for combustion. As a result, the revolutions of the ventilator are fluently controlled within a wide range which ensures the high output range of the boiler. The supply of air into the ventilator is performed through the shaped piping from the connection system.

The supply of combustion air, including the forced exhaust of burnt gases outside the boiler is, as a rule, ensured by coaxial piping which runs horizontally through the peripheral wall or vertically through the roof construction into the open air. It is necessary to install the piping to prevent (due to the low temperatures of burnt gases) the possibility of the freezing of the exhaust terminal. Vertical piping must terminate at the roof chimney, horizontal with a slight slope into the expiration of the boiler. For these reasons it is necessary to use a smoke collection unit which is exclusively delivered by the producer!

The collection of condensate from the condensation body, exhaust piping for burnt gases and the supply of air are directed by hoses into the odour closure if the condensate flows outside the boiler.

On the input for the returned water from the system is a Grundfos transport pump ensuring the flow of water through the boiler. The sufficient flow of heating water is monitored by the flow switch installed in the multi-purpose GRF 3 collector together with the by-pass, a valve for charging the heating system from the input of the utility water (or outside connection) and the discharging valve. A safety valve is connected to the collector for the over-pressure protection of the boiler.

The boiler part of the equipment in front of the output for the heating water from the boiler is fitted with a motor-driven three-way valve for the division of heating the solar accumulator for hot service water

and heating the heating system.

The control panel is completely plastic. On the front part are the control elements (see instructions for operators). Inside the unit is a single-board DIMS03-TH01 automated system, which contains electric circuits for ignition of the torch and for micro-processor control of the activity of the boiler.

Notification: For the correct functioning of the boiler it is necessary to keep the minimum water pressure in the heating system at 0.8 bar (measured in cold status). If the boiler is connected to the system with an open expansion vessel, it must be at a minimum height of 8 m above the boiler. Otherwise the boiler reports a failure of low pressure of the system and is not able to operate.

Notification: In the case that the temperature of the surrounding environment decreases below freezing point when the system is disconnected, it is necessary to discharge the storage tank for hot service water!

In the lower part of the SOLARTHERM unit there is a 250l solar storage tank. The main part of the heater is a cylindrical storage tank in which the water is heated. In the storage tank are two heating exchangers. The lower heating exchanger is designated for the connection of the primary heat source which is the solar system and the upper, secondary heating exchanger is connected to the heating circuit for the boiler. It is designated for additional heating of the upper part of the storage tank. The anti-corrosion protection of the storage tank is ensured by the enamelled surface and the special ACES electronic anode. This anode consists of a titan core with an active end and is fitted into the plastic cap with a ½" thread. The use of noble metals, activated by a patented process, ensures effective operation and prolongs the service life of the tank. The generator is located in a fireproof box made of Noryl resin.

The compact SOLARTHERM equipment also includes the pump group which ensures the flow of the heating medium in the solar collector circuit - the lower storage tank exchanger. Intelligent control for the pump group is ensured by the built-in SRS 3 solar regulator. The regulator evaluates information about the temperatures in the collector field and in the storage tank and on the basis of calculation it controls the circulating pump of the solar system. The SRS 3 regulator also communicates with the gas condensation boiler and according to request activates or deactivates the boiler.

In addition to the mentioned elements, the SOLARTHERM compact unit is fitted with an expansion tank for the solar system, an expansion tank for the heating system, an expansion tank for the hot service water circuit and, moreover, it is prepared for the simple connection of the hot service water circulation pump. The mounting of all safety elements is a matter of course which includes complex securing of the boiler, safety valves, thermostatic mixing valve on the output for the storage tank, etc.

3. TECHNICAL DATA

	Measuring unit	17 KDZ 25	28 KDZ 25
Consumer appliance category :		I2H	I2H
Type of gas		G20 – natural gas	G20 – natural gas
Nominal thermal input power	kW	16	26,4
Minimum thermal input power	kW	3,3	6,2
Nominal thermal output for heating at Δt = 80/60 °C:	kW	15,7	26
Nominal thermal output for heating at Δt = 50/30 °C:	kW	17	28
Nominal thermal output for heating hot service water	kW	15,7	26
Minimum thermal output at Δt = 50/30 °C	kW	3,5	6,6
Drilling of gas curtain:	mm	4,3	6,5
Overpressure on the consumer appliance input	mbar	20	20
Consumption of gas:	$m^3.h^{-1}$	0,35 -1,7	0,66 - 2,85
Maximum overpressure of the heating system	bar	3	3
Minimum overpressure of the heating system	bar	0,8	0,8
Maximum input pressure of the cold water	bar	6	6
Maximum output temperature of the heating water	°C	80	80
Diameter of the coaxial exhaust of burnt gases	mm	60/100 (80/125)	60/100 (80/125)
Maximum temperature of burnt gases	°C	74	78
Weight of the flow of burnt gases:	$g.s^{-1}$	2,1 - 9,8	3,1 - 14,7
Maximum flow of burnt gases according to CSN 01 16 03	dB	52	52
Efficiency of the boiler	%	98 – 106	98 – 106
Class NOx of the boiler		5	5
Nominal supply voltage / frequency	V / Hz	230 / 50	230 / 50
Nominal electric input power	W	175	175
Nominal current for the boiler fuse	A	2	2
Level of the coverage of the electrical part		IP 41 (D)	IP 41 (D)
Environment according to CSN 33 20 00 – 3		basic AA5/AB5	basic AA5/AB5
Volume of the expansion tank for the heating system	l	7	7
Filling over-pressure of the expansion vessel for the heating system	bar	1	1
Volume of the storage tank for hot service water	l	250	250
Flow of off-take hot service water (D – according to CSN EN 625):	$1.m^{-1}$	14,2	15,8
Volume of the expansion tank for the solar system	l	12	12
Maximum over-pressure of the solar system	bar	6	6
Volume of expansion tank for hot service water	l	12	12
Dimensions of equipment height/width/depth	mm	1970/715/705	1970/715/705
Weight of equipment	kg	179	182

4. PRODUCTION INSPECTION

All parts of the consumer appliance are checked and adjusted before completion by the producer. Each boiler is tested for tightness of the water circuit, tightness of the gas circuit and tightness of the solar circuit. At the same time the activity of regulation and safety elements is checked and adjusted.

5. BASIC INSTRUCTIONS FOR EQUIPMENT ASSEMBLY

Assembly must only be performed by a qualified professional company and it is necessary to pay attention to all advice and notifications contained in this manual. Assembly must be performed in accordance with valid standards and regulations – see: CSN EN 1775, CSN 33 20 00 – 7 – 701, CSN 06 1008, CSN 73 4201, TPG 704 01 and TPG 905 02.

Prior to installation the assembly company is obliged to inspect the correct choice of the type of boiler concerning the functional properties and required parameters, including the type of fuel. At the same time, it is necessary to check the marking on the package so that the delivered consumer appliance corresponds to the ordered type. After unpacking it is necessary to inspect the correctness and completeness of the delivery. In the case of any doubt, then prior to assembly, inform the producer or the supplier.

• LOCATION OF EQUIPMENT

The compact SOLARTHERM 17, 28 KDZ 25 unit can be located inside or outside the interior. The consumer appliance has coverage of electric parts IP 41 (D). Location in premises with a bath or a shower and washing premises must be in accordance with CSN 33 2000 - 7 - 701.

The room in which the boiler is located must be according to CSN 33 2000 – 3: a basic environment protected against frost with an ambient temperature of air within the range +5 do +35 °C and relative moisture up to 80%.

Near the contour of the boiler there must not be items pursuant to CSN EN 13501-1 within a lower distance than:
100 mm made of hard-flammable or medium flammable items
200 mm light-flammable substance (e.g. wooden-fibre boards, cellulose substance, polyurethane, polystyrene, polyethylene, PVC etc.)

Notification:

Items from flammable substances must not be placed on thermal equipment and at a distance lower than its safe distance (the minimum distance of a consumer appliance from flammable substances in the direction of the main radiation is 50 mm and in other directions is 10 mm).

Before starting any work which may result in a change of the environment in the area of the installed boiler (e.g. work with coating substances, glue, etc.) it is necessary to disconnect the boiler by the switch for operation (position of the indicator on the left).

Before installation of the boiler it is necessary to ensure that the selected area corresponds to the requirements for the location of the exhaust of burnt gases and that the minimum distances mentioned in previous chapters are fulfilled.

The whole consumer appliance is designed in terms of construction as stationary. Due to the weight it is placed on the floor with a sufficient load-bearing capacity and ceiling construction. The consumer appliance includes special adjusting units, which ensure stability by simple adjustment.

• CONNECTION (OF BOILER PART) TO THE HEATING SYSTEM

As it concerns a hot water flow boiler which is fitted with its own pump, it is possible to connect it to the existing system, as well as to the new systems designated for the forced circulation of water in the heating system. The design of the heating system must be resolved in relation to the hydraulic index calculations of the heating system related to the total transmitted outputs. Due to the economical use of the condensing regime it is recommended to design the heating system for low temperatures (Δt = 50/30 °C). For use of the maximum output of the exchanger, it is necessary to ensure the minimum overpressure of the heating system at 0.8 bars to keep the correct function and long service life.

Before connection of the boiler part of SOLARTHERM, it is necessary to flush the heating system to remove any minor dirt and sludge which could consequently be deposited in the exchanger and devalue its position. The heating system **must** be equipped with a suitable filter or de-sludger (e.g. Spirovent kal) and must be performed in accordance with:

CSN 06 0310 – Design and assembly of central heating
CSN 06 0830 – Protection system for central heating and heating utility water

The built-in expansion tank enables to connect the boiler to the closed heating system, The necessary expansion volume for the respective system must be stated according to ČSN 06 0830 by calculation from the formula:

$$V_c = V \cdot \Delta_v \cdot 1{,}3$$

V_c expansion volume (m³)
V volume of water in the heating system (m³)
Δ_v relative increase of the volume during heating to t_m (při t_m = 80 °C is Δ_v = 0.029)

The calculated expansion volume of the tank is the minimum volume. If the calculated expansion volume of the tank is higher than the volume of the expansion vessel in the boiler, it is necessary to install another expansion tank into the heating system.

• COLLECTION OF CONDENSATE

SOLARTHERM is fitted with an odour closure (siphon), which must be flooded before running the boiler with about 100 ml of water. Firstly, it is necessary to connect neutralizing equipment to the outlet for the condensate and then to discharge the condensate to the sewerage piping. The discharging of the condensate into the sewerage piping is governed by national or regional (local) regulations.

The discharge piping must have a minimum declination of 5° from the boiler into the sewerage piping and must not be blocked (in the case of blocking the collection of condensate there is flooding of the combustion chamber of the boiler).

Analysis of the condensate:

Index	Specific unit	Value
pH	mg.l⁻¹	3
Nitrites	mg.l⁻¹	0,06
Copper (Cu)	mg.l⁻¹	0,2
Lead (Pb)	mg.l⁻¹	065
Cadmium (Cd)	mg.l⁻¹	1,25
Zinc (Zn)	mg.l⁻¹	2,1

• CONNECTION TO THE DISTRIBUTION OF UTILITY WATER

The water supply must be connected according to CSN 06 08 30 – securing equipment for central heating and the heating of service water with all required fittings.

The quality of water in the circuit of hot service water has a significant influence on the possibility to block an indirect insert of the storage tank for hot service water. Therefore, quality parameters must be fulfilled according to the Regulation of the Ministry of Health 376/2000 Coll., (drinking water) mainly in

indicators of hardness (sum of material concentrations of calcium and magnesium < 2.5 mmol/l). In the case of debt or unverified parameters (own wells) we recommend to use the automatic dosing of equipment for the treatment of water.

Cold water is connected to the input marked with the text „INPUT FOR HOT SERVICE WATER". Each hot service water heater must be fitted with a safety valve for operation. This valve is standard equipment of the compact SOLARTHERM unit. It is necessary to inspect the valve before each commissioning. The valve is inspected by manually separating the of membrane from the seat of the valve. The correct function of the separating device is reflected by the discharge of water through the discharge tube of the safety valve.

When filling the storage tank there is the expansion of hot service water. Due to the prevention of redundant water losses caused by the dropping of the safety valve during the heating of the storage tank, SOLARTHERM is fitted with an expansion vessel in the hot service water circuit. The mentioned expansion vessel levels the expansion of the volume of water during heating and, at the same time, it restricts the pressure shocks which originate during the use of level taps.

In the case that in the supply piping (even only temporarily) there is greater pressure than 0.6 MPa a reduction valve must be installed in front of the storage tank. For the correct s**etting of the reduction valve** we recommend that the pressure in the tank was **lower by 20% than the opening over-pressure of the safety valve** (i.e. 0.48 MPa).

Hot service water is connected to the outlet indicated with the text „OUTPUT FOR HOT SERVICE WATER". At the same time, the SOLARTHERM unit is prepared for the connection of the circulating pump for hot service water. For the fixation of the circulation pump a special holder can be used (see Fig. below). The circulation pump can only be used in objects which already have circulation piping!

Circulation pump holder
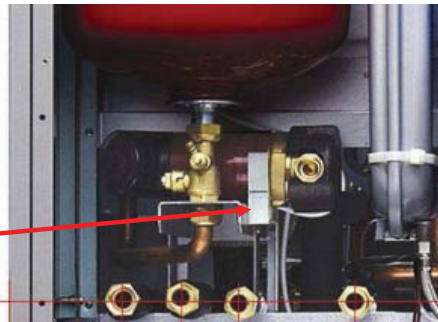
• **ANTI-CORROSION ELECTRONIC SYSTEM**

Enameled surface and a special electronic anode rod, ACES, provide anticorrosion protection for the storage tank.

The anode consists of a titanium core with an activated tip, fitted to a 1/2" threaded plastic sleeve. The use of noble metals, activated by a patented process, guarantees efficient operation and prolongs the service life of the tank. The generator is housed in a fireproof, heat-resistant casing in Noryl resin.

ACES offers a wide range of unique functions:

a) Active protection by means of electric current from an external source.

b) A high degree of operation flexibility: the system adapts itself to changes in the condition of the inner layer
    and to water quality through an automatic control of the el. current intensity.

c) Permanent protection, no regular checks and/or maintenance needed.

d) ACES protects boilers and water heaters against corrosion, saving thus costs and time.

Technical Specification

	ACES
el. protection	IP 55
operating temperature	0-40°C
power supply cable	with flag plug (length 1.9 m)
low/tension output cable	with faston connector (length 1.9
anode holder	UNI-ISO 7/1-R1/2"
anode	3 mm diam. in treated titanium
L/I: length of anode	200/250 or 350/250
power supply	230V ± 10% - 50/60Hz
max. output tension	18V
maximum output current	0.18A
max. power consumption	2.5W
overall dimensions of generator	60x52x45mm
weight	÷ 0.4kg

Description
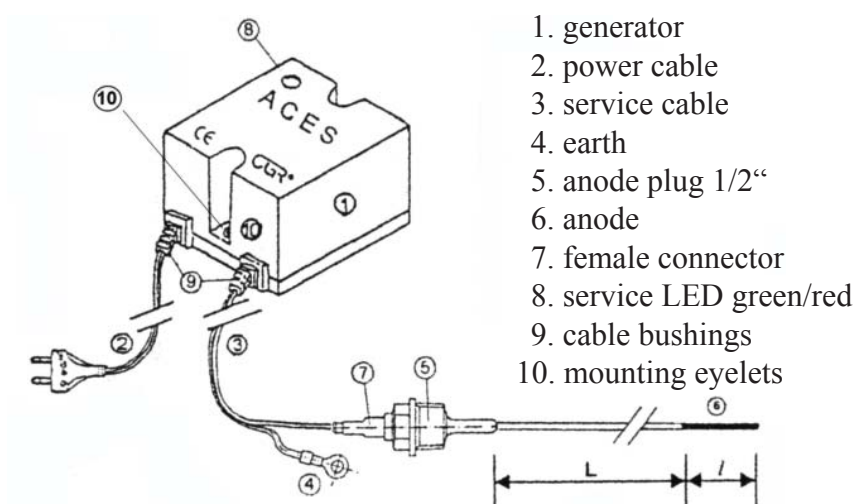
1. generator
2. power cable
3. service cable
4. earth
5. anode plug 1/2"
6. anode
7. female connector
8. service LED green/red
9. cable bushings
10. mounting eyelets

Installation and Operation

A LED positioned on the front of the casing indicates the conditions of the device: green light means that it is in perfect working conditions. The red light means a defect and it is necessary to unplug power supply cable. If the tank is empty, it shall be replenished with water or the anode repositioned. The anode must not touch any metal part of the tank as it could cause short circuit and subsequent damage to the device. It is recommended to place the active section of the anode (the dark one) into the geometric center of a tank. No anode cleaning is permitted as it might get damaged.

