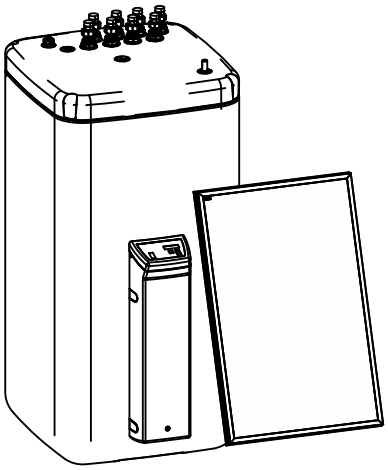
Installation and operation manual

Regulation and pump unit for solar systems



EKSRPS4A▲

▲= , , A, B, C, …, Z

Table of Contents

1 Safety

1.1 Observing instructions

The original instructions are written in English. All other languages are translations of the original instructions.

All activities required for installation, commissioning, operation, and adjustment of the heating system are described in this manual. For detailed information regarding the connected components of your heating system, please observe the respective documents.

- Work on the Daikin EKSRPS4A (such as hydraulic and electrical connection and initial start-up) is only to be carried out by persons who are authorised and who have successfully completed qualifying technical or vocational training and who have taken part in advanced training sessions recognised by the appropriate responsible authorities for the specific activity. This includes, in particular, heating specialists who, as a result of their technical training and knowledge, have experience with the proper and appropriate installation and maintenance of heating systems and solar systems.
- Please read this manual carefully and thoroughly before proceeding with the installation and commissioning or carrying out an operation on the heating system.
- Comply strictly with warning instructions!

Relevant documents

Documents listed below are part of the technical documentation of the Daikin solar system and therefore must be observed. The documents are included in the scope of supply of the individual components.

- Daikin high-performance flat solar panels Solar EKSV21P, EKSV26P, and EKSH26P. Installation instructions for on-roof, in-roof and flat-roof mounting
- Daikin hot water storage tank (EKHWP* or EKHWC*): Operating and installation instructions
- Daikin Altherma ECH₂O: Operating and installation instructions

When connecting to an external heat generator or storage tank which is not included in the scope of delivery, the individual associated operating and installation instructions apply.

1.2 Warning signs and explanation of symbols

Meaning of the warnings

Warnings in this manual are classified according into their severity and probability of occurrence.

DANGER
Indicates a situation that results in death or serious injury.

WARNING
Indicates a situation that could result in death or serious injury.

CAUTION
Indicates a situation that could result in minor or moderate injury.

INFORMATION
Indicates useful tips or additional information.

Special warning signs

Some types of danger are indicated by special warning signs.

DANGER: RISK OF ELECTROCUTION
Indicates a situation that could result in electrocution.

DANGER: RISK OF EXPLOSION
Indicates a situation that could result in explosion.

DANGER: RISK OF BURNING/SCALDING
Indicates a situation that could result in burning/scalding because of extreme hot or cold temperatures.

1.3 Avoid danger

Daikin solar installations are state-of-the-art and are built to meet all recognised technical requirements. However, improper use can lead to serious injuries or death, as well as causing material damage. Install and operate only Daikin solar systems to avoid danger:

- as stipulated and in perfect condition,
- with an awareness of the safety and hazards involved.

This assumes knowledge and use of the contents of this manual, the relevant accident prevention regulations and the recognised safety-related and occupational medical rules.

1.4 Intended use

The Daikin solar system may only be used for solar-supported heating of hot water systems. The Daikin solar system must be installed, connected and operated only according to the instructions in this manual.

The regulator and pump unit is not suitable for use in an explosive atmosphere.

Any other use outside the intended use is considered as improper. The operator alone shall bear responsibility for any resulting damage.

Intended use also includes compliance with the maintenance and service conditions. Spare parts must at least satisfy the technical requirements defined by the manufacturer. This is the case, for example, with original spare parts.

1.5 Instructions for working safely

Working on the roof

- Installation work on the roof may only be carried out by authorised and trained persons (heating technicians, roofers, etc.) under observance of the relevant Accident Prevention Regulations.
- Material and tools must be secured against falling.
- Barriers must be erected to prevent persons from entering the area below the roof where the work is being carried out.

Before working on the heating system

- All work on the heating system (such as installation, connection and commissioning) may only be carried out by authorised and trained heating technicians.
- Switch off the main switch and secure it against unintended switching on when carrying out any work on the heating system.