When installing an anode rod, its proper polarity must be maintained: the cable with the female connector shall be connected to the anode (+) while the cable with the eyelet shall be connected to the tank ground (-).

Failure to respect the above described wiring will make the warranty null and void.

• CONNECTION TO GAS

Connection of the compact SOLARTHERM unit to gas must always be carried out by an authorized company in accordance with Regulation CUBP and CBU 21/1979 Coll.(as amended by Regulation No. 554/1990 Coll.) by employees with qualified according to Regulation FMPE 175/1975 Coll. (as amended by FMPE Regulation 18/1986 Coll.) and according to the approved documentation for gas installation. It is not necessary to place the gas regulator before the consumer appliance. It is contained in the associated gas fitting which is part of the unit. On the input for the gas into the consumer appliance there must be a ball valve

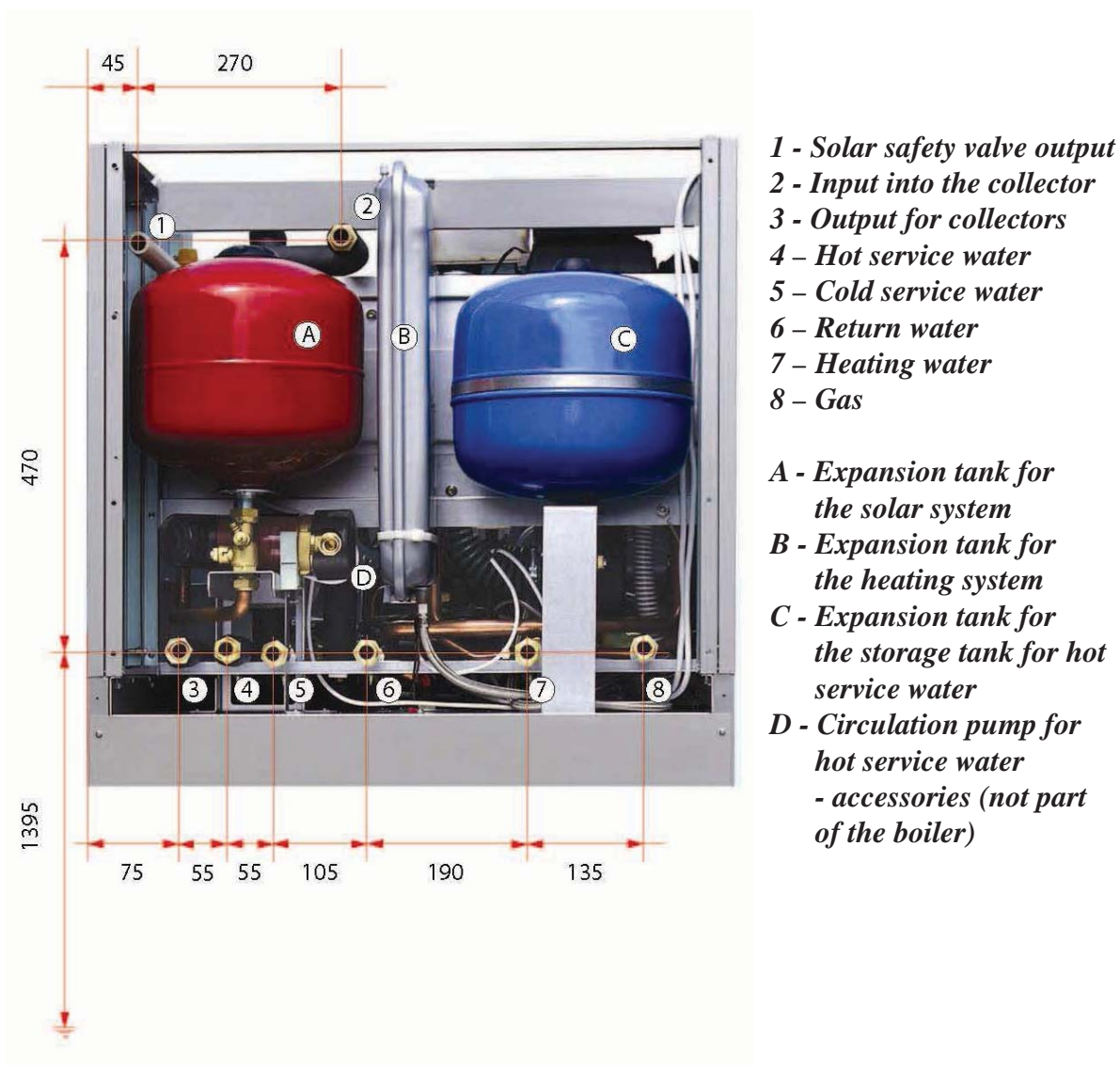with the respective attestation for gas. The gas closure must be accessible.

SOLARTHERM 17, 28 KDZ 25 is designated for the operation of natural gas with caloric capacity from 9 to 10.5 kWh/m^3 and nominal pressure in the distribution network of 20 mbar.

## • CONNECTION TO THE ELECTRICITY NETWORK

The device is equipped with a movable connection with a fork. It is connected to the socket installed near the device so that the network fork is accessible after installation pursuant to **CSN EN 60 335-1**. The socket must fulfil **CSN 33 2180 and CSN 33 2000-4-46**. The network voltage must be 230 V ±10%. The socket installation, connection of the spatial thermostat, solar system sensors or THERM Q01 outside temperature sensors for equithermal regulation and service for the electric part of the boiler must be carried out by a person with the respective professional electrotechnical qualification according to **Regulation No. 50/1978 Coll.**

• CONNECTION TO THE SOLAR CIRCUIT

The compact SOLARTHERM unit is ready for connection to the solar circuit for the additional preparation of hot service water. The boiler heats the upper part of the built-in storage tank (about 125l). In the rear part of the unit (see Fig. – Positions 2 and 3) there is an inlet and outlet for the connection of SOLAR-THERM and solar collectors.

1 - Solar safety valve output
2 - Input into the collector
3 - Output for collectors
4 – Hot service water
5 – Cold service water
6 – Return water
7 – Heating water
8 – Gas

A - Expansion tank for the solar system
B - Expansion tank for the heating system
C - Expansion tank for the storage tank for hot service water
D - Circulation pump for hot service water
    - accessories (not part of the boiler)

The compact SOLARTHERM unit is fitted in a standard manner with the SOLAR 1 pump group. The pump unit is fitted with a circulation pump for the solar circuit, safety valve, flow meter, pressure meter, thermometer and a charging and discharging ball valve. Due to minimising thermal losses, the pump group is built into the insulating box. The box is equipped with the holder for fixation of the unit and the groove for the cable. A special window enables to read and regulate the flow without the necessity of removing the cap.
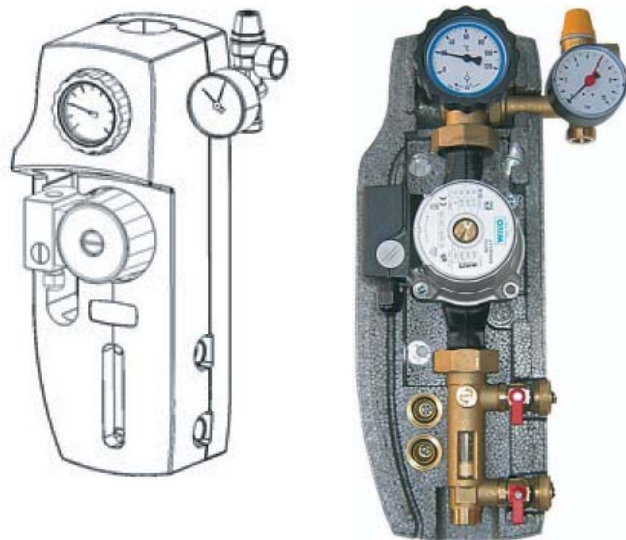
Pump station SOLARTHERM - description:
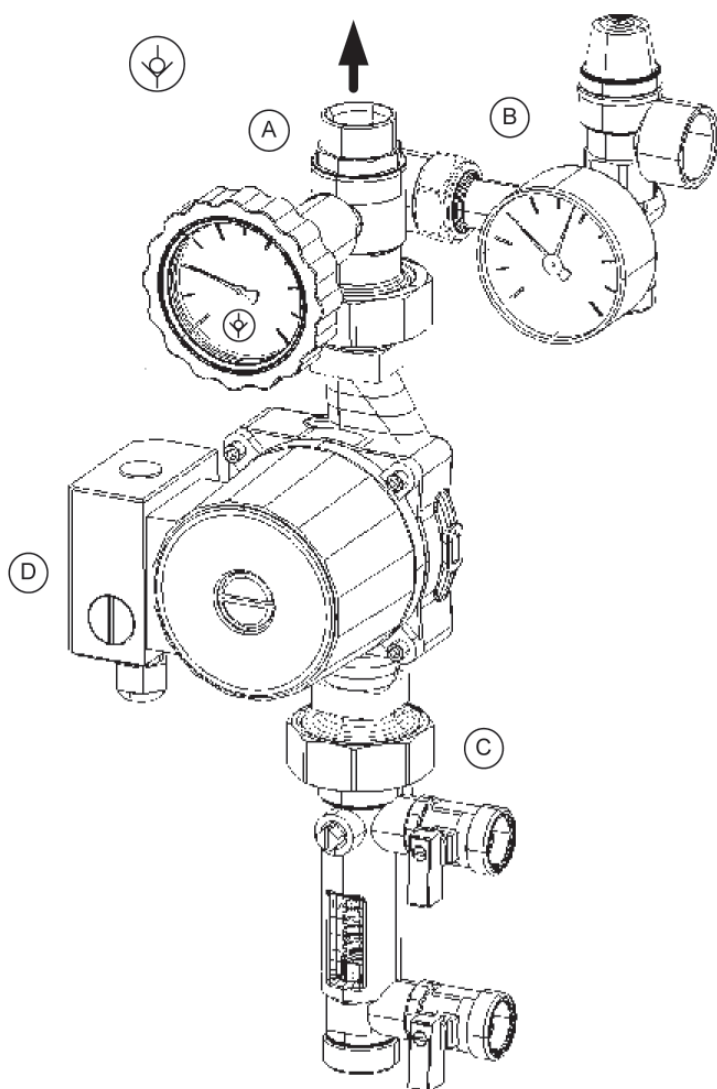
Legend:

(A) Ball valve on the return line (thermometer with a blue ring and scale 0-120°C) with "Solar" check valve.

Solar Check Valve

It is included in the ball valve in the return line. It ensures the seal and low head losses. To exclude the check valve, for instance in case of emptying, rotate the handle by 45° clockwise.

(B) Safety Unit

The security unit, approved according to CE and TÜV, protects the installation from overpressures. It is equipped with a 6bar safety valve. It is also provided with a manometer and with a connection to the expansion vessel with a ¾" thread.

(C) Flowmeter

The flowmeter allows to regulate the flow rate depending on the capacity of the installation, by a 3-way valve. The flow rate is measured and shown by a special sliding cursor.
Further it enables the following actions to be taken: system filling - draining - flushing.
Two flowmeters are available with a different range of measurement: 2-12 l/min and 8-28 l/min.

(D) Circulation pump

Three-speed circulation pump with manual regulation. Thanks to the seal of the ball valves before and after the circulating pump, it can be removed without emptying the installation.
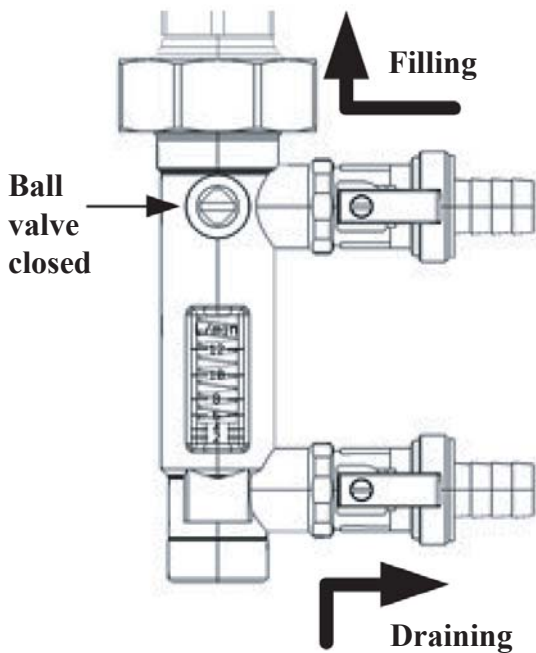
Filling the installation:

- Attach the filling hose to the filling valve and open it completely.
- Attach the return hose to the drain valve and open it completely.
- Turn the groove on the flowmeter's adjustment screw into a horizontal position. The integrated ball valve will close.
- Pour sufficient solar liquid into the filling station tank (not included in the delivery) and fill the solar system.
- Flush the solar system using the filling station for at least 15 min. In order to remove air from the system completely, open shortly the regulation screw on the flowmeter (groove vertically).

Filling

Ball valve closed

Draining

Do not flush the system with water. Since it mostly does not get completely empty, there is a risk of frost damage.

- With the filling pump running, open the drain valve and increase the pressure to approx. 5.5 bar. This value can be read on the manometer.
- Close the filling valve and turn off the filling pump, open the regulation screw on the flowmeter (groove vertically).
- Air bleed the system above collectors until bubble-free solar liquid starts flowing out. Then increase the pressure to approx. 5 bar again and check the system for leaks.
- Adjust the working pressure as given by the collector manufacturer.
- Turn on the circulation pump at its highest speed (see its Instruction Manual) and let circulate for at least 15 min.
- Then air bleed the system and set the pump to the desired speed.

Commissioning the solar circuit:

Circulation

Ball valve open
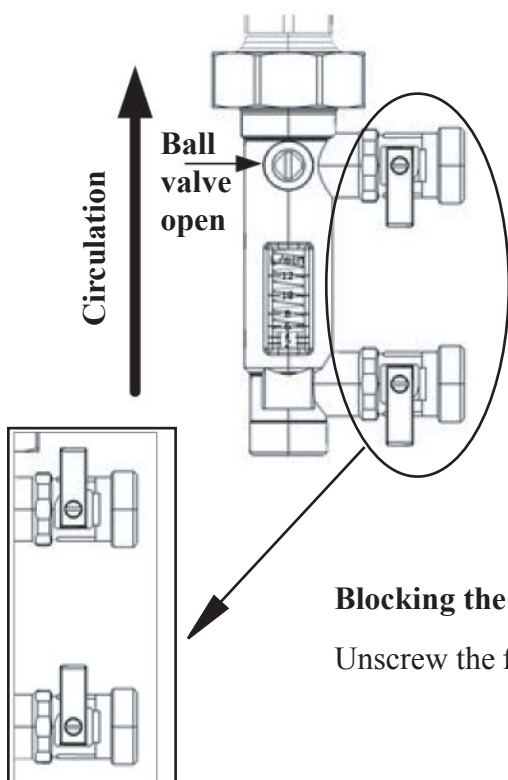
- Set a suitable flow rate by the flowmeter according to the data supplied by the collector manufacturer (1-2 l/min. for each flat solar collector).
- Remove the filling station hoses and screw caps on both the filling and drain valves.
- Test the system for leaks once again.

Blocking the filling/drain levers:

Unscrew the fixing screw, take out the lever and place it back turning it by 180°.

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Setting the flow rate:
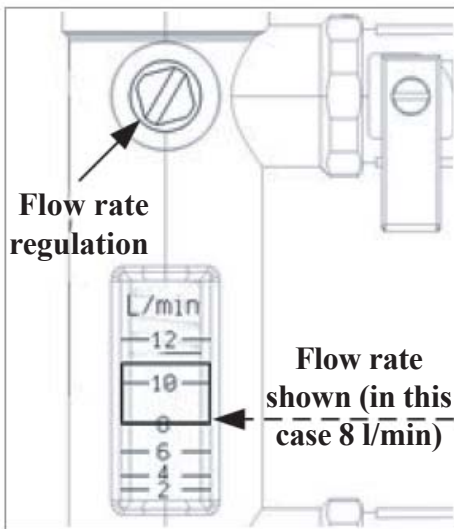
Regulate the flow rate using the regulation element on the ball valve until the right flow rate is shown.

N.B.
The flow rate is shown taking as reference the lower edge of the sliding cursor. (see pic.)

Flow rate regulation

Flow rate shown (in this case 8 l/min)

Complete information about assembly, connection and running the solar systems can be found in the specific manuals!

• EXHAUSTION OF BURNT GASES

The boiler part of the equipment must be installed only with accessories (piping for the supply of the combustion air and exhaust of burnt gases, including termination, semi-pieces, knee) which is designated for this purpose by the producer. These components are delivered independently depending on the type and the specific condition of the installation and without their use the boiler part of the consumer appliance must not be commissioned.

Requirements for termination of the exhaustion of burnt gases from consumer appliances with the torch with the forced supply of combustion air and with the forced exhaust is governed by technical rule **TPG - 800 01** and the standard **CSN 73 42 01**, or the connection to the chimney according to **TPG – 941 01**. The actual exhausting of burnt gases must be designed and prepared in the project for the connection of the boiler while respecting the rules for the possible collection of the condensate. The horizontal piping is necessary to install with the slope 2° from the terminal in the direction of the boiler to prevent the discharge of the condensate from the terminal unit of the exhaust into the open air.

The maximum pressure loss of the exhaust system of burnt gases and the supply of the combustion air is 80 Pa.

Lengths of exhaustion of burnt gases permitted by the producer:

Coaxial system 60/100:
Horizontal piping: The minimum length is 1 meter, the maximum is: 17 KDZ 25 - <u>4 metres</u>,
28 KDZ 25 - <u>3 metres</u> – measured from the knee on the boilerafter termination on the facade. Each other 90° knee shortens this length by 0.75 m and the 45° knee by 0.5 m.

Vertical piping: The minimum length is 1 meter, the maximum is: 17 KDZ 25 – <u>3.7 metres</u>,
28 KDZ 25 – <u>2.7 metres</u> – measured from the boiler to the upper edge of the roof adapter. Each other 90° knee shortens this length by 0.75 m and the 45° knee by 0.5m.

Coaxial system 80/125:
Horizontal piping: The minimum length is 1 meter, the maximum is: 17 KDZ 25 – <u>15 metres</u>,
28 KDZ 25 - <u>14 metres</u> – measured from the knee on the boilerafter termination on the facade. Each other 90° knee shortens this length by 0.75 m and the 45° knee by 0.5 m.

Vertical piping: The minimum length is 1 meter, the maximum is: 17 KDZ 25 – <u>15 metres</u>,
28 KDZ 25 – <u>14 metres</u> – measured from the boiler to the upper edge of the roof adapter. Each other 90° knee shortens this length by 0.75 m and the 45° knee by 0.5m.

Separated system 2 x 80:

When using divided and separated piping for the exhaustion of burnt gases and a supply of combustion air with Ø 80 mm, including termination, the piping can have the length: **17 KDZ 25 - <u>max. 2 x 13 metres</u>,**
**28 KDZ 25 - <u>max. 2 x 12 metres</u>.**

Reading the equivalent lengths of knees remains valid.

• EXHAUSTION OF BURNT GASES

When filling the heating system the consumer appliance must be disconnected from the electricity network by disconnecting the forks from the socket. The filling pressure at the cold system must be 1 to 1.5 bar. The fulfilment must run slowly to be able to perform a slight air escape through the respective de-aerating valves. The water for the first filling and additional filling must be, according to **CSN 07 7401**, clear without colour, without the suspended material, oil and chemically aggressive impurities, must not be acid (pH lower than 7), with minimum carbonaceous hardness (max. 3.5 mval/l). In the case of not keeping to the stated requirements, the pump or the exchanger or other components of the machine can be damaged.

The producer is not liable for such damaged components, i.e. blocking of the exchanger and in this case no warranty can be applied!

After filling the heating system the **built-in filling valve** can be used. After filling to the required pressure (the pressure in the system can be monitored on the manometer integrated in the control panel) it is necessary to close the valve again!
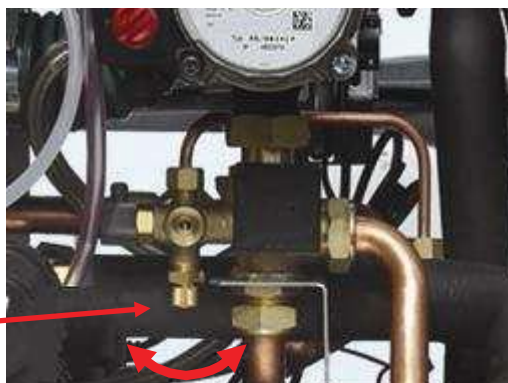
Valve for filling the heating circuit

• SELECTION OF REGULATING AND CONTROL ELEMENTS

The boiler part of the equipment is fitted with standard and above-standard regulation and safety elements as evident from the electrical diagrams. For the further expansion of regulation it is possible to use regulation according to the spatial temperature in the selected reference room or equitherm (regulation according to the outside temperature) regulation of heated water or also combined regulation.

For control according to the spatial temperature there is a wide range of thermostats at the producer: for example Honeywell CM 707, CM 907, or Electrobock PT 10, PT 21, PT 30, BPT 30 and others. For beneficial equithermal regulation the Thermona company delivers the THERM Q01outside sensor.

For high-quality regulation it is possible to use the intelligent programmable regulator Honeywell CR04, THERM RC 03, or regulator PT59, which using interface IU02 communicates with the microprocessor of the boiler automated system. There is the transfer of information not only about the required temperature of the heating system depending on the spatial and outside temperature, but also the display of operating information about the boiler (work regime, performance, temperatures, possible failures, etc.). This system is characterized by many adjustable and displayed parameters for optimal control of the heating equipment with modulation of the boiler output

Recommendation:

We recommend controlling the operation of the separate boiler (without the option of equithermal regulation) at least by using a simple spatial thermostat. The spatial temperature is time stable and keeps the boiler in longer operating regimes. The setting of the boiler thermostat is recommended in transient periods (autumn, spring) at 60°C, in winter periods up to 80°C. It is recommended to use the built-in possibilities of equithermal regulation either independently or completed by a spatial thermostat, as mentioned below.

The mentioned additional regulations **are not included in the delivery** of the boiler!

• COMMISSIONING

! The equipment (in particular the boiler part) must only be commissioned by a service technician authorised by the producer!

Before the first ignition of the boiler it is necessary to take the following measures:
♦   check that the heating system is filled with water and that the boiler is correctly de-aerated
♦   make sure that all valves (e.g. heating and return water) are opened
♦   open the gas valve and test the tightness of the gas distribution in the boiler.

The procedure for the first ignition of the boiler is as follows:
♦   set the output temperature knob to the maximum
♦   insert the network supply into the socket and activate the boiler by the operating regime switch
♦   the boiler automatically ignites with a short turn of the operating regime switch into the position for unblocking the failure (when the gas inlet is de-aerated)
♦   adjust the combustion of the boiler by means of an analysis of burnt gases
♦   inspect the correct activity of all safety thermostats and control elements
♦   Inspect the setting of the output range of the boiler or modify the setting according to the demands of the heated object

Notification:
*The setting of the output range of the boiler and the other parameters must be in accordance with the technological data. **Any overloading and incorrect use of the boiler may cause the devaluation of its components The warranty cannot be applied for such damaged components.***
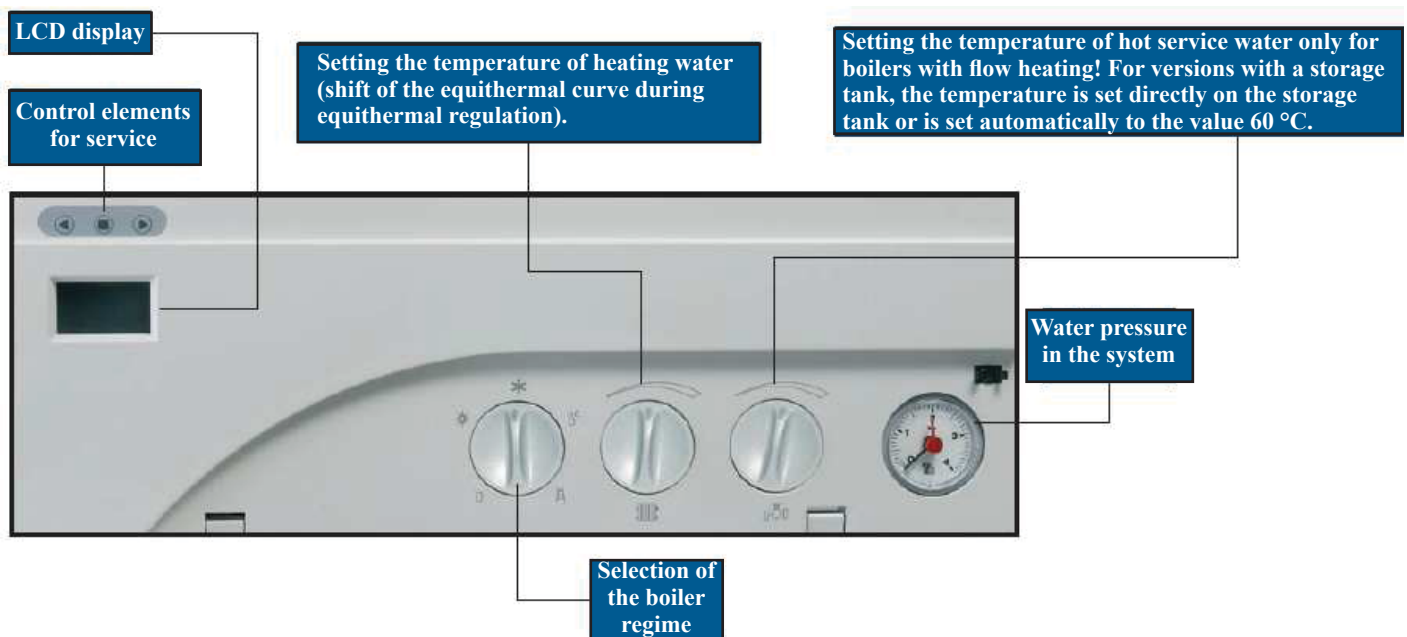
• DISCONNECTION OF EQUIPMENT FROM OPERATION

It is possible to disconnect the boiler part for a shorter period by the operating regime switch or the switch on the spatial thermostat. For the long-term disconnection of the boiler it is recommended to close the gas valve. In the case of the disconnection of equipment in the winter period, it is necessary to discharge the storage tank.

# 6. REGULATIONS FOR OPERATION AND MAINTENANCE – BOILER PART

• OPERATION OF THE BOILER

Only persons older than 18 years may operate the boiler.

LCD display

Control elements for service

Setting the temperature of heating water (shift of the equithermal curve during equithermal regulation).

Setting the temperature of hot service water only for boilers with flow heating! For versions with a storage tank, the temperature is set directly on the storage tank or is set automatically to the value 60 °C.

Water pressure in the system

Selection of the boiler regime

♦ **Service buttons** – are designated for diagnostics and setting the parameters of the boiler.

♦ **Setting the heating temperature** – rotary knob for the user setting on the output temperature of the water in the heating system within the range 30 – 80°C. In the case of selected equithermal regulation the shift of heating curve is set (within the range ± 15°C from equithermal curve).

♦ **Setting the temperature of hot service water** – rotary knob for the user setting of the requested temperature of hot service water (35 – 60°C, only for "KDC" boilers with a flow heater for hot service water).

♦ **Pressure meter** – displays the water pressure in the heating system.

♦ **Switch for operating regimes** – has the following regimes:

0   Disconnection of the boiler (regime)

❄   Summer operation (only heating of service water is active, the heating is disconnected)

✳   Winter operation (heating of premises and service water is active)

💧   Unblocking of the failure status of the boiler

🪜   Service mode (so called function sweeper), (the heating is active to maximum output and the maximum temperature). This regime serves only for service measurement at the maximum output of the boiler (emissions, temperature of burnt gases, etc.).

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♦ **LCD display:**
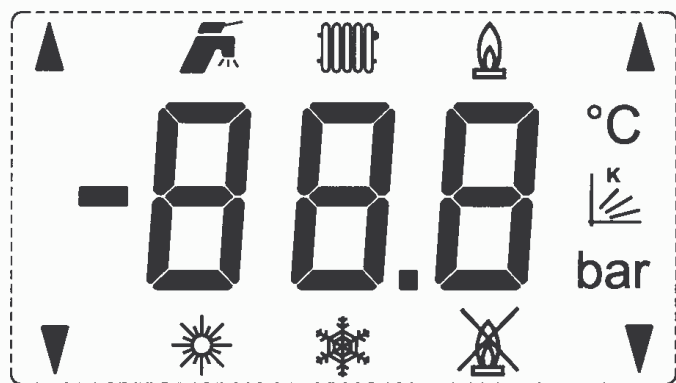
Definition of symbols used:

-88.8   - numeric display of temperatures, failure statuses and service values

🚿   - symbol of the hot service water regime (displayed temperature of the service water)

♨   - symbol of the heating regime (displayed temperature of heating)

♨   - symbol for burning of the boiler

°C   - symbol of displayed value of temperature

⚞   - symbol of the displayed value of the "K" factor (equitherm regime)

☀   - symbol of selected "summer mode"

❄   - symbol of selected "winter mode"

⚠   - symbol of the failure of the ignition of the boiler

▼▲   - symbols for indication of communication with the connected interface (IU02, IU04.10, IU05)

Indication of set temperature:

When turning the wheel for setting the temperature of the heating system or hot service water, the respective regime symbols start to flash and numerically display the temperature. In this case the value of the adjusted temperature is indicated. After termination of the setting, the indication of the adjusted temperature will continue for a time of about 5 seconds. With the consequent display of the numeric value and the symbol, the real temperature of the respective regime is indicated.

Indication of failures or exceeding operating values:

Displayed on the LCD display by the symbol "E" and the code for the failure according to the table

Failure code	Definition
E01	failure of the ignition of the boiler
E02	insufficient flow of heating water (between repeated attempts)
E03	-
E04	damaged sensor of the heating water
E05	damaged sensor of hot service water (only for "KDC" boilers)
E06	failure of exceeding the limit of the temperature of the heating water (blocking thermostat)
E07	damaged outside temperature sensor (during equithermal regulation)
E08	Failure of the ventilator (feedback signal of revolutions)
E09	failure of the ventilator (revolutions outside regulation range)
E010	failure of ventilator (rotates at stop)
E011	insufficient flow of heating water (after repeated attempts)
E012	high temperature of burnt gases in the condensing body

Information shown on the display

Service buttons (side buttons; right arrow „ ⊕ " – stepping forward, left arrow „ ⊛ " – backward stepping) it is possible to display parameters of boiler in the sequence order:

1. Set temperature of heating water   (+ °C + the numeric value flashes).
2. Actual temperature of heating water   (▥ + °C + numeric value).
3. Set temperature of service water TUV *   (▥ + °C + numeric value flashes).
4. Actual temperature of service water *   (☇ + °C + numeric value).
5. Outside temperature *   (☇ + °C + numeric value).
6. Shift of equithermal curve **   (⬊ + numeric value).
7. Ventilator revolutions   (without symbol + numeric value x 10)
8. Return to the standard display

The numeric value is displayed together with the respective flashing symbol during 10 seconds from the termination of stepping by button. Then the regime returns to the standard display.
(*) – For KDZ boiler in the SOLARTHERM unit there is no numeric value data (display "- -")
(**) – These parameters are displayed only in the case of the selection of the equithermal regulation of heating (switched the respective switch of parameters of the boiler, connected and undamaged outside temperature sensor.