Electrical installation

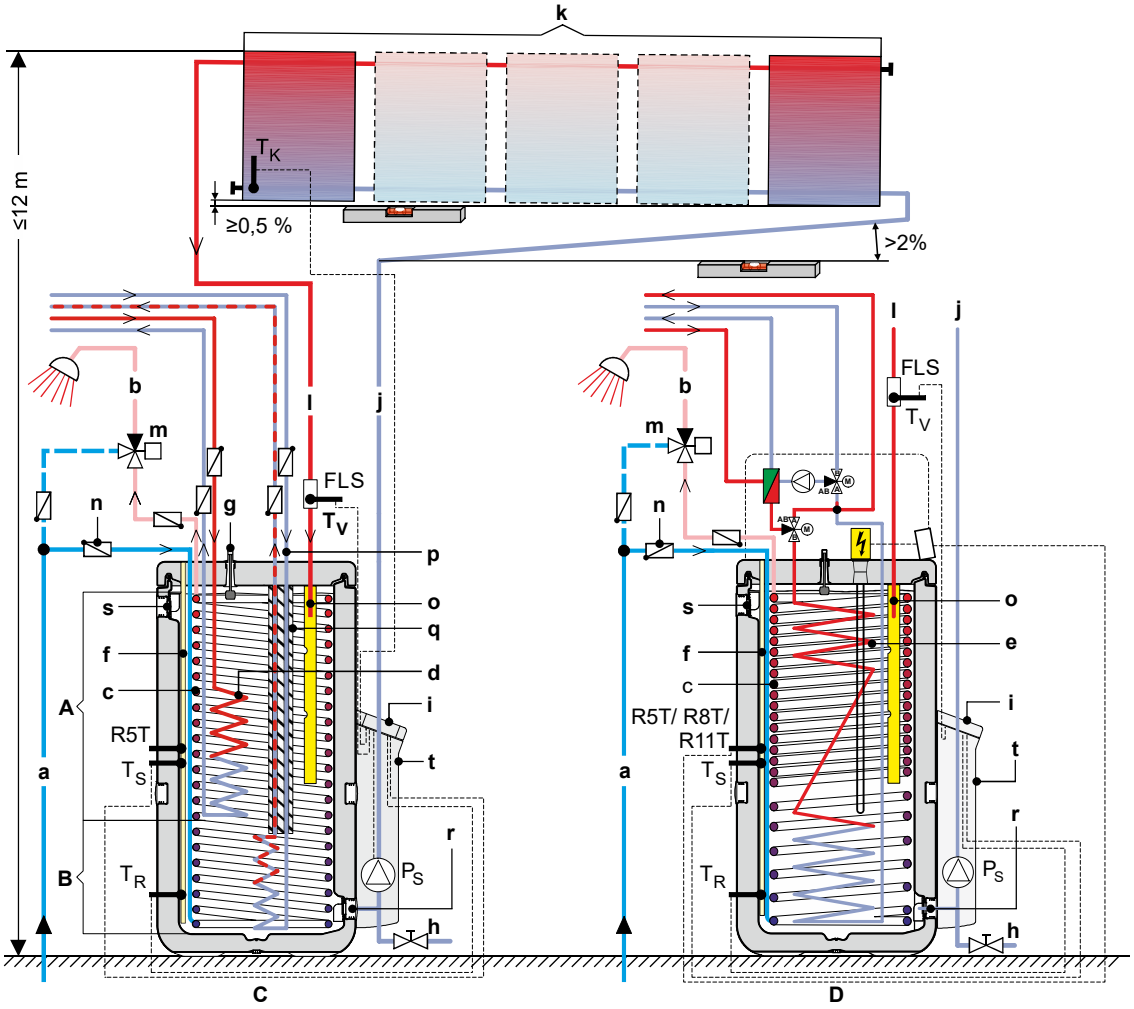
- Electrical installation must be carried out only by qualified electrical experts and in compliance with the valid electro-technical guidelines as well as the regulations of the relevant energy supply company (EVU).
- Make up the power supply in accordance with IEC 60335-1, via an isolator with contact separation in all poles with a contact opening distance in accordance with the conditions of the over-voltage category III for full disconnection, and a residual current protection switch (FCD) having a reaction time ≤ 0.2 secs.
- Before completing the mains connection, compare the mains voltage, indicated on the type plate (230 V, 50 Hz) with the supply voltage.
- Before beginning work on live parts, disconnect them from the power supply (switch off main switch, remove fuse) and secure against unintentional restart.
- Equipment covers and service panels must be replaced as soon as the work is completed.

Instructing the user/owner

- Before you hand over the heating system, explain to the user/owner how to operate and check the heating system.
- Make a record of the handover by filling out and signing the installation and instruction forms jointly with the user/owner.

2 About the box

2.1 Structure and Components of Solar system



a Cold water connection line
b Domestic water (hot) distribution line
c Stainless steel corrugated heat exchanger for domestic water (hot)
d Stainless steel corrugated heat exchanger for storage tank charging
e Stainless steel corrugated heat exchanger for storage tank charging and heating support
f Submersion sleeve for storage, return temperature sensors
g Fill level display
h Filling and draining cock (KFE BA accessory)
i Solar R4 controller
j Solar return line (at the bottom on the solar panel)
k Solar panel array
l Solar flow line (at the top on the solar panel)
m Thermal mixing valve (scalding protection, provided by customer)
n Convection brake (accessory)
o Solar flow layering pipe
p Corrugated stainless steel heat exchanger for heating support
q Thermal insulation sleeve for corrugated stainless steel heat exchanger for heating support
r Solar return connection
s Safety overflow connection
t Regulation and pump unit
A Zone with water for domestic use
B Solar zone
C Domestic hot water storage tank EKHWP* or EKHWC*
D Daikin Altherma floor standing unit with integrated ECH$_2$O tank
FLS Solar FlowSensor (flow measuring)
P_S Solar operating pump
R5T, R8T, R11T DHW storage tank temperature sensor
T_K Solar panel temperature sensor
T_R Solar return flow temperature sensor
T_S Solar storage tank temperature sensor
T_V Solar inflow temperature sensor

2.2 Info parameters

The Daikin solar system is a thermal solar system for supplying hot water for consumption and solar support.

INFORMATION

The Daikin regulator and pump unit EKSRPS4A can only be installed and operated in the depressurised Daikin Solar System (DrainBack) using the provided installation material.

The prerequisite for problem-free operation in the DrainBack system, is that the connection lines are routed with a constant gradient (at least 2 %), and that the bottom edges on the solar panels with double-sided connections are mounted with a constant gradient to the return connection, or, with same side connection, are mounted horizontally.

Mode of operation

The Solar EKSV21P, EKSV26P and EKSH26P high-performance solar panels efficiently convert the sun's radiation into heat. The heat transport medium is normal tap water.

As soon as the solar collectors have reached a useful temperature level, the water in the storage tank (which is not under pressure) is pumped directly through the collectors. With insufficient collector temperature, the circulation pump is switched off and the system is drained automatically. This operating mode has several advantages:

- High operational reliability, as there are no components that could be damaged or fail (such as expansion vessel, safety valve, venting valves, etc.).
- Excellent heat transfer and heat storage capacity (system works without antifreeze agents).
- Minimum maintenance requirements.
- Frost proof.
- Without separate solar heat exchanger.
- No stagnation problems.

Modular design

The system consists of several preassembled modules. Plug-in technology and a high degree of pre-assembly ensure fast and simple system installation.

Storage tank

The following storage tanks can be used for the Daikin solar system:

- Domestic hot water storage tank EKHWP* or EKHWC*
  - Thermally insulated, de-pressurised plastic storage tank
  - Connection facility for a Daikin air-water heat pump
- Daikin Altherma floor standing unit with integrated ECH_2O tank
  - Thermally insulated, de-pressurised plastic storage tank
  - Integrated solar connection

INFORMATION

Construction, operating principle, commissioning, and operation of other solar components are not described in this manual. Detailed information about the components can be seen in the operating and installation instructions of the individual units.

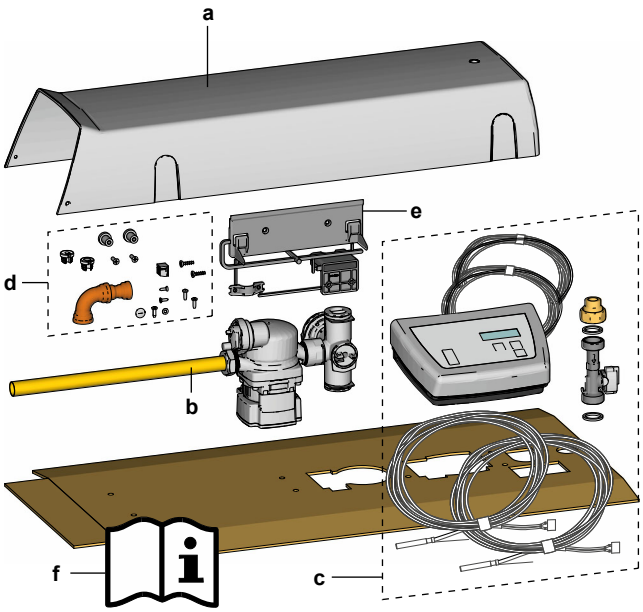
The handling instructions and descriptions in this manual are valid for all Daikin storage tanks to be used in conjunction with this solar system, even if only one type is used for illustrative purposes. Any deviations from other storage tanks will be noted separately.

Electronic control

The fully electronic Daikin Solar R4 control system ensures optimal solar heat utilization (for hot water heating and heating backup) and compliance with all operational safety requirements. All the parameters required for comfortable operation are preset at the factory.

2.3 System components

2.3.1 Regulation and pump unit EKSRPS4A



a Cover
b Connecting pipework to the solar operating pump
c Daikin Solar R4 controller with storage tank temperature sensor (T_S), return flow temperature sensor (T_R, FlowSensor (with 2 gaskets), connection cable 230 V mains connection (controller + pump, 3 m), Pump connection cable (PWM signal)
d Accessories bag (angle with fitting, 4 countersunk head screws, 5 self-tapping screws, sensor plugs, plastic plug, washers, connection plug for solar panel temperature sensor)
e Mounting material (retaining bracket for pump mounting, holding bar and fixing bracket for controller), Installation screw template
f Solar Documentation

2.3.2 Optional accessories

KFE Filling connection

For convenient filling and draining of the Daikin hot water storage tank, you can connect the KFE filling connection (KFE BA).

For setting and display of the flow rate of 2-6 l/min, you can use the setting valve (FlowGuard FLG).

Solar storage tank extension kit

If the heat output of a single Daikin hot water storage tank is not adequate, you can interconnect several Sanicube / HybridCube as modules.

The following components are offered:

- Solar storage tank extension kit CON SX
- Solar storage tank extension kit 2 CON SXE
- FlowGuard FLG

The installation and operation of this accessory component is described in detail in the individual operating and installation instructions provided.

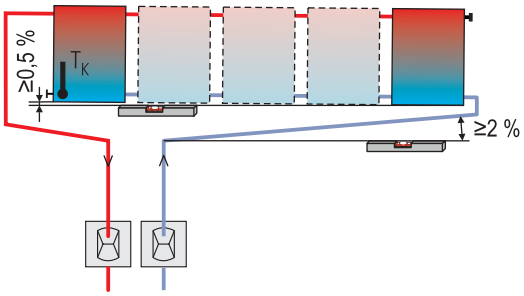
3 Installation

3.1 System concepts

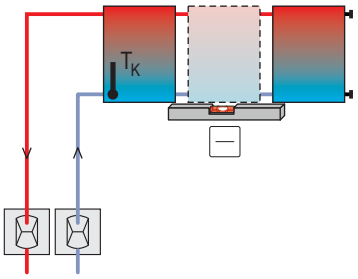
Daikin solar systems are usually built according to one of the following system concepts. Information concerning hydraulic system incorporation with example schematics see "8 Hydraulic system connection" [▶ 28].

3.1.1 Parallel connection

Solar panel field with a connection at each end

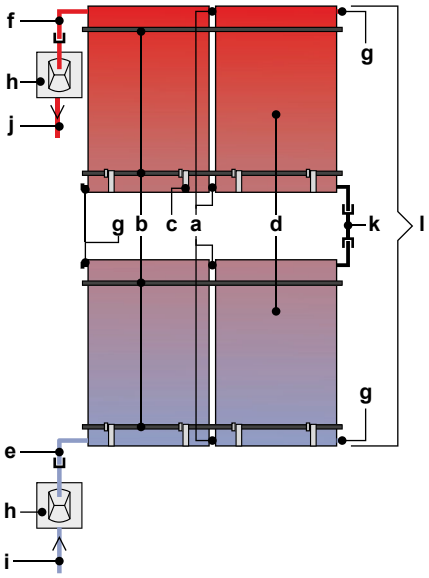


Solar panel field with both connections at one end



3.1.2 Serial connection

As an alternative to the parallel mode described in this manual, and if necessary, a maximum of 3 solar panels can be mounted one above the other. Solar panels or solar panel fields mounted one above the other must be connected in series.



a Collector connector
b Mounting rail
c Solar panel securing hook
d Solar panel
e Return panel connection
f Flow panel connection
g Collector sealing cap
h Roof penetration boxes for inflow/return flow
i Solar return line
j Solar flow line
k Series panel connector
l Solar panel array (2x2 panels)

3.2 Installing the regulation and pump unit

DANGER: RISK OF ELECTROCUTION

Live parts can cause an electric shock on contact and cause life-threatening burns and injuries.

- Before beginning work on the boiler switching panel or the solar controller, disconnect the devices from the power supply (switch off fuse, main switch) and secure against unintentional restart.
- Electrical installations must always be carried out by qualified electrical technicians in conformity with the relevant electrical guidelines and the regulations of the electric utilities company to prevent hazards from damaged electric wiring.
- Comply with the relevant safety at work regulations.

DANGER: RISK OF EXPLOSION

Leaking gas in the immediate proximity of electrical components can cause an explosion.

- The EKSRPS4A regulating and pump unit and electrical components should not be installed in locations where there is a danger of flammable gas escaping.
- Observe the minimum clearances to walls and in shafts.

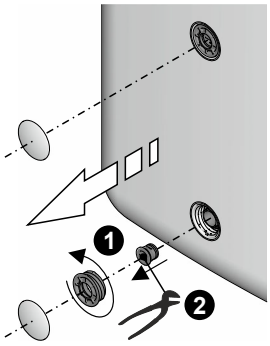
3.2.1 Installation pump unit

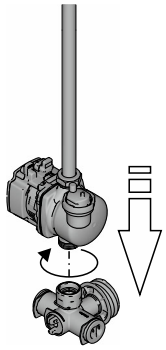
CAUTION

Large volumes of water may come out of the solar storage tank during installation.

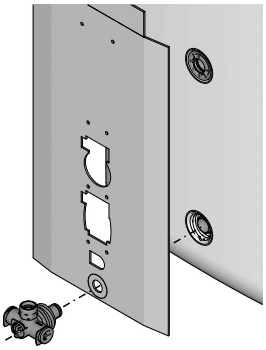
- Mount the pump unit before filling the solar storage tank (depressurised range) with water.
- If the pump unit is to be connected to solar storage tank that is already in operation, the depressurised storage area must first be drained.