During the control of the boiler by spatial regulator Honeywell CR 04 (THERM RC 03, PT 55, PT59) with the interface IU02 the running communication Open-Therm is signalled by the upper side arrows in the corners of the display "▲ ▲ ", during the communication of the cascade (IU04.10 a IU05) by lower side arrows "▼ ▼ " .

• CONTROL ELECTRONICS DIMS03-TH01

Switch for selection of the type and parameters of the boiler (dip-switch)

	DS1-TUV	DS2-ext. sensor	DS3-cascade	DS4	DS5	DS6
OFF	storage tank	without external sensor	slave			
ON	flow	with external sensor	master			

Setting by the producer DS1-according to the type of the boiler, DS2-OFF (regime 1.1), DS3-OFF; run out of the pump 50% = 5 minutes; anti-cycling time 50% = 5 minutes.

Description of activity:

1.1 Heating system regime (without equithermal regulation)
Setting: The outside temperature sensor is not connected; service switches DS2, DS3 – OFF.

The working phase of the boiler starts by switching off the spatial thermostat (regime switch in the winter operation position). Then there is the starting of the ventilator and the activation of the running of the circulating pump and the automatic ignition system. The boiler is ignited for the starting output which is kept for 10 seconds after ignition of the boiler (feedback from the ignition automation system). Then the output is decreased to the minimum and with slow linear starting (about 1min.) ;the output is increased to the point of modulation stated by the service setting for the maximum heating output. Regulation of the output of the boiler in this phase is the PID (proportionally-integration-derivative) type with keeping the temperature set by the wheel on the control panel (within the range 30 – 80 °C). During the heating of the heating system with a lower input power than the minimum output of the boiler, there is an increase in the output temperature of the heating water by 5 °C above the adjusted value. In this phase the boiler interrupts the burning while keeping the running of the circulating pump and runs the time restriction of re-ignition (service setting within the range 0 – 10 minutes). Now the boiler becomes a highly adaptable source of heat due to the large variability of consequently regulated heating systems (e.g. use of zone regulation, thermostatic valves, etc.). After disconnection of the spatial thermostat, there is activation of the function of the adjustable time restricted run out of the pump (service setting 1 - 10 minutes). This function is used to take the heat from the

condensing body and for the improvement of the allocation of the temperatures of the heating bodies (in particular for horizontal distribution lines) while using spatial regulators with PI linkage with short working cycles (e.g. Honeywell CM 707, CM 907).

1.2 Heating system regime with equithermal regulation

Adjustment: The outside temperature sensor is connected; service switches DS2, DS3 – OFF.

The working phase of the boiler is identical with the above-mentioned regime in par. 1.1 with the difference that the temperature for the heating system is automatically set according to the outside temperature (ascertained by the sensor). The calculation of the temperature of the heating system is the function of the outside temperature and the function of the **"K"** factor (declination of the equithermal curve), which is set by the service technician with respect to the locality and character of the heating system. Using the wheel for the temperature of the heating water on the control panel, the user can set the requested thermal comfort (correction of the shift of the equithermal curve within the range ± 15 °C of heating water). The equithermal curve is modified for the standard heating system with radiators.

Graphs of curves

Declinations of equitherm

Shifts of equitherm
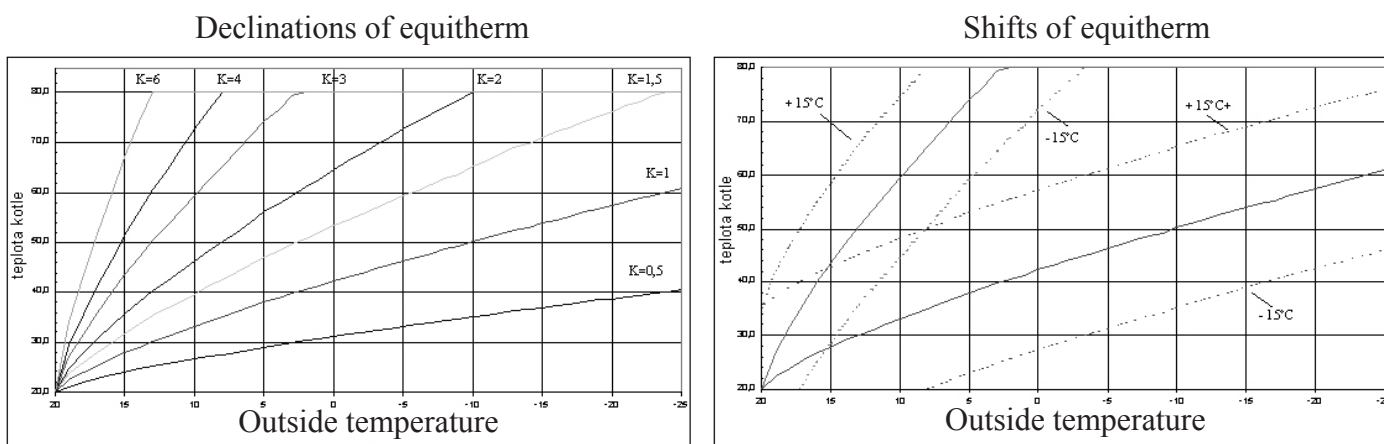
It results from the aforementioned facts that using the wheel for setting the temperature for heating on the control panel in this regime of the boiler, the requested value of the heated area is not adjusted. The initial service setting is recommended **"K" = 1.6**. The user setting of the rotary knob for the temperature of the heating in the middle of the setting route (pointer upward which corresponds to the shift of the curve 0 °C). After checking the temperature of the heated area (after about 24 hours) it can be set according to your requirements for thermal comfort. Such a set level of the temperature of the heating area will be automatically kept without depending on the changes of outside temperature.

Using this regime for regulation of the boiler it is possible to achieve a further decrease in operating costs with improved thermal comfort (continuous heating of the heating bodies). Last but not least we will appreciate this possibility as pre-regulation of the primary heating circuits when using zone regulation (mixing valves), etc.

Of course, for the decrease of the temperature in the heated area, it is possible to connect the thermostat. In this case, we recommend the variant without PI regulation (only with switching according to the thermal difference). The rotary knob for setting the temperature is set at a slightly increased value compared with the operation without the spatial thermostat.

In the case of the failure of the outside temperature sensor, this status is signalled and the boiler continues in operation with the temperature of the heating system according to the setting in the previous regime. 1.1.

2. Regime for heating the solar storage tank for hot service water
Adjustment: Service switch DS1 – OFF, DS2 according to the above-mentioned DS3 – OFF.

The working phase of this regime of the boiler is run by the built-in control unit of the SRS solar circuit. Activate the relay of a three-way valve and the valve is switched into the position for heating the storage tank for hot service water. After about 8 seconds there is the running of the pump and activation of the

ignition automated system. The boiler is ignited for starting output (10 seconds after ignition of the boiler) and consequently the output of the boiler is increased to the maximum to increase the output temperature to 80 °C as quick as possible. This temperature is kept by the regulation of the output of the PID type. During the heating of the storage tank, the thermostat disconnects and the boiler interrupts the burning. After 10 seconds the pump is stopped and disconnects the relay of the three-way valve and the valve is switched into the heating position. During the re-adjustment of the valve (about 8 seconds) any request for ignition is blocked. Consequently, the boiler may continue with heating the heating system (according to request).

Heating of the solar storage tank for hot service water has priority against heating in the case of parallel requirements!

Additional functions:

- After termination of burning of the boiler, the ventilator is in operation 20 seconds longer with the revolutions of the starting output (collection of the remaining burnt gases from the combustion cham ber).
- Regular running of the pump outside of operation (for 30 seconds after 24 inactive hours).
- Regular switching of three-way valve (for 10 seconds after 24 inactive hours)
- Anti-freeze protection is activated in the case of a decrease of temperature in the boiler below 6 °C. The pump is running, the boiler is ignited and the heating circuit is heated up to 30 °C. After the rea ching this temperature, it is disconnected.
- Re-checking of the flow switch is activated in the case that the flow switch is not activated within 15 seconds of the running of the pump. The pump is stopped and after 45 seconds there is a further attempt at running the boiler. This is repeated 10x. Then the boiler must be disconnected and con nected again by the regime switch. If the time of inactivity of the pump before re-running the boi ler exceeds 30 minutes, the first interval of the running of the pump is prolonged to 180 seconds. Intervals between trying cycles are indicated according to the following table for the indication of failures.

Service technician with the authority from the producer is obliged during the running to proven-ly familiarize the user with the operation of the equipment, its individual parts, safety devices and the manner of control, to complete the warranty certificate and to hand over the user manual.

The user is obliged to take care of the correct use of equipment in accordance with this manual which is the condition for acknowledgement of the warranty. It is strictly prohibited to intervene into secured parts of the boiler!

• GAS FITTING SIT 848 SIGMA

Solenoid coils

Setting the start of regulation

Input of the air pressure signal

Setting the ratio of air / gas

Measuring adapter for the output gas pressure

Measuring adapter for the input gas pressure

Gas output

Input of gas
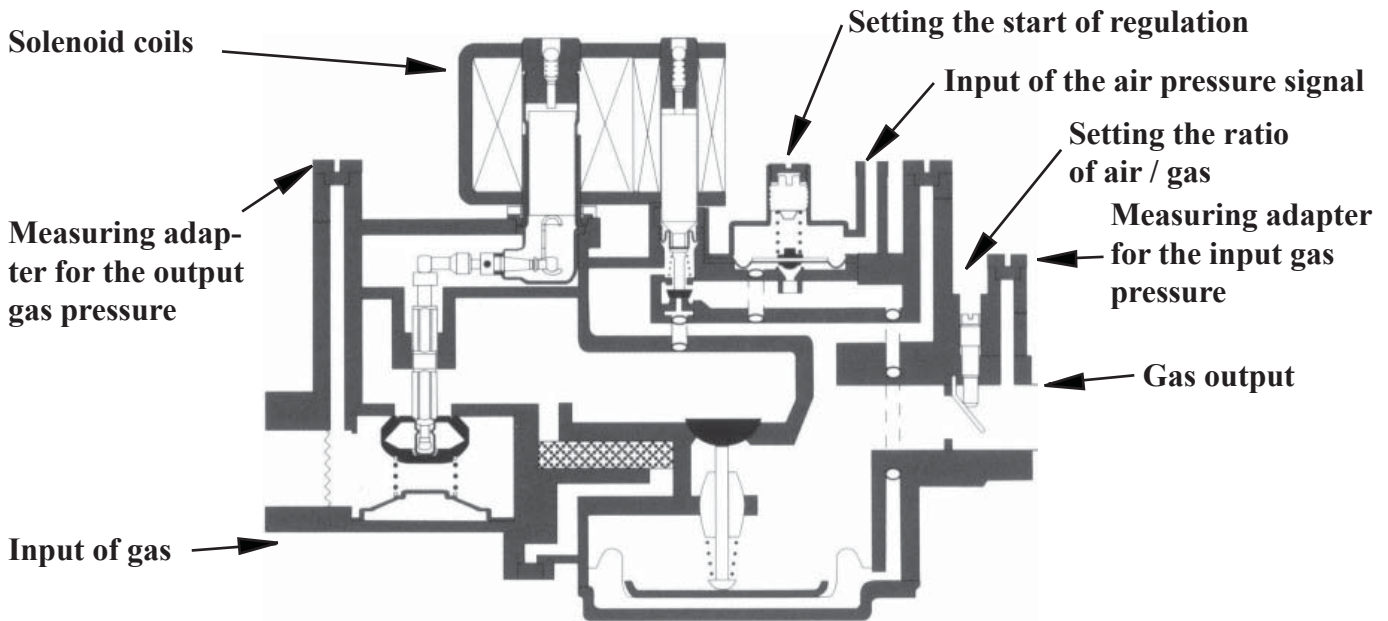
SIT 848 SIGMA is gas fitting with the ratio of the regulation of air / gas. It is fitted with two solenoid valves for blocking the passing of gas in the case of inactivity of the boiler. The regulation systems works depending on the feedback signal of the gas pressure from the mixer. In addition to the closable measuring adapters of the input, output and medium pressure of gas, there are elements for setting the correct ratio of air / gas in the whole range of regulation of the output of the boiler.

1. Setting the start of regulation

   This is done by the plastic screwdriver in the feeder for the regulation system of the auxiliary membrane. The screw is accessible after unscrewing the brass cover. The ratio of the mixture at the minimum output of the boiler is set here (i.e. at the adjusted minimum revolutions of the ventilator). By screwing the bolt, the volume of gas in the mixture is increased.
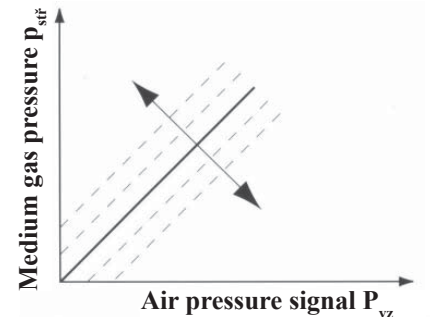
2. Setting the ratio of mixture air / gas

   This is performed by the regulation screw of the throttle valve of the gas on the output of the gas valve.
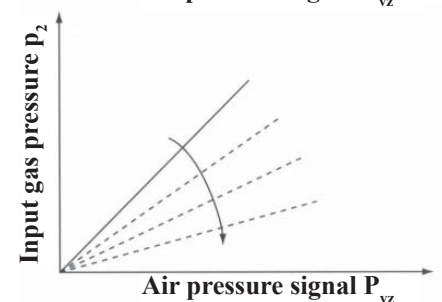
   Here the ratio of the mixture is set at the maximum output of the boiler (i.e. at the adjusted maximum revolutions of ventilator). By screwing the bolt, the volume of gas in the mixture is decreased.