1 Remove the cover plates and the screw plug with sealing plug of the unit and disconnect the connecting angle from the pump.

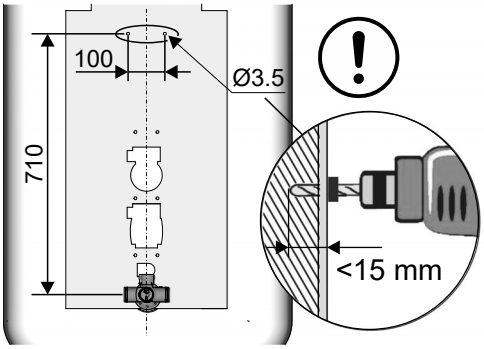




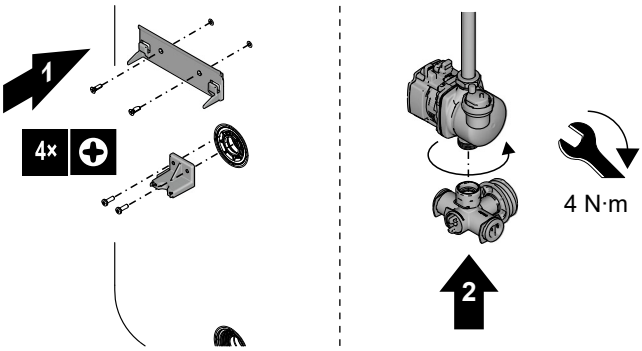
2 Install the installation screw template and fix it with the connecting angle.



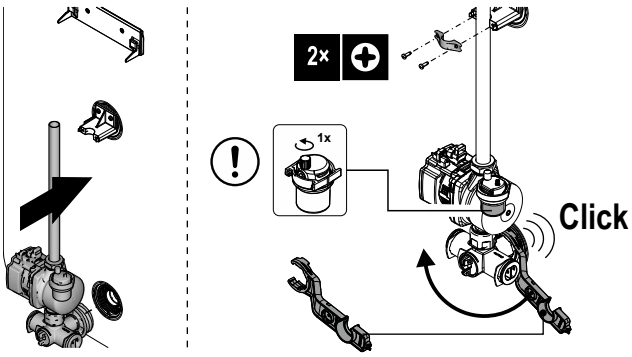
3 Drill the holes with a 3,5 mm drill bit, taking care not to drill deeper than 15 mm. Remove the installation screw template when finished.



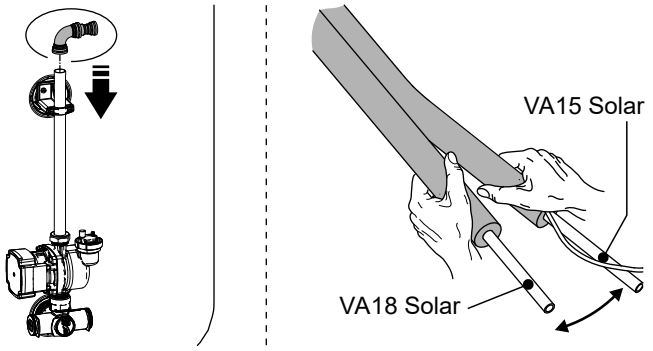
4 Mount the retaining bracket for pump mounting and the fixing bracket for controller. Connect the connection angle to the pump unit.



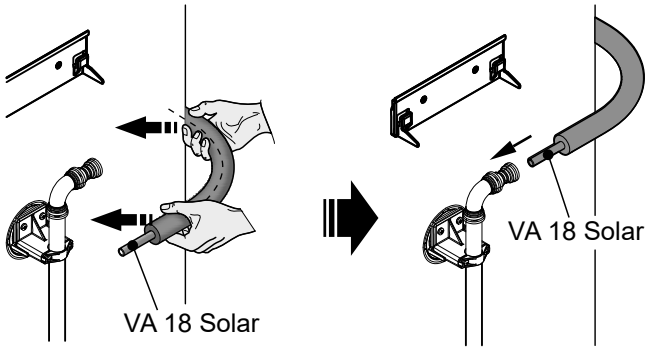
5 Install the pump unit to the storage tank and fix it with holding bar. Open the manual air vent valve by one turn.



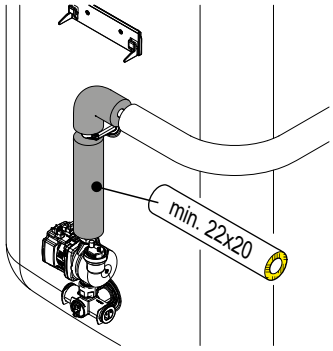
6 Install the angle with fitting on the pump unit. Separating the solar connection cables.



7 Bend the solar connection cable (VA 18) around the storage tank and connect it to the angle.



8 Insulate the water piping.



CAUTION

In the case of longer pipe runs with only a minimum gradient, it is possible for water pockets to develop due to thermal expansion of the plastic pipes between the mounting points with siphon action:

- Use support troughs.
- Always make sure that pipe runs have a continuous gradient of at least 2 %.

3.2.2 Installation of FlowSensor, FlowGuard (optional)

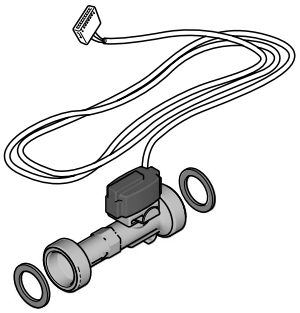
INFORMATION

Note the direction of flow when installing the FlowSensor.

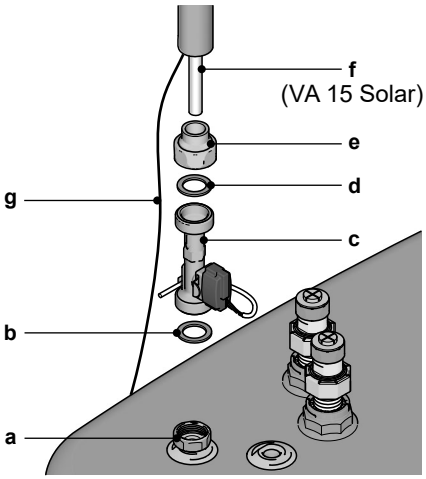
Displayed in this manual is the installation on a storage tank (EKHWP*). For heat pumps (Daikin Altherma 3 ECH_2O or Daikin Altherma 4 ECH_2O), installation is carried out in the same way.

FlowSensor

The FlowSensor FLS 20 is a measuring device that simultaneously determines the flow rate in the solar panel and the flow temperature. The measuring ranges are 0...20 l/min (flow quantity) and 0...120°C (inflow temperature). The measured values are displayed on the Solar R4 controller. By controlling the speed of the solar operating pump P_S, the Solar R4 controller automatically adjusts the optimum flow quantity.



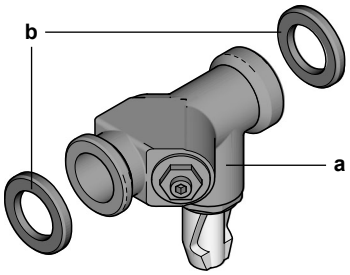
1 Insert the gasket (b) in the solar flow connection (a) on the storage tank.
2 Screw the FlowSensor (c) on to the drainback connection (a) on the storage tank.
3 Fit the gasket (d) and insert the push-in fitting (e) in the inlet of the FlowSensors (c).
4 Cut the solar flow pipe (f) (Ø 15 mm) to the required length and insert it in the push-in fitting (e).
5 Route the FlowSensor cable between the FlowSensor (c) and the Solar R4 controller.
6 Plug the FlowSensor cable (g) into the FlowSensor (c) and into the FLS slot on the circuit board of the Solar R4 controller. (see "Electrical connection of the control system" [▸ 10]).



a Drainback connection
b Gasket
c FlowSensor
d Gasket
e Fitting
f Solar flow pipe
g FlowSensor cable

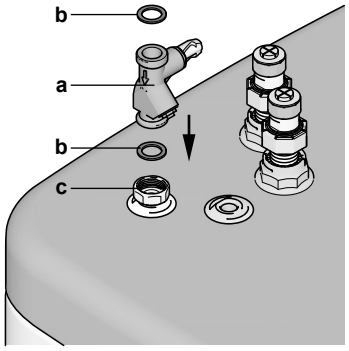
FlowGuard

The FlowGuard FLG is available as an accessory. It is a regulating valve with integrated flow indicator which can be used to set the flow rate through the solar panel array. The display range is 2… 16 l/min.



a FlowGuard
b Gaskets

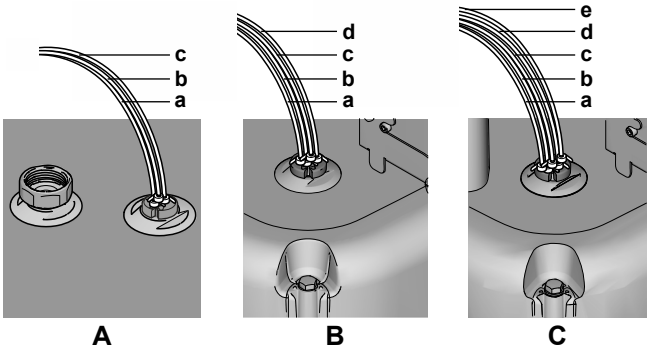
1 Insert the seal in the drainback connection.
2 Mount the FlowGuard, and screw it tight.
3 Fit the seal and insert the push-in fitting in the inlet of the FlowGuard.
4 Insert the prepared flow pipe into push-in fitting in the FlowGuard.



a FlowGuard
b Gaskets
c Drainback connection

3.2.3 Installing temperature sensor

The installation variants of the temperature sensors differ depending on the product type and the number of sensors. All temperature sensors are installed according to the same principle, but with different immersion depths in the sensor tube.



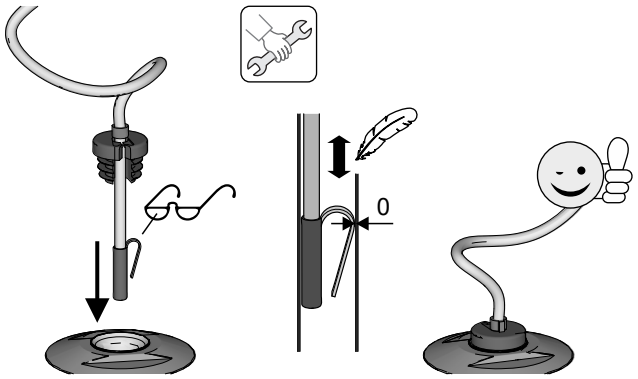
A Installing temperature sensors in case of a tank (EKHWP* or EKHWC*)
B Installing temperature sensors in case of Daikin Altherma 3 ECH_2O
C Installing temperature sensors in case of Daikin Altherma 4 ECH_2O

CAUTION

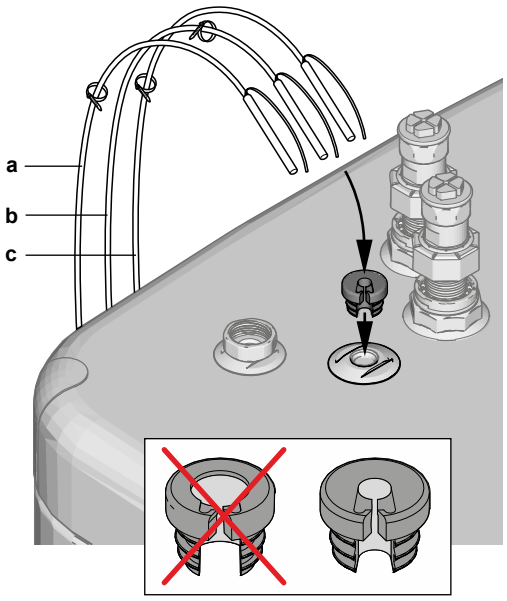
The storage tank temperature sensor of the control unit must never be immersed more than 750 mm into the sensor immersion sleeve. A sensor that is inserted too deeply can lead to overheating of the consumption water section, as well as a "hang-up" of the control unit during the storage tank charging phase.

1 Bend over the contact springs on both sensors (return temperature sensor, storage tank temperature sensor) and insert into the sensor tube.