Electric diagram for the connection of the connector of the solenoid coils. Gas fitting contains two EV1 solenoid valves (solenoid of the gas input) and EV2 (solenoid for the regulation system). Coils are connected in the connector of the connecting cable connected in parallel (i.e. they are connected at the same time). The supply voltage of coils is 220 V AC. (alternating).
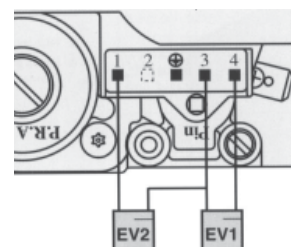
• GRAPH OF USABLE CONNECTING OVER-PRESSURES OF HEATING WATER

Connecting over-pressure SOLARTHERM 17 KDZ 25

Connecting over-pressure SOLARTHERM 28 KDZ 25
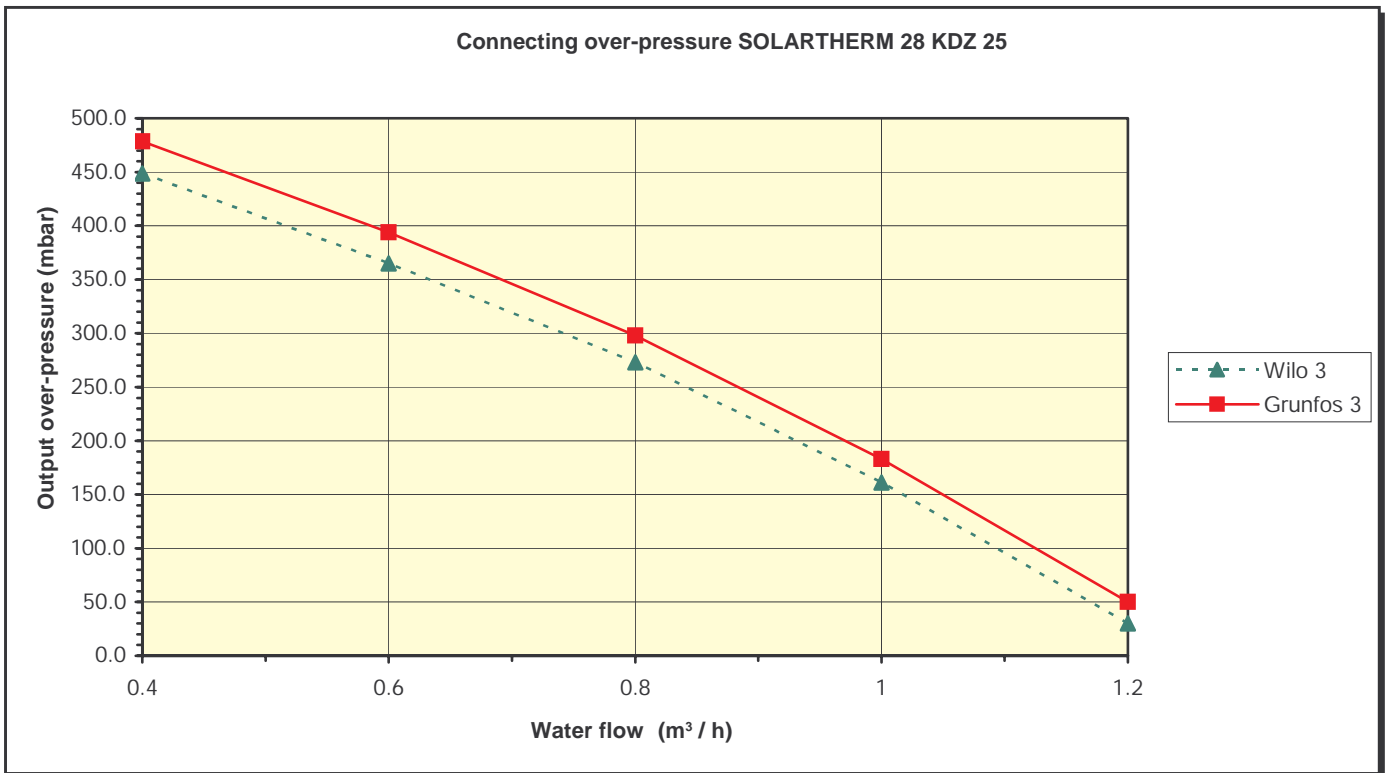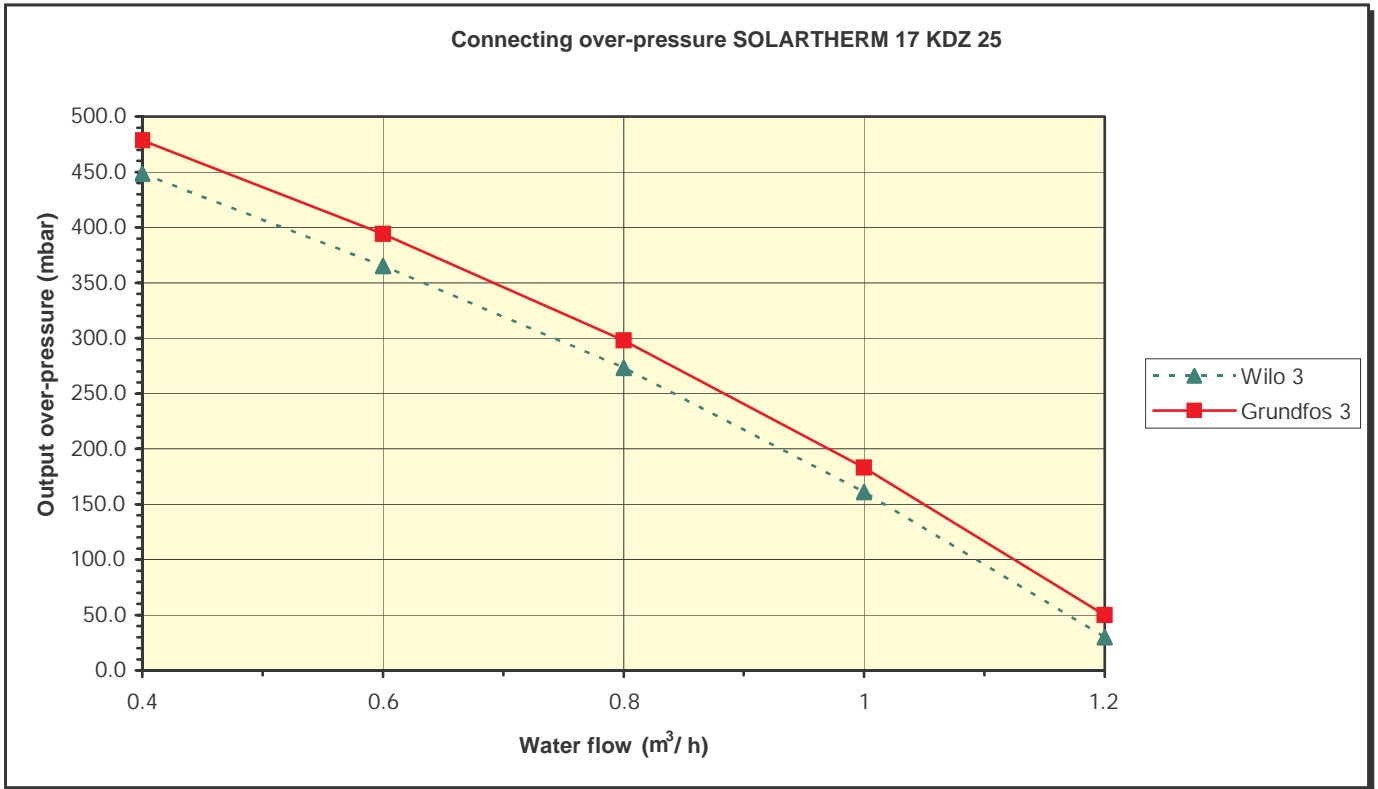
Notification: *Curves of usable connecting over-pressures are processed for Wilo 25/70 and Grundfos 15/60 pumps for the highest regulation level. Due to the speed of the heating of the storage rank for THERM 17 or 28 KDZ boilers we do not recommend to decrease the output of the pump.*

• ELECTRICITY DIAGRAM OF THE CONNECTION OF THE BOILER PART
– automation system DIMS03-TH01

LCD display with service buttons

Solar regulator SRS 3

PC

RS232 INTERFACE

Thermal probe for burnt gases

Black
Black

X14
X11
Board with relay
Re1

Black

HV
Brown

X1

X10

Thermal probe for heating

Black
Black

SW1
1 2 3 4 5 6

Interface IU02, IU04, IU05

*Outside temperature sensor

X6

X8

Switch for the selection of the type and parameters of the boiler

TOP.

X18

X22
Brown
Black
Black
Red
Brown

PWM signal
Feedback
GND
+/-Supply 24 V

Ventilator

Blocking thermostat

Black
Brown

X9

Black
Brown

Transformer
24V~
230V~

Spatial thermostat

X7

Brown

MÓD

X16

X24

3-way valve
Black
Red
White

Flow switch

2   1
Black
Brown

Blue
Brown

X2

DIMS03 - TH01

X17
N

X12
N

X19

Pump
Brown
Blue
Green/yellow

Blue
Brown
Green/yellow

Green/yellow
Green/yellow

Green/yellow
Green/yellow

Green/yellow

Blue
Brown

Gas fitting

IE   ZE

BURNER

N   L

Network input

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• INSTRUCTIONS FOR USE AND MAINTENANCE - SOLAR PART

• CONTROLLER DESCRIPTION

The REGULUS SRS3 controller is designed for control of solar systems with 1 solar collector field and up to 2 loads or 1 load and up to 2 solar collector fields.

It can be used in solar systems for DHW and pool heating or backup heating.

It facilitates efficient use and function control of solar systems, enables speed control of a solar pump and protective functions for collectors and tank. The device has simple operation, help texts for individual functions and menu in several languages.

♦ both graphics and texts on a backlit display
♦ simple viewing of the current measurement values
♦ analysis and monitoring of the system also by means of statistical graphics
♦ extensive setting menus with explanations
♦ menu lock can be activated to prevent unintentional setting changes
♦ usual preset parameters in factory setting
♦ further measurement and switching applications using a temperature difference and a thermostat function

• SPECIFICATION

Electric specification:

Mains voltag	230 V ~ ±10%
Mains frequency	50-60 Hz
Power consumption	2 VA
Switched power	
Electronic relay R1	min. 20 W, max. 120 W for AC3
Mechanical relay R2	max. 460 VA for AC1 / 185 W for AC3 (AC1 - resistive load, AC3 - inductive load)
Internal fuse	2A slow-blow, 250 V
El. protection	IP40
Protection class	II
Sensor inputs	3× Pt1000
Measuring range	-40 °C to 300 °C

Permissible ambient conditions:

Ambient temperature	
for controller operation	0-40 °C
for transport/storage	0-60 °C
Air humidity	
for controller operation	max. 85% rel. humidity at 25 °C
for transport/storage	no moisture condensation permitted

Other specifications and dimensions:

Housing design	2-part, ABS plastic
Installation methods	wall installation, optionally panel installation
Overall dimensions	163 × 110 × 52 mm

Aperture installation dimensions	$157 \times 106 \times 31$ mm
Display	Fully graphical display, 128×64 dots
Light diode	multicolour
Operation	4 entry keys

Optional temperature sensors:

Immersion sensor	Pt1000, with lead TT/S2 up to 180 °C
Immersion sensor	Pt1000, with lead TT/P4 up to 95 °C
Pipe-mounted sensor	Pt1000, pipe-mounted sensor TR/P4 up to 95 °C
Sensor leads	min. $2\times 0{,}75$ mm², extendable up to 30m max.

Temperature resistance table for Pt1000 sensors:

°C	0	10	20	30	40	50	60	70	80	90	100
Ω	1000	1039	1077	1116	1155	1194	1232	1270	1308	1347	1358

• HYDRAULIC VARIANTS

Generally spoken, the controller offers a wide choice of solar system connection variants.

1. Solar system with a storage tank
2. Solar system with a thermostat for storage tank heating or cooling
3. Solar system with a bypass
4. Solar system with a heating return pre-heating
5. Solar system with a thermally stratified storage tank
6. Solar system with a heat exchanger
7. Solar system with 2 collector fields (East/West)
8. Solar system with 2 collector fields and 2 pumps
9. Solar system with 2 storage tanks and a zone valve
10. Solar system with 2 storage tanks and 2 pumps
11. Solar system with two storage tanks and a heat exchange pump
12. Solar system with a pool
13. Solar system with a pool and storage tank
14. Solar system + cooling 1
15. Solar system + cooling 2
16. Solar system + cooling 3
17. Solar system + solid-fuel boiler
18. Solar system + zone valve + thermostat
19. One differential ΔT controller and 1 thermostat (no solar functions)
20. 2 temperature difference controller $2\times\Delta$T (no solar functions)

     In the regulator, connection diagram No.2 is set in production. Due to the correct running of the whole equipment, it is not possible to change this diagram! In terms of the construction, the equipment is ready for operation according to diagram No.2!
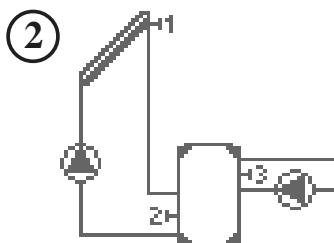
• ELECTRICAL WIRING

⚡ Low-voltage cables such as temperature sensor cables must be routed separately from mains voltage cables. Feed temperature sensor cables only into the left-hand side of the unit, and mains voltage cables only into the right-hand side.

The controller is not equipped with a mains switch. For this purpose please use e.g. a circuit breaker or just unplug the device. The cables being connected to the unit must not be stripped by more than 55mm, and the cable jacket must reach into the housing just to the other side of the strain relief.

Relay R1 is only suitable for standard pumps (20-120VA) which are speed-controlled via the controller. The internal wiring of the controller is such that residual currents flow over relay R1 even in the rest condition. Therefore under no circumstances may valves, contactors or other consumers with low power consumption be operated on this output.

Installing the temperature sensors

🛈 Max. sensor lead length is 30 m and its cross section at least 0.75 mm2.
Make sure that the terminals of extension cables and sensors are properly tightened.
Use only immersion or pipe-mounted sensors. For solar collectors, use sensors of a suitable temperature resistance (min. 180°C) that are enclosed in the supply. The temperature sensor cables must be routed separately from mains voltage cables!

• SOLAR CONTROLLER WIRING DIAGRAM

Hydraulic variant No. 2 - Solar system with thermostat for storage tank heating (default setting)

Low voltage - sensor connection

Terminal: connection for:
S1 (2×)   sensor 1 collector
S2 (2×)   sensor 2 storage tank lower
S3 (2×)   sensor 3 storage tank upper
The polarity of the sensors is freely selectable.

Mains voltage - 230V 50Hz

Terminal: connection for:
L   mains phase conductor L
N   mains neutral conductor N
R1   pump L (speed)
N   pump N
R2   thermostat function L
N   thermostat function N
PE   protective conductor (green-yellow)

Sensor side max. 12V ⚠ Caution   **Mains side 230VAC** ⚡ Danger
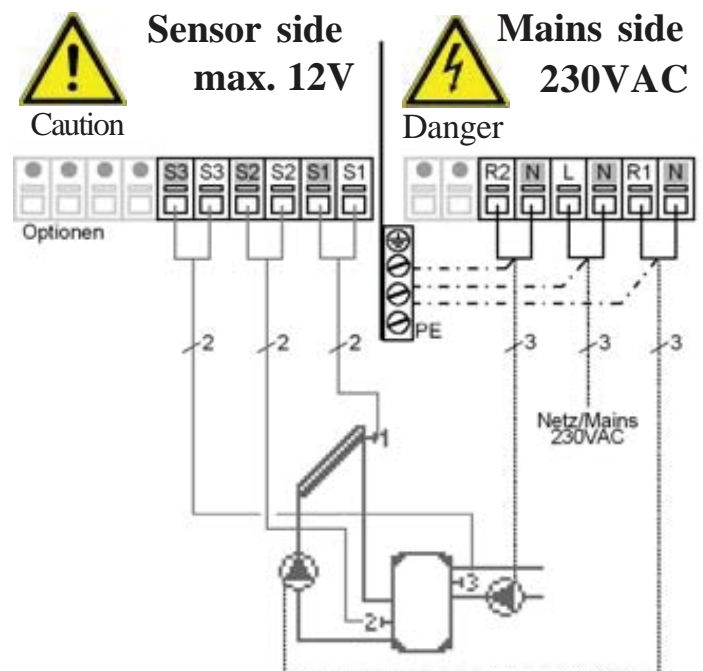
🛈 R1 output: for speed control of standard solar pumps, minimum load 20VA

DISPLAY AND INPUT
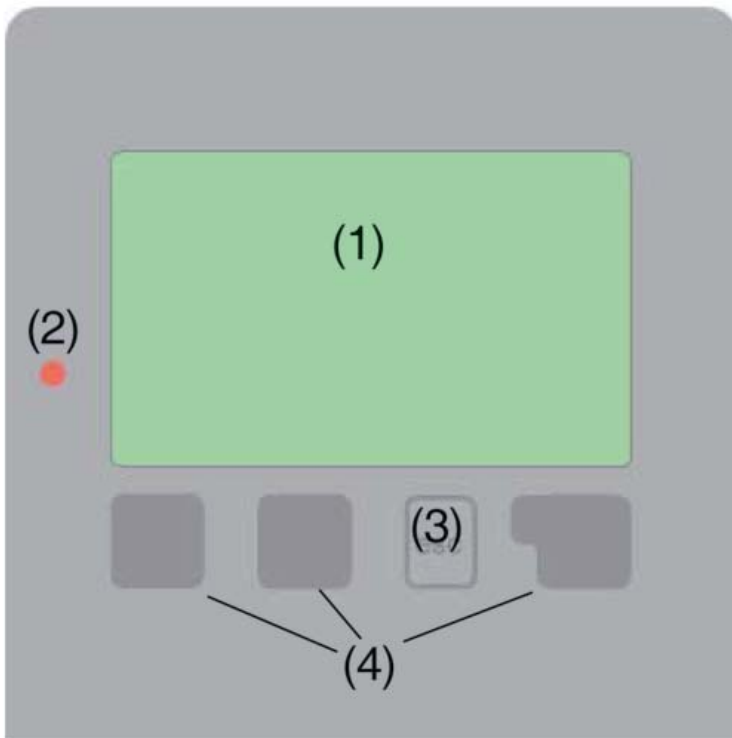
The display (1) shows graphic and text info on the hydraulic variant, set and measured values and other text info.

The LED lamp (2):

lights up green -	if a relay is closed and the controller works right
lights up red -	if the controller is set to automatic operation and all relays are open
flashes slowly red -	if manual operation mode is set
flashes quickly red -	if an error occurred

Examples of display symbols:

Symbol	Description
	pump (rotates in operation)
	valve (direction of flow black)
	collector
	storage tank
	pool
	temperature sensor
	heat exchanger
	warning/error message
	new information available

CONTROLLER USE:

Entries are made using four keys **(3+4)**, which are assigned to different functions depending on the situation.

The **"esc" key (3)** is used to cancel an entry or to exit a menu.

If applicable there will be a request for confirmation as to whether the changes which have been made should be saved.

The function of each of the other three keys **(4)** is shown in the display line directly above the keys; the right-hand key generally has a confirmation and selection function.

Examples of key functions:

+/-	increase/decrease values
▼/▲	scroll menu up/down
YES/NO	confirm/reject
Info	additional information
Back	to previous screen

MENU STRUCTURE
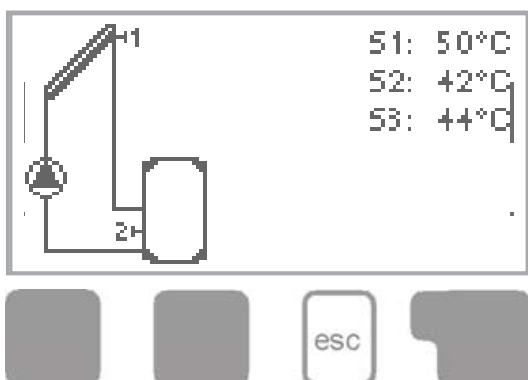
The graphics or overview mode appears when no key has been pressed for 2 minutes, or when the main menu is exited by pressing "esc".
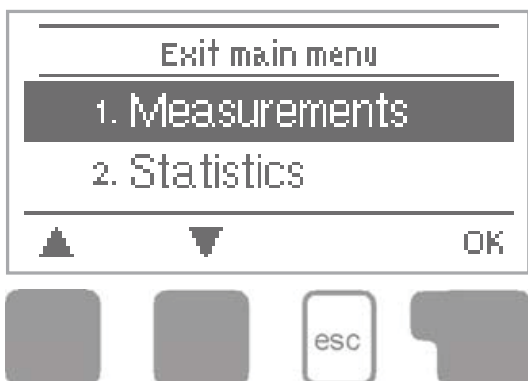
Pressing any key **(4)** in graphics or overview mode takes you directly to the main menu.

The following menu items are then available for selection there:

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1. Measurements	Current temperature values with explanations
2. Statistics	Function control of the system with operating hours etc.
3. Display mode	Select graphics mode or overview mode
4. Operation mode	Automatic mode, manual mode or switch unit off
5. Settings	Set parameters needed for normal operation
6. Protections	Solar and frost protection, recooling, antiseizing protection
7. Special functions	Commissioning help, program selection, sensor calibration, clock etc.
8. Menu lock	Against unintentional setting changes
9. Service data	For diagnosis in the event of an error
10. Language	Language selection

• CONTROLLER SETTING

SOLAR SYSTEM WITH THERMOSTAT FOR STORAGE TANK HEATING (DEFAULT SETTING)

> **Setup wizard**
>
> Would you like to start the setup wizard?
> _____
> no   yes

The first time the controller is turned on, language and clock need to be set.

After that a query appears as to whether you want to parameterize the controller using the commissioning help or not. The commissioning help can also be terminated or called up again at any time in the special functions menu. The commissioning help guides you through the necessary basic settings in the correct order, and provides brief descriptions of each parameter in the display.

Pressing the **"esc"** key takes you back to the previous value so you can look at the selected setting again or adjust it if desired. Pressing the **"esc"** more than once takes you back step by step to the selection mode, thus cancelling the commissioning help. Finally, menu 4.2 under operating mode **"Manual"** should be used to test the switch outputs with the consumers connected, and to check the sensor values for plausibility. Then switch on automatic mode.

FREE COMMISSIONING

If you decide not to use the commissioning help, you should make the necessary settings in the following sequence:

- Menu 10.   Language
- Menu 7.2   Time and date
- Menu 7.1   Program selection
- Menu 5   Settings, all values
- Menu 6   Protective functions if modifications are necessary
- Menu 7   Special functions if additional changes are necessary

Finally, menu 4.2 under operating mode **"Manual"** should be used to test the switch outputs with the consumers connected, and to check the sensor values for plausibility. Then switch on automatic mode.

Observe the explanations for the individual parameters on the following pages, and check whether further settings are necessary for your application.

PARAMETER SETTINGS

Menu 1: Measurement values

The menu **"1. Measurement values"** serves to display the currently measured temperatures.
What measurement values are displayed depends on the selected program and the specific controller model.

The menu is closed by pressing **"esc"** or selecting **"Exit measurement values"**.

Selecting **"Info"** leads to a brief help text explaining the measurement values.

Selecting **"Overview"** or **"esc"** exits the Info mode.

If **"Error"** appears on the display instead of the measurement value, then there may be a defective temperature sensor or its wiring.

If the cables are too long or the sensors are not placed optimally, the result may be small deviations in the measurement values. In this case the display values can be compensated for using the function of sensor compensation - see Chapter D 7.3.

Menu 2: Statistic
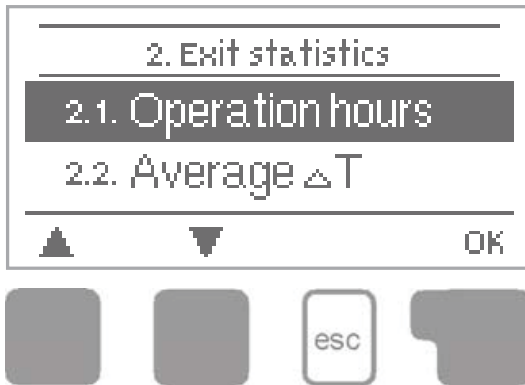
The menu **"2. Statistics"** is used for function control and long-term monitoring of the system.

The menu is closed by pressing **"esc"** or selecting **"Exit statistics"**.

For analysis of the system data it is essential that time is set accurately on the controller.

Please note that the clock does not continue to run if the mains voltage is interrupted, and must therefore be reset. Incorrect time set in Regulus SRS 3 controller may result in data being deleted, recorded incorrectly or overwritten.

Operating hours - menu - point 2.1

Display of operating hours of the solar pump connected to the controller; various time spans are available (last day, week, month, year).

Average temperature difference ΔT - menu - point 2.2

Display of the average temperature difference between the reference sensors of the solar system with the consumer switched on.

Heat output - menu - point 2.3

Display of the approximate heat output of the solar system. Settings see

Graphic overview - menu - point 2.4

This function provides a clearly-organized display of operating hours, average ΔT and heat output as a bar graph. Various time ranges are available. The two left-hand keys can be used to page through the data.

Message log - menu - point 2.5

Display of the last 10 events occurring in the system with indication of date and time. Errors (e.g. collector alarm) and operating states (e.g. anti-legionella function on) are displayed.

Reset / clear - menu - point 2.6

Resetting and deleting the individual analyses of Regulus SRS 3 controller. The function "All statistics" clears all analyses but not the error messages.

Menu 3: Display mode
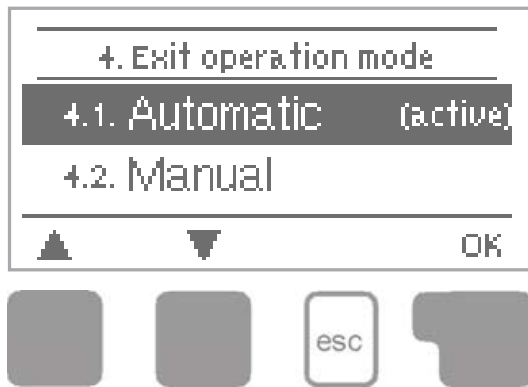
Menu **"3. Display mode"** is used to define the controller's display for normal operation. This display appears whenever two minutes go by without any key being pressed. The main menu appears again when a key is pressed.

The menu is closed by pressing **"esc"** or selecting **"Exit display mode"**.

Diagram - menu - point 3.1

In graphics mode, the selected hydraulic systems are depicted with the measured temperatures and operating states of the connected valves and pumps.

Overview - menu - point 3.2

In overview mode, the measured temperatures and operating states of the connected consumers are shown in text form. No hydraulic system is shown.

Alternating - menu - point 3.3

In alternating mode the diagram mode and then the overview mode are active for 5 seconds at a time.

Menu 4: Operating mode
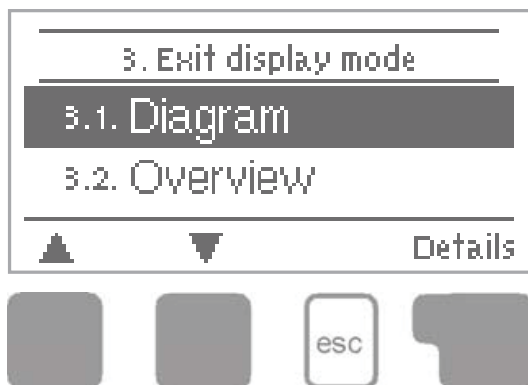
In menu **"4. Operating modes"** the controller can either be switched to automatic mode, switched off, or switched to a manual operating mode.

The menu is closed by pressing **"esc"** or selecting **"Exit operating modes"**.

Never select other mode than automatic without reason! Long-term operation in another mode can lead to overheating of the solar collector, storage tank and shortening the lifetime of the solar liquid or other system components!

Automatic - menu - point 4.1

Automatic mode is the normal operating mode of the SRS 3 controller.
Only automatic mode provides proper controller function taking into account the current temperatures and the parameters that have been set!

Manual - menu - point 4.2

The manual mode is intended to be used by a technician when commissioning or checking the system. The relay and thus the connected pump, valve or heating rod are switched on and off by pressing a key, with no regard to the current temperatures and the parameters which have been set. The measured temperatures are also shown. Long-term operation in manual mode in current operation can lead to system damage or overheating of water in the storage tank!

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Off - menu - point 4.3

When the operating mode **"Off"** is activated, all controller functions are switched off. This can lead, for example, to overheating of the solar collector or other system components. The measured temperatures are displayed.

Fill system - menu - point 4.4

This special operating mode is intended only for the filling procedure for a special **"Drain Master System"** with a fill level contact. It is not used in Regulus solar systems. However, if you activate it, be sure to terminate the function when finished!

After an interruption of the mains voltage the controller automatically returns to the last operating mode selected!

Menu 5: Settings

The necessary basic settings required for the control function are made in menu **"5. Settings"**.

The menu is closed by pressing **"esc"** or selecting **"Exit settings"**.

The hydraulic variant No. 2 is preset in the controller as a default setting. The entire system will not work properly if this setting is changed! The system is factory-set to be operated according to Hydraulic variant No. 2!

Often more conditions must be met simultaneously for the relay to switch, as it is obvious from the Table 5.14. (E.g. ΔT between a collector and storage tank, Min./max. collector temperature and max. storage tank temperature). When only one condition is met, the relay does not switch (e.g. ΔT might be reached but the collector temperature is still below T1min).

Tmin S1 - menu - point 5.1 = sensor S1 switch-on temperature

If this value is exceeded at sensor S1 and the other conditions as in Table 5.14 are also met, then the controller switches the associated pump and/or valve on. If the temperature at sensor S1 drops below this value by 5 °C, then the pump and/or the valve are switched off again.

Setting range: 0-99 °C / default setting: 20 °C

Tmin S2 - menu - point 5.2 = sensor S2 switch-on temperature

If this value is exceeded at sensor S2 and the other conditions as in Table 5.14 are also met, then the controller switches the associated pump and/or valve on. If the temperature at sensor S2 drops below this value by 5 °C, then the pump and/or the valve are switched off again.

Setting range: 0-99 °C / default setting: 40 °C

Tmin S3 - menu - point 5.3 = sensor S3 switch-on temperature

If this value is exceeded at sensor S3 and the other conditions as in Table 5.14 are also met, then the controller switches the associated pump and/or valve on. If the temperature at sensor S3 drops below this value by 5 °C, then the pump and/or the valve are switched off again.

Setting range: 0-99 °C / default setting: 20 °C

Tmax S2 - menu - point 5.4 = sensor S2 switch-off temperature

If this value is exceeded at sensor S2, then the controller switches the associated pump and/or valve off. If sensor S2 temperature falls below this value again and the other conditions as in Table 5.14 are also met, then the controller switches the pump and/or valve on again.

Setting range: 0-99 °C / default setting: 60 °C

Temperature values which are set too high will allow higher solar heat accumulation but it shall be checked that all system components are resistant to high temperature and scalding protection is provided. Regulus solar systems are safe for heating water up to 95 °C.

Tmax S3 - menu - point 5.5 = sensor S3 switch-off temperature

If this value is exceeded at sensor S3, then the controller switches the associated pump and/or valve off. If sensor S3 temperature falls below this value again and the other conditions as in Table 5.14 are also met, then the controller switches the pump and/or valve on again.

Setting range: 0°-99° C/default setting: 60 °C (in hydraulic variants with S3 default: Off)

ΔT R1 - menu - point 5.6 = switch-on/switch-off temperature difference for relay R1

If this temperature difference between the reference sensors is exceeded and the other conditions as in Table 5.14 are also met, then the controller switches the pump on. When the temperature difference drops below ΔT R1 Off, then the pump is switched off again

Settings range: ΔT R1 4-20 °C, ΔT R1 off 2-19 °C. efault settings: ΔT R1 10 °C, ΔT R1 off 3 °C

1) Setting the temperature difference too big will lead to switching the circulation pump on and off due to uselessly high temperature difference between a collector and storage tank which could lead to a mild reduction of annual solar yield. It may also cause more frequent solar pump switching on and off (so called cycling). Selecting the right ΔT will depend on the size of the solar system, length of the solar piping and quality of pipe insulation. Generally spoken, the shorter the distance between a collector and a tank and the better pipe insulation, the lower value of ΔT can be selected, and vice versa.

2) Setting the temperature difference too small may lead to solar pump operating even under unfavorable conditions (no or little sunshine). Solar system then remains in operation even with minimum gain and the pump power consumption may be higher than the solar gains.

For most current solar systems the values of ΔT between 8 and 12 K are used.

Situations described in 1) and 2) may occur also if the sensors are improperly located or their compensation set to a wrong value.

ΔT R2 - menu - point 5.7 = switch-on/switch-off temperature difference for relay R2

If this temperature difference between the reference sensors is exceeded and the other conditions as in Table 5 are also met, then the controller switches the pump and/or the valve on. When the temperature drops below ΔT R2 Off, then the pump is switched off again.

Settings range: ΔT R2 4-20 °C, ΔT R2 off 2-19 °C. Default setting: ΔT R2 10 °C, ΔT R2 off 3 °C

1) Setting the temperature difference too big will lead to switching the circulation pump off even when the sun is still shining. Temperature increase in the collector will make the pump start again. The pump will then keep switching on and off.

2) The right ΔT value depends on the number and type of solar collectors and the flow rate of solar liquid set. If a too small temperature difference is set, the pump may run permanently. This may be caused by placing sensors differently in a collector and in a tank, improperly set sensor compensation… Even a small difference between the measured and real temperature will influence the controller.

T set poin S3 - menu - point 5.8 = thermostat function at sensor S3

If the temperature at sensor S3 falls below this value, the relay R2 together with backup heating is switched on. If the temperature at sensor S3 exceeds this value plus hysteresis, the relay is switched off.

Setting range: Tset point 0-99 °C / Default setting: 60 °C

Hysteresis - menu - point 5.8 = Hysteresis for thermostat function at sensor S3

Hysteresis value for backup heating on (see D 5.8 Tsetpoint S3 above)

If the Energy saving mode is active (see D 5.16), the system heats up until Tmin S3+hysteresis temperature is reached.

Setting range: Hysteresis 2 to 20 °C /default setting: 10 °C

Table - menu - point 5.18 = The chart shows which sensors control switching of individual relays.