2 Push the sealing plug into the well, and run the cables.



Installing temperature sensors in case of a tank (EKHWP* or EKHWC*)

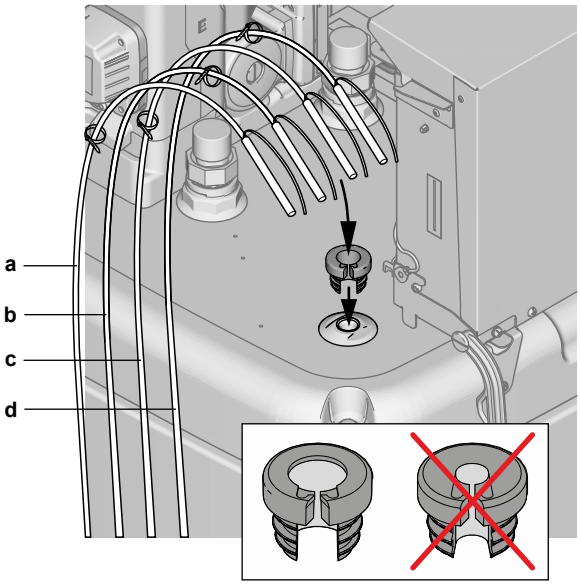


a Solar return flow temperature sensor (T_R)
b Solar storage tank temperature sensor (T_S)
c DHW temperature sensor 1 (R5T)

1 Position the sensors in the sensor tube in the correct assembly order and at the specified insertion depth (cable ties):

Assembly order	Sensor	Distance from plug	Color tie wrap
1	Solar return flow temperature sensor (T_R)	1300 mm	black
2	DHW temperature sensor 1 (R5T)	800 mm	red
3	Solar storage tank temperature sensor (T_S)	700 mm	red

Installing temperature sensors in case of a Daikin Altherma 3 ECH$_2$O



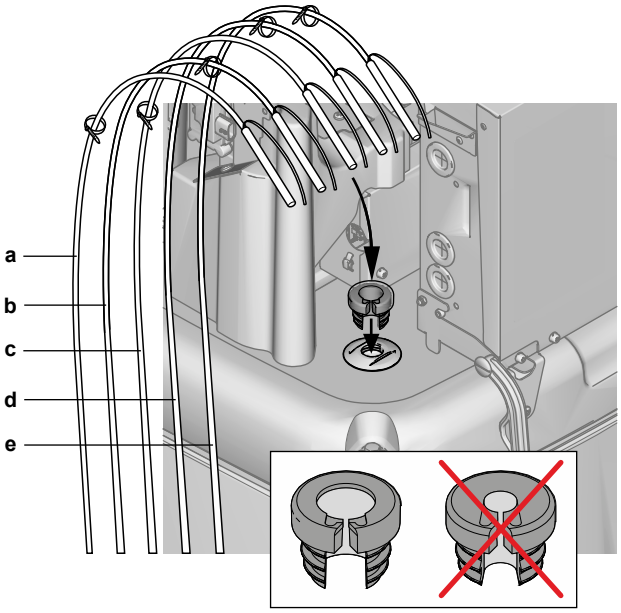
a Solar return flow temperature sensor (T_R)
b Solar storage tank temperature sensor (T_S)
c DHW temperature sensor 1 (R5T)
d DHW temperature sensor 2 (R8T)

1 Position the sensors in the sensor tube in the correct assembly order and at the specified insertion depth (cable ties):

Assembly order	Sensor	Distance from plug	Color tie wrap
1	Solar return flow temperature sensor (T_R)	1300 mm	black
2[(a)]	DHW temperature sensor 2 (R8T) for model type EBSH/X(B)* , ELSH/X(B)* , ETSH/X(B)*	1200 mm	red
3	DHW temperature sensor 1 (R5T)	800 mm	green
4	Solar storage tank temperature sensor (T_S)	700 mm	red
5[(a)]	DHW temperature sensor 2 (R8T) for model type EHSH/X(B)*)	600 mm	red

[(a)] The assembly order of DHW temperature sensor 2 depends on the type of the model.

Installing temperature sensors in case of a Daikin Altherma 4 ECH₂O



a Solar return flow temperature sensor (T_R)
b Solar storage tank temperature sensor (T_S)
c DHW temperature sensor 1 (R5T)
d DHW temperature sensor 2 (R8T)
e DHW temperature sensor 3 (R11T)

1 Position the sensors in the sensor tube in the correct assembly order and at the specified insertion depth (cable ties):

Assembly order	Sensor	Distance from plug	Color tie wrap
1	Solar return flow temperature sensor (T_R)	1300 mm	black
2	DHW temperature sensor 3 (R11T)	1250 mm	natural
3	DHW temperature sensor 1 (R5T)	800 mm	green
4	Solar storage tank temperature sensor (T_S)	700 mm	red
5	DHW temperature sensor 2 (R8T)	200 mm	red

3.2.4 Preparing and fitting the control system

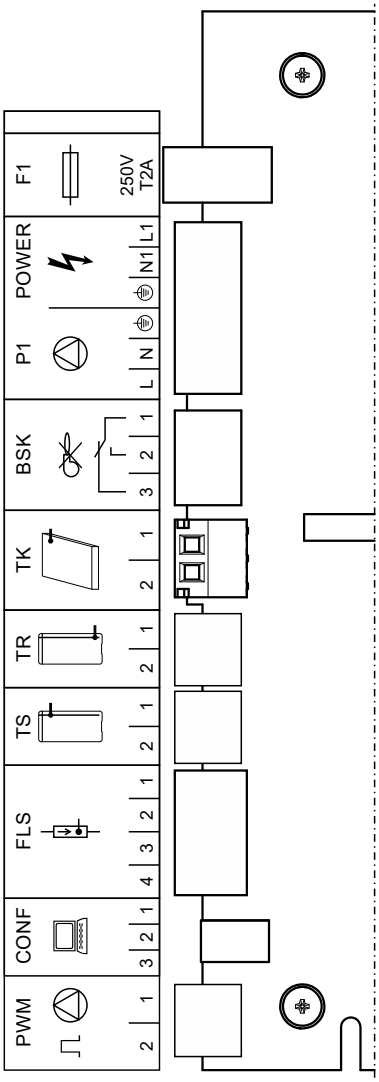
Requirements of the control system

- For electrical connections and consumable electrical materials (cable, insulation, etc.), follow all valid country-specific guidelines.
- For every fixed mains connection, use a separate EN 60335-1 disconnector for all-pole disconnection from the power mains and a GFCI circuit breaker with a reaction time ≤ 0.2 s.

Permissible cable types at the terminal strip:

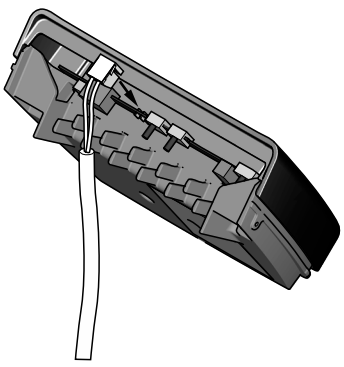
- Single core ≤ 2.5 mm²
- Multi-core ≤ 2.5 mm²
- Multi-core with wire end sleeves with insulating collar ≤ 1.5 mm²
- Multi-core with wire end sleeves without insulating collar ≤ 2.5 mm²

Electrical connection of the control system

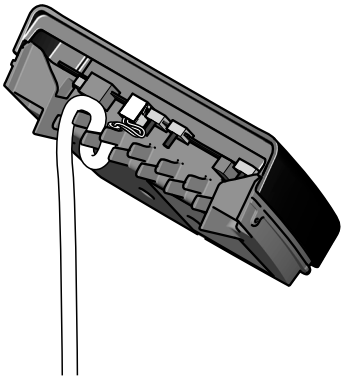


BSK Burner blocking contact
CONF Programming socket for software updates
F1 Fuse
FLS FlowSensor
n.a. Not assigned
P1 Solar operating pump
Power Mains supply
PWM Pump connection (PWM signal)
TS Storage tank temperature sensor
TR Return flow temperature sensor
TK Solar panel temperature sensor

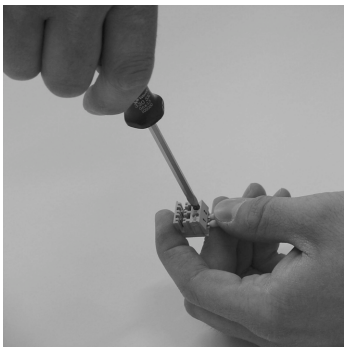
1 Plug in the supplied cables using the PCB edge connectors at the rear of the control unit. The connectors are polarised to prevent errors. A connecting diagram is provided in the control unit cover.



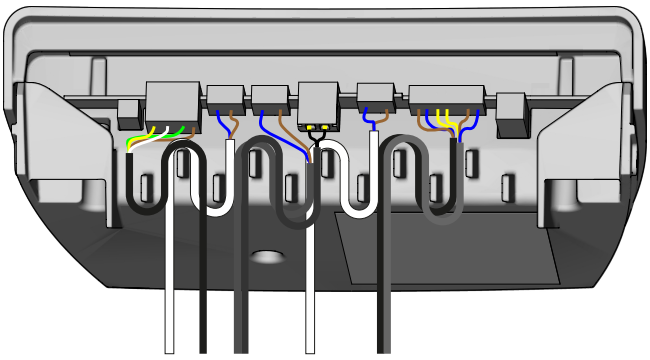
2 To ensure reliable tension relief, all cables should be run through the respective labyrinths.



3 Connect the collector temperature sensor cable (integrated into the connecting cable) to the plug.



4 Insert the plug at the edge of the board on the controller, at position TK (2-pin).

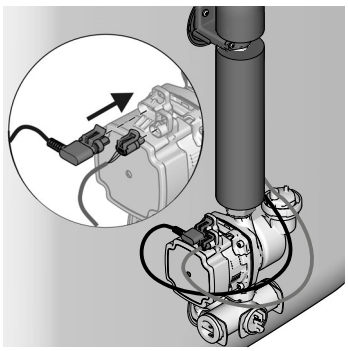


5 Insert the control unit into its fixing bracket from above.

- Make sure that the cable loops point downwards.

6 Cabling of the solar operating pump P_S:

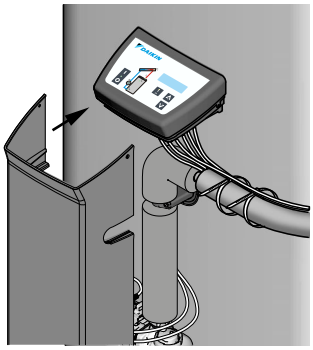
- Connect the pump cable to the solar operating pump P_S



7 Run the control cables along the return pipe and fix them with cable ties.

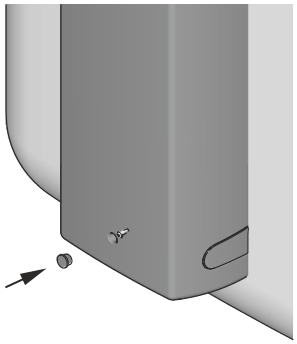
3.2.5 Fit the covering hood

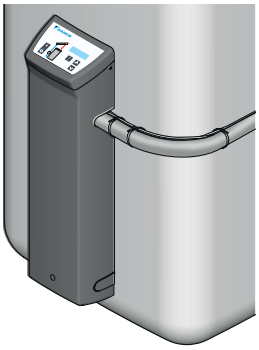
1 Fit the cover and align it. Make sure that the cover is pushed under the control unit housing so that there is an evenly spaced joint all around the control unit.



2 Fix the cover to the control unit on both sides with countersunk screws.

3 Fasten the cover to the storage tank connecting bracket underneath. To do this, carefully screw in the self-tapping fixing screw (pre-fitted on the cover) through the recess in the lower part of the front of the housing and then fit the cover cap.





4 Commissioning

4.1 Start-up

WARNING

The solar system cannot be started until all hydraulic and electrical connections have been completed.

Incorrect commissioning will impair the system's function, and can lead to damage to the entire installation. Installation and start-up must therefore must conducted by Daikin-authorised and trained heating experts.

The protective conductor resistance and correct wiring must be checked before start-up.

CAUTION

Commissioning in frosty conditions can result in damage to the entire heating system.

Commissioning with outside temperatures below 0°C should only be undertaken if a water temperature of at least 5°C in the solar circuit can be guaranteed (e.g. by previous heating of the storage tank).

Daikin recommends that you avoid operating the system in extremely frosty conditions.

CAUTION

UK only: If filling or topping up the storage tank is done by means of the boiler filling and drain valve, a temporary filling loop must be used with the appropriate backflow prevention device in accordance with clause G24.2, Guidance to the Water Supply (Water Fittings) Regulations 1999.

All the following work must be carried out in the specified sequence.

1 Filling the storage tank:

- Filling the heat exchanger for domestic water

INFORMATION

The domestic water quality must comply with the EU Guideline 98/83 EC and the regionally-applicable regulations.

- Fill the buffer storage volume via the filling and draining cock (**KFE BA**) on the regulation and pump unit EKSRPS4A until water comes out of the safety overflow.
- Close the filling and draining cock (**KFE BA**).

2 Switch on the Solar R4 controller.

Result: The initialisation phase begins

3 When the initialisation phase is finished (temperature display), fill and vent the solar system by simultaneously pressing both arrow keys (starting manual mode).