Sensors: S1, S2, S3
Relays: R1, R2

	Hydraulic variant No. 2
TminS1	S1 --> R1
Tmin S2	-
Tmin S3	-
Tmax S2	S2 --> R2
Tmax S3	-
Δ T R1	S1/S2 --> R1
Δ T R2	-
Tset point S3	S3 --> R2
Hysteresis	S3 --> R2
Priority	-
T-priority	-

Menu 6: Protective functions

```
┌─────────────────────────────────┐
│     6. Exit protections         │
│ ▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬  │
│  6.1. Antiblock                 │
│  6.2. Frost protection          │
│  ▲        ▼            OK        │
└─────────────────────────────────┘
```

Menu **"6. Protective functions"** can be used to activate and set various protective functions.

⚠️ These functions do not under any circumstances replace safety elements in solar systems!

The menu is closed by pressing **"esc"** or selecting **"Exit settings"**.

Pump seizing protection - menu - point 6.1 / 6.1.1 - 6.1.2

Pump seizing protection using regular short turning on a pump or a valve. Seizing may occur after prolonged inactivity of valves or pumps. If this protection is activated, then the controller switches the relay in question and the connected consumer on every day at 12:00 or on Sundays at 12:00 (for weekly settings) for 5 seconds in order to prevent the pump and/or the valve from sticking after an extended stationary period.

Setting range R1: daily, weekly, off/default setting: Off
Setting range R2: daily, weekly, off/default setting: Off

Frost protection - menu - point 6.2 / 6.2.1 - 6.2.2

Frost protection prevents freezing of collectors and solar system filled with water instead of antifreeze fluid. In order to save energy, please leave it off for Regulus solar systems.
A two-stage frost protection function is available. In stage 1 the controller switches the pump on for 1 minute every hour if the collector temperature drops below the set value "**Frost stage 1**". If the collector temperature drops further to the set value **"Frost stage 2"**, the controller switches the pump on continuously. If the collector temperature then exceeds the value "Frost stage 2" by 2 °C, then the pump switches off again.

Frost protection setting range: on, off/default setting: off
Frost stage 1 setting range: from -25 °C to 10 °C or off/default setting: 7 °C
Frost stage 2 setting range: from -25 °C to 8 °C or off/default setting: 5 °C

ℹ️ *This function causes energy to be lost via the collector!*
As Regulus solar systems are filled with antifreeze fluid, the antifreeze protection shall remain off.

System protection - menu - point 6.3 / 6.3.1 - 6.3.5

If "SProt Ton" is exceeded at the collector, the pump is switched off. The collector is let at high temperature. The pump is activated again when the temperature drops below "SProt TOff".

Automatic shutdown - settings range: On / Off / Default: on
Settings range: SProt Ton 60 °C to 150 °C / Default: 120 °C
Settings range: SProt Toff 50 °C to Ton -5 °C / Default: 115 °C

ℹ️ *Collectors do not get cooled and stay heated. This may result in limited lifetime of the solar fluid. If you use this function, please check your solar fluid regularly.*

Collector protection - menu - point 6.4

If "CP Ton" is exceeded at the collector sensor, the pump is switched on in order to cool the collector down. The pump turns off when the collector temperature falls below "CP Toff" or the temperature "CP Tmax storage" is exceeded in the storage or pool. In systems with 2 storage tanks only the lower-priority tank or pool is used for collector cooling.

Collector protection - Setting range: On, Off / default setting: Off
Settings range: CP Ton 60°C to 150°C / Default: 110°C

Settings range: CP Toff 50 °C to CP Ton -5 °C / default setting: 100 °C
Settings range: CP Tmax storage 0 °C to 140 °C / default setting: 90 °C

When collector protection is active, the storage or pool may get heated to a high temperature!

Col.- Alarm - menu - point 6.5

If this temperature is exceeded at the collector sensor when the solar pump is on, a warning is triggered. A red LED starts flashing and a warning message is shown in the display.

Setting range: Collector alarm off, on / default setting: off
Setting range: Col. alarm 60 °C to 300 °C / Default setting: 150 °C

Recooling - menu - point 6.6

At the end of a sunny day the temperature in a storage tank may easily reach high values. In order to prevent further temperature increase the next day, excess energy can be released into the air via collectors under cloudy conditions or after sunset.
If the temperature in the storage tank exceeds the value **"Recool Tsetpoint"** and the collector is at least by 20 °C cooler than the storage tank, the solar pump starts. The storage tank is then cooled down until the **"Recool Tsetpoint"** is reached. In systems with two storage tanks the setting applies to both storage tanks.

Setting range: Recooling off, on / default setting: off
Setting range: Recooling Tsetpoint from 0 °C to 99 °C / default setting: 70 °C

This function enables to release excess heat from the storage tank considerately and without solar fluid overheating, via piping and collectors into the ambient air. It is recommended to keep activated. Combinable with protective solar function.

Anti-Legionella - menu - point 6.7

With the **"AL function"** activated the controller makes it possible to heat the storage tank up once at certain intervals (the **"AL frequency"**) to a higher temperature (**"AL Tsetpoint S2"**), assuming that the energy source allows this.

*Setting range: **AL function:** On or Off / default setting: Off*
*Setting range: **AL Tsetpoint S2:** from 60 °C to 99 °C / default setting: 70 °C*
*Setting range: **AL frequency:** from 1 to 28 days / default setting: 7 days*
***AL function:** Shows the last time the AL function was active*

The anti-Legionella function is switched off at delivery. This function is only relevant for storage tanks where sensor 2 is installed. Whenever heating-up has been carried out with the anti-Legionella function switched on, an information message with the date appears on the display.

*During the anti-Legionella function the storage tank is heated up over the set value **"Tmax S2"**!*

To provide complete protection against Legionella bacteria, the function must be applied to all the tanks and sufficient energy must be available for safe heating the system up to the necessary temperature. This protection is efficient only where a high temperature is present, that is why the circulation pump shall be switched on at the same time, ensuring piping protection as well.

Menu 7: Special functions

```
7. Exit special functions
7.1. Program selection
7.2. Time & date

 ▲      ▼           OK
```

Menu **"7. Special functions"** is used to set basic items and expanded functions.

⚠️ *Only time setting is intended for the user. Other settings may only be made by a specialist.*

The menu is closed by pressing **"esc"** or selecting **"Exit special functions"**.

Program selections - menu - point 7.1

The suitable hydraulic variant for the specific application is selected and set here (see Chapter A2 Hydraulic variants). The associated diagram can be displayed by pressing "info".

Setting range: Program selection 1-20 / default setting: 1

🛈 *Normally the program selection is made only once during initial commissioning by the specialist. Incorrect program selection can lead to wrong operation and unpredictable errors.*

⚠️ **The hydraulic variant No. 2 is preset in the controller as a default setting. The entire system will not work properly if this setting is changed! The system is factory-set to be operated according to Hydraulic variant No. 2!**

Time & dates - menu - point 7.2

This menu is used to set the current time and date.

🛈 *For analysis of the system data it is essential for the time to be set accurately on the controller. Please note that the clock does not continue to run if the mains voltage is interrupted, and must therefore be reset.*

Sensor calibration - menu - point 7.3

Deviations in the temperature values displayed, for example due to cables which are too long or sensors which are not positioned optimally, can be compensated for manually here. The settings can be made for each individual sensor in steps of 0.5 °C.

Setting range: Offset S1...S3 -100 °C to +100 °C / default setting: 0

🛈 *Settings are only necessary in special cases at the time of initial commissioning by the specialist. Incorrect measurement values can lead to wrong operation and unpredictable errors.*

Commissioning help - menu - point 7.4

Starting the commissioning help guides you in the correct order through the basic settings necessary for commissioning, and provides brief descriptions of each parameter in the display.

Pressing the "esc" key takes you back to the previous value so you can look at the selected setting again or adjust it if desired. Pressing the "esc" more than once takes you back to the selection mode, thus cancelling the commissioning help. (see Commissioning help).

🛈 *May only be started by a specialist during commissioning! Observe the explanations for the individual parameters in these instructions, and if further settings are necessary for your application, set them after the help is finished.*

Reset to factory settings - menu - point 7.5

All of the settings that have been made can be reset, thus returning the controller to its delivery state.

The entire parameterization, analyses, etc. of the controller will be lost irrevocably. The controller must then be commissioned and set once again.

Expansions - menu - point 7.6

This menu can only be selected and used if additional options or expansions have been built into the controller.

The associated supplementary installation, mounting and operation instructions are then included with the specific expansion.

Heat quantity - menu - point 7.7 / 7.7.1 - 7.7.5

A simple heat metering function for basic system control can be activated in this menu. Set the type and concentration of the antifreeze fluid and its flow rate read from the mechanical flowmeter (in the pump station). A deviation value for heat metering can be also set by modifying **"ΔT Offset"**.

Remember that the hydraulic variant does not change. Settings in this menu are used for heat calculation only and should be set according to the real system. Resulting data is only approximate value for function control!

Heat metering - menu - point 7.7.1

Activate or deactivate the heat metering function.

Settings range: On/off /default setting: Off

AF type - menu - point 7.7.2

Adjust the type of antifreeze used in the system. Kolekton Super Plus is of propylene type.

Setting range: Ethylene/Propylene / default setting: Ethylene

Glycol portion - menu - point 7.7.3

Adjust the percentage of glycol that has been used in the system. Kolekton Super Plus has a concentration of 40%.

Setting range: 0-60% /default setting: 40%

Flow rate - menu - point 7.7.4

Adjust the flow rate read from the flowmeter (in the pump station). The flowmeter shows flow rate in l/minute. For l/hour just multiply the number with 60 (e.g. 4 l/min = 240 l/hour).

Setting range: 10-5000 l/h /default setting: 500 l/h

ΔT Offset - menu - point 7.7.5

Calculation of heat metering is based on the temperature of the collector and storage where measuring takes place.

For a proper calculation, the temperature of the feed and return lines of the solar system shall be used. The temperatures of the tank sensor and of the solar return line are usually almost identical. Possible deviations of these temperatures can be compensated using the value **ΔT Offset** .

Example: Displayed collector temp. 40° C, displayed storage temp. 30° C, ΔT is 40-30=10 °C. Measured flow temp. 39° C, measured return temp. 31° C, ΔT is 93-31=8 °C. This means an offset setting of -20% (Displayed ΔT 10K, actual ΔT 8K which is by 20% less => -20% correction value.)

Setting range: -50% to +50% / default setting: 0%

Start aid function - menu - point 7.8 / 7.8.1 - 7.8.3

With some vacuum tube collectors, it may occur that the sensor is often not at the hottest location. This function turns on the solar pump for a while which helps moving the heated solar liquid to the sensor for real temperature check.

When the start help is activated, the following sequence is carried out:

If the temperature at the collector sensor increases by the value specified under **"Increase"** within one minute, then the solar pump is switched on for the set **"Purging time"** so that the medium to be measured can be moved to the collector sensor. If this still does not result in a normal switch-on condition, then the start help function is subject to a 5-minute lockout time.

Start help setting range: on, off/default setting: off
Purging time setting range: 2-30 sec./default setting: 5 sec.
Increase setting range: 1°C - 10°C/default setting: 3°C/min.

In Regulus tube collectors the sensor sheath is placed in optimum position inside the collector and the start help function is **not needed**.

Pump speed control - menu - point 7.9

If the speed control is activated, the SRS3 makes it possible to vary the speed of standard pumps at relay R1.

This function should only be activated by a specialist. Depending on the pump and pump stage used, the minimum speed should not be set too low, because otherwise the pump or the system may be damaged. The information provided by the relevant manufacturer must also be observed! If in doubt, the min. speed and the pump stage should generally be set to high rather than too low.

Variants of speed control - menu - point 7.9.1

Off: There is no speed control. The connected pump is only switched on or off with full speed.

Variant V1 - Control to the set ΔT, starts from min. speed:

The pump starts at max. speed. After the purging time (D 7.9.2) the controller switches to the set max. speed (D 7.9.4).

If the temperature difference ΔT between the reference sensors (collector and storage tank) is less than the set value, then the speed is decreased by one stage after the Sweep time (D 7.9.3) elapses. If the temperature difference between the reference sensors is greater than the set value, then the speed is increased by one stage after the Sweep time (D 7.9.3) elapses.

If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is ΔT off, the pump is switched off.

If the temperature difference between the reference sensors is less than the set value, then the speed is decreased by one stage after the Sweep time (D 7.9.3) elapses. If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is below TΔoff, the pump is switched off.

Variant V2 - Control to the set ΔT starts from min. speed:

The pump starts at max. speed. After the purging time (D 7.9.2) the controller switches to the set min. speed(D 7.9.4).

If the temperature difference ΔT between the reference sensors (collector and storage tank) is greater than the set value, then the speed is increased by one stage after the Sweep time (D 7.9.3) elapses.

If the temperature difference between the reference sensors is less than the set value, then the speed is decreased by one stage after the Sweep time (D 7.9.3) elapses. If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is below TΔoff, the pump is switched off.

Variant V3 - Control to a constant collector temperature, starts from min. speed:

The pump starts at max. speed. After the purging time (D 7.9.2) the controller switches to the set min. speed.

If the temperature at the reference sensor (collector) is greater than the Setpoint (D 7.9.6), then the speed is increased by one stage after the Sweep time (D 7.9.3) expires.

If the temperature at the reference sensor (collector) is less than the Setpoint, then the speed is decreased by one stage after the Sweep time (D 7.9.3) expires. If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is less than 1/3 of the required ΔT, the pump is switched off.

Setting range: V1, V2, V3, off / default setting: off

Purging time - menu - point 7.9.2

During this time the pump starts up at its full speed (100%) to ensure reliable starting. Only after this purging time does the pump run with speed control and switches to the max. or min. speed, depending on the variant set.

Setting range: from 5 to 600 seconds/default setting: 8 s

Sweep time - menu - point 7.9.3

The control time is used to determine the delay for speed control in order to avoid large temperature oscillations as much as possible. Longer delay should be set for systems with less collectors and long pipes from collectors to the storage tank. Shorter delay then for larger systems with a shorter distance to the storage tank. The meaning of the parameter is described above (D 7.9.1).

Setting range: Sweep time 1-15 min./ default setting: 4 min.

Max. speed - menu - point 7.9.4

The maximum starting speed of the pump at relay R1 is specified here.

Setting range: 70-100% /default setting: 100%

The indicated percentages are guide values that may vary to a greater or lesser extent depending on the system, pump and pump stage.

Min. speed - menu - point 7.9.5

The minimum starting speed of the pump at relay R1 is specified here.

Setting range: from 30 to max. speed -5 % / default setting: 50%

The indicated percentages are guide values that may vary to a greater or lesser extent depending on the system, pump and pump stage.

Setpoint - menu - point 7.9.6

This value is the control setpoint for variant 3. If the value at the collector sensor drops below the Setpoint, the speed is reduced. If it rises above the Setpoint, the speed is increased.

Setting range: 0 - 90 °C / default setting: 60 °C

When adjusting the min. speed, also the Sweep time shall be adjusted!

Setting the Sweep time: The Sweep time shall be long enough for the solar pump to move the solar medium at min. speed round the solar system (the liquid runs one round).

Set the Variant 3 of speed control and the Setpoint (7.9.6) to 0°C. Set the Sweep time (7.9.3) to 15 min. and the Purging time (7.9.2) to 5 sec.

After starting the system, wait for the temperature to stabilize, for about 15 min. At the 15th minute the speed will increase. Measure time from that moment and follow the temperature at the collector sensor. It will start sinking after a while. Wait for another 15 minutes and note down the collector

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temperature each minute. The time needed for the collector temperature to calm down after the speed change is the min. time to be set as the Sweep time.

Menu 8: Special functions

Menu **"8. Menu lock"** can be used to secure the controller against unintentional changing of the set values.

The menu is closed by pressing **"esc"** or selecting **"Exit menu lock"**.

The menus listed below remain completely accessible despite the menu lock being activated, and can be used to make adjustments if necessary:

D1	Measurement values
D2	Statistics
D3	Display mode
D7.2	Time&date
D8	Menu lock
D9	Service values

To lock the other menus, select **"Menu lock on"**. To enable the menus again, select **"Menu lock off"**.

Setting range: on, off/default setting: off

(!) *It is advisable to keep the lock activated in order to prevent unintentional changes by a user.*

Menu 9: Service data

The menu **"9. Service values"** can be used for remote diagnosis by a specialist in the event of an error etc.

(!) *When you note down data from the Service values Menu at the time when an alarm or error occurs, this might help your technician to solve the problem. The data may be entered e.g. into the following table.*

The menu can be closed at any time by pressing "esc".

|			
9.1.		9.31.	
9.2.		9.32.	
9.3.		9.33.	
9.4.		9.34.	
9.5.		9.35.	
9.6.		9.36.	
9.7.		9.37.	
9.8.		9.38.	
9.9.		9.39.	
9.10.		9.40.	
9.11.		9.41.	
9.12.		9.42.	
9.13.		9.43.	
9.14.		9.44.	
9.15.		9.45.	
9.16.		9.46.	
9.17.		9.47.	
9.18.		9.48.	
9.19.		9.49.	
9.20.		9.50.	
9.21.		9.51.	
9.22.		9.52.	
9.23.		9.53.	
9.24.		9.54.	
9.25.		9.55.	
9.26.		9.56.	
9.27.		9.57.	
9.28.		9.58.	
9.29.		9.59.	
9.30.		9.60.	

Note: ADC1 to 3 are internal data of temperature transducer 1 to 3.

Menu 10: Language

Menu **"10. Language"** can be used to select the language for the menu guidance. This is queried automatically during initial commissioning.

The controller involves English, German, Italian, Polish and Czech language versions.

• DEFECTS AND MAINTENANCE

Error and info messages
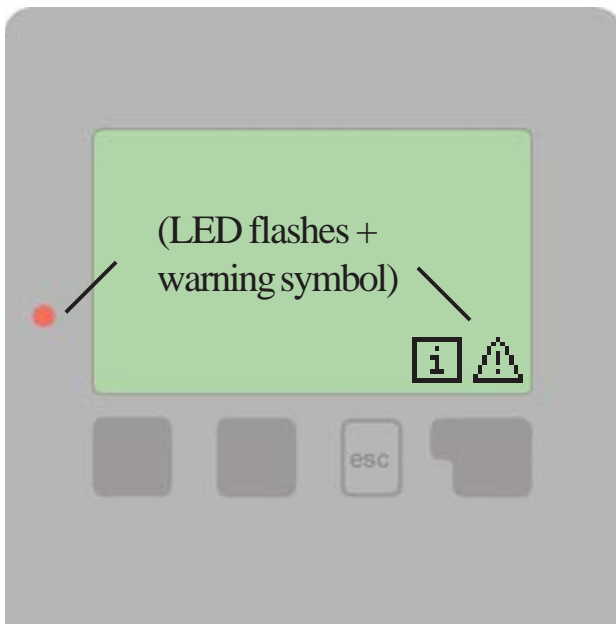
If the controller detects a malfunction, the red light fl ashes and the warning symbol also appears in the display. If the error is no longer present, the warning symbol changes to an info symbol and the red light no longer fl ashes.

To obtain more detailed information on the error, press the key under the warning or info symbol.

Do not try to deal with this yourself. Consult a specialist in the event of an error!

(LED flashes + warning symbol)

Possible error messages:	Notes for the specialist:
Sensor x defective	Means that either the sensor, the sensor input at the controller or the connecting cable is/was defective. (Resistance table see chap. A6)
Collector alarm	Means that the collector has risen/rose above the temperature set under menu 6.3.1 (chap. 6.3)
Night circulation	Means that the solar pump is/was in operation between 23:00 and 04:00. (Exception see D 6.4)
Restart	Means that the controller was restarted, for example due to a power failure. Check the date&time!
Time&date	This message appears automatically after a mains failure because the time&date have to be checked, and reset if necessary.

Replacing the fuse

Repairs and maintenance may only be performed by a specialist. Before working on the unit, switch off the power supply and secure it against being switched on again! Check for the absence of power!

Only use the supplied spare fuse or a fuse of the same design with the following specifications: T2A 250V.
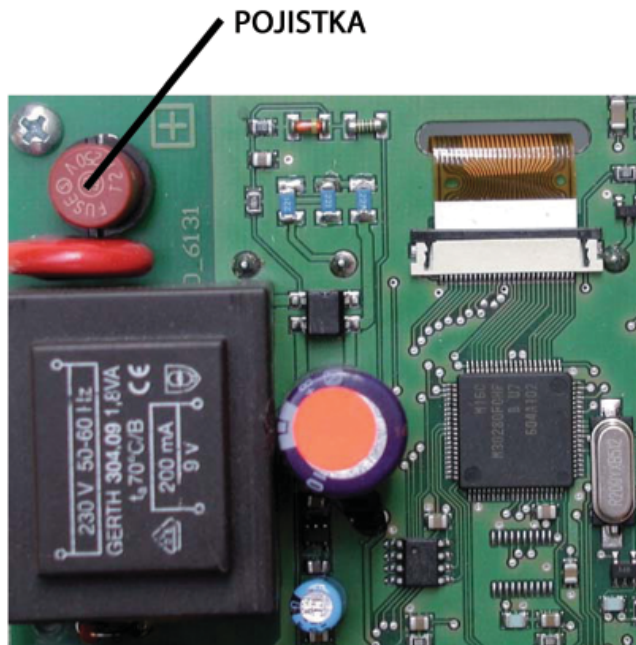
If the mains voltage is switched on and the controller still does not function or display anything, then the internal device fuse may be defective. In that case, disconnect the device, open it, remove the old fuse and check it. Exchange the defective fuse for a new one, locate the external source of the error (e.g. pump) and exchange it. Then first recommission the controller and check the function of the switch outputs in manual mode as described under D 4.2.

Maintenance

In the course of the general annual maintenance of your heating system you should also have the functions of the controller checked by a specialist and have the settings optimized if necessary.

Performing maintenance:

> Check the date and time (see D 7.2)
> Assess/check plausibility of analyses (see D 7.4)
> Check the error memory (see D 7.5)
> Verify/check plausibility of the current measurement values (see D 6)
> Check the switch outputs/consumers in manual mode (see D 9.2)
> Poss. optimize the parameter settings

Useful hints and tricks

Instead of setting the flow rate for the system using a flow rate limiter, it is better to adjust the flow rate using the switch on the pump and by means of the "max. speed" setting on the controller (see D 7.9.4). This saves electricity!

The service values (see D 9) include not only current measurement values and operating states, but also all of the settings for the controller. Write the service values down just once after commissioning has been successfully completed.

In the event of uncertainty as to the control response or malfunctions the service values are a proven and successful method for remote diagnosis. Write the service values down (see D 9) at the time that the suspected malfunction occurs. Send the service value table by fax or e-mail with a brief description of the error to the specialist.

The Operating hours displayed in the "Analysis" menu are solar operating hours. This therefore only takes into account hours in which the solar pump is active.

To protect against loss of data, record any analyses and data that are particularly important to you at regular intervals.

8. SOLARTHERM 17, 28 KDZ 25 – GROUP
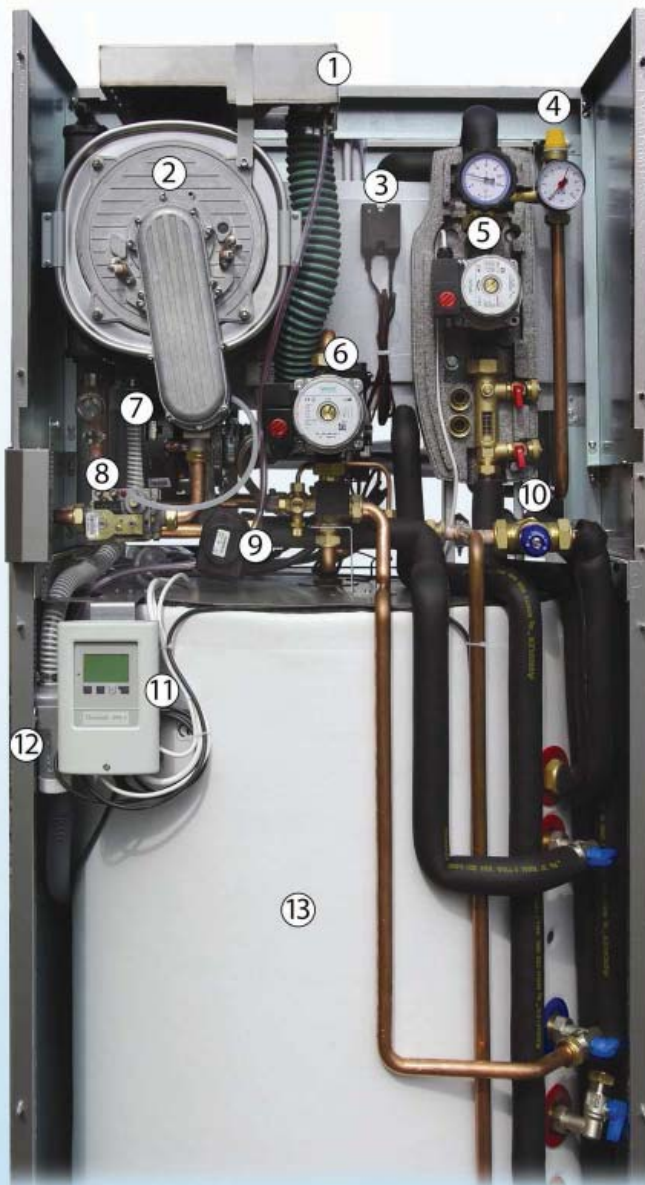
1 – Suction piping

2 – Condensing body

3 - Unit for anode protection of the storage tank

4 - Safety valve for the solar system

5 - Pump group for the solar system

6 - Pump for the heating system

7 – Ventilator

8 – Gas fitting

9 – Three-way valve

10 – Thermostatic mixing valve

11 - Control unit for the solar system

12 – Condenser tap

13 – Storage tank 250 l

9. SOLARTHERM 17, 28 KDZ 25 – EXTERNAL DIMENSIONS

1970

715

705

10. SOLARTHERM 17, 28 KDZ 25 - CONNECTION
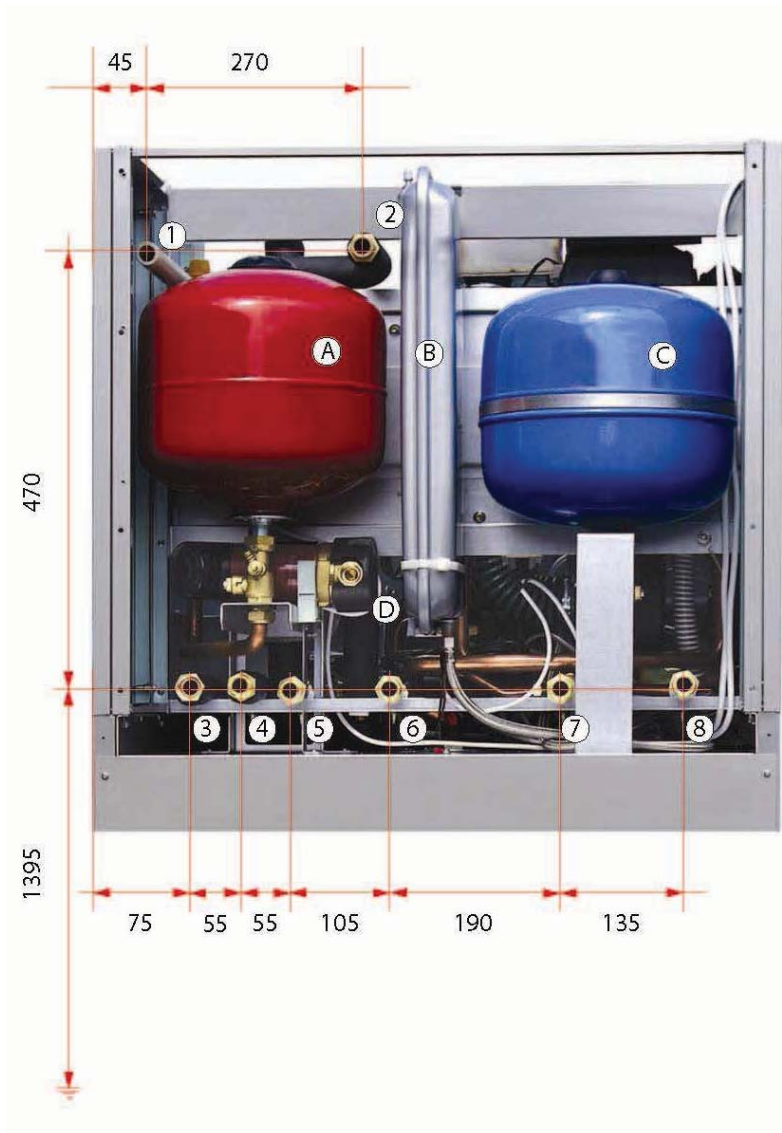
1 - Solar safety valve output
2 - Input into the collector
3 - Output for collectors
4 – Hot service water
5 – Cold service water
6 – Return water
7 – Heating water
8 – Gas

A - Expansion tank for
    the solar system
B - Expansion tank for
    the heating system
C - Expansion tank for
    the storage tank for hot
    service water
D - Circulation pump for
    hot service water
    - accessories (not part
    of the boiler)

11. WARRANTY AND LIABILITY FOR DEFECTS

The producer is not liable for mechanical damage to individual components by inappropriate handling of equipment, damage caused by unprofessional intervention into the electronics during the adjustment and connection of additional regulations, damage caused by the use of other parts and components by the replacement of original parts used by the producer.

The warranty is not applicable to defects caused by non compliance with the binding notifications and terms stated in the individual parts of this manual for the use and maintenance of the boiler.

The warranty is also not applicable to non standardized parameters in the distribution network /variation of electric voltage – in particular over-voltage peaks, pressure and cleanliness of gas, etc., defects outside Solartherm which influence its activity, improper collection of burnt gases, dirt in combusted air, dirt in the heating system, damage by outside influences, mechanical damage, storage, transport and defects originated by natural disasters.

In these cases the service organisation may require that the client pays for the repair.

The producer provides the warranty for **24 months**.

Terms for application of the warranty:

1. Inspection of equipment once a year. The inspection must only be performed by an authorized organisation, i.e. contractual service.

2. Documentation of all records of warranty repairs and annual inspections in the appendix to this manual.

12. RECORD OF WARRANTY AND POST-WARRANTY REPAIRS AND ANNUAL INSPECTIONS

Action taken	Contractual organisation	Signature of client	Date of record
	50		

Notification of the liquidation of the packaging and product after termination of its service life

All materials used fully harmonize with the requirements stated in Section 10 of Act No. 185/2001 Coll. and Section 6 of Act No. 477/2001 Coll.
The packaging of the product is collected by collecting units for paper waste, wrapping foil into the collection units for plastics.
Parts of the boiler from steel, copper and copper alloys are collected into the sorted metal collection units.
Thermal insulation of the combustion chamber is harmless to health and is liquidated as household waste.

CERTIFICATION OF QUALITY

AND COMPLETENESS OF THE PRODUCT

Solar storage tank with additional heating

Model: **SOLARTHERM 17 KDZ 25**
                      SOLARTHERM 28 KDZ 25

Serial number:

The consumer appliance fulfils the requirements of the above-mentioned directives, technical regulations and standards and operation is safe under the conditions of usual use. Measures were taken which ensure the compliance of this consumer appliance introduced on the market with the technical documentation and basic technical, safety and hygiene requirements.

The mentioned variants of condensing boilers were evaluated and approved by the Engineering testing institute, state enterprise in Brno, **ES notified body No. 1015:**

SOLARTHERM 17 KDZ 25, SOLARTHERM 28 KDZ 25 – certificate of testing of the **type** according to EC Regulation for consumer appliances for gas fuel **90/396/EEC No. E-30-01037-09.**

SOLARTHERM 17 KDZ 25, SOLARTHERM 28 KDZ 25 – certificate of testing of the **type** according to EC Regulation for consumer appliances for gas fuel **92/42/EEC No. E-30-01038-09.**

Technical inspection

Date: ....

Seal and signature: ....

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