Result: The solar operating pump P_S now runs at full power and the solar system is exposed to the maximum possible operating pressure. The solar system fills, the air escapes through the flow line into the air compartment of the storage tank.

4 Check the entire system for leaky joints (in the building and on the roof). Seal any leaks that occur in a professional manner.

5 Switch off the Solar R4 controller.

6 Check the filling level in the hot water storage tank.

INFORMATION

Within a few minutes after switching off and emptying of the solar system, the fill level indicator in the hot water storage tank once again reach almost to the fill level.

- The reason for a slightly lower fill level is the remaining of a small volume of water in the lower collection pipes in the panels. If the solar panels are correctly aligned, this volume of water is not dangerous for the panel, even under the effects of frost, since there is adequate space for expansion.
- If the fill level remains considerably below the fill level, this can be an indication of undiscovered leaks or faulty line routing (water pockets). In this case the installation must be checked very closely once more.

7 Adjusting the filling time:

- Switch the Solar R4 controller on again (initialisation phase starts).
- When the initialising phase is finished (temperature display), you can start the manual operating mode by simultaneously pressing both arrow keys.
- Measure the time it takes to fill the solar system completely. The system is fully filled when you can no longer hear any air noises and a steady value for the flow rate is displayed (activate the measuring point [Flow rate] using the arrow keys).
- Set the measured time plus 20 seconds in the parameter [time P2] (see "5.3.6 Setting and resetting parameters" [▶ 20]).

8 Switch the Solar R4 controller to the automatic mode by pressing the two arrow keys simultaneously or by switching off and on again.

Result: The solar system is now ready for operation.

INFORMATION

The correct flow rate in the solar circuit is set automatically by regulating the speed of the solar operation pump P_S.

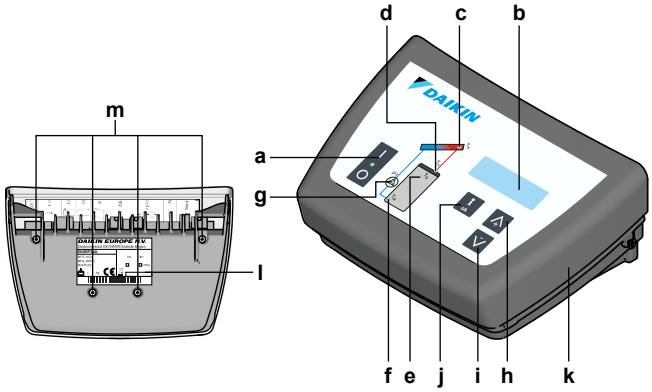
9 Only when connecting a EKSRPS4A regulating and pump unit to several solar storage tanks:

- The entire flow rate, measured with the FlowSensor in the solar flow line must be distributed evenly to all the connected solar storage tanks. We recommend using a FlowGuard (FLG) at each storage tank for regulation purposes.

10 Instruct the user, fill out the acceptance report, and send it to the address indicated on the rear cover of this manual.

5 Control unit

5.1 Operating and display components



a Main switch with indicator light
b Display of temperature and parameter indication (energy saving function: Display illumination is switched off 10 minutes after the last actuation)
c Light for collector temperature display
d Light for solar flow temperature and flow measurement (FLS)
e Light for storage tank temperature display
f Light for solar return flow temperature display
g Operating status light for speed-controlled solar operating pump P_S (lights up when pump running - flickers if the pump is running in a restricted condition)
h Up arrow for moving the temperature or parameter display up by one setting/increasing parameter settings
i Down arrow for moving the temperature or parameter display down by one setting/decreasing parameter settings
j Information key for accessing the information level (displays measured values, maximum values and calculated values) and OK key for confirming and storing settings in the setting menu
k Controller housing
l Type plate
m Locking screws for device housing (back)

DANGER

Unit may only be opened by an authorised technician. Disconnect from mains supply before opening the housing.

5.2 Operating mode of control system

INFORMATION

Due to continual improvements for the optimum use of the system, the Solar R4 controller have been equipped with an update function. Consequently some of the functions described in this chapter are only applicable to certain software versions. These functions are separately identified by symbols.

Software updates to the Solar R4 controller must only be done by the Daikin service technician.

INFORMATION

The power switch completely disconnects the Solar R4 controller from the mains voltage. Switching of the mains switch takes more effort in pushing the button than is required for actuating the operating buttons.

5.2.1 Pump operation

The solar system is operated fully-automatically all year round without the need for manual intervention. The speed-regulated pump operation is controlled by the Solar R4 controller. For the operating and display elements see "5.1 Operating and display components" [▶ 13].

Criterion for actuation:

- Pump operation depends on the continuously measured temperature difference between the solar panel (T_K) and the return flow temperature (T_R) and a comparison with the set value of the parameter [Delta T on].

  The solar operating pump P_S switches on, if the temperature difference (= T_K – T_R) exceeds the value set in the parameter [Delta T on] (e.g. return flow temperature = 40°C and [Delta T on] = 15 K; solar panel temperature > 55°C).

Criteria for switching off:

- The solar operating pump P_S switches off if the temperature difference falls below the value set on the parameter [Delta T off].

  1. Possibility: Normal switch-off if the "filling time" (Parameter [time P2]) has expired and the temperature difference between the flow and return temperatures has reached the switch-off condition (T_V – T_R < [Delta T off]).

  2. Possibility: Rapid switch-off if the solar panel cools off too quickly within the "filling time" (Parameter [time P2]) (T_K – T_R < [Delta T off]).

INFORMATION

If there is active frost protection (T_K<0°C within the last 24 h) there will be no rapid switch-off. The solar operating pump P_S is operated for an extended period, so that the connecting lines are heated up to such a temperature that does not permit the formation of ice plugs.

In this case, however, a considerably higher solar panel temperature must be achieved before the solar operating pump P_S switches on.

- Achieving the maximum storage tank temperature set via parameter [T_S max] (T_S light flashes). In this case, restarting the solar operating pump P_S is only possible if the storage tank temperature has fallen by more than 2 K.
- Achieving the maximum permissible panel temperature set via the parameter [T_K permitted] (T_K light flashes). In this case, restarting the solar operating pump P_S is only possible if the solar panel temperature has fallen below the parameter value [T_K permitted] by more than 2 K.
- Faulty FlowSensor.

5.2.2 Booster function for high solar panel temperatures

Above a solar panel temperature of [TK max], the output of the solar operating pump P_S is operated at max. output.

This increases the system pressure as well as the flow quantity, which enables more heat to be stored within a shorter time.

The booster temperature can be changed by a heating expert with the parameter [TK max]. This increase in output is switched off again automatically if the booster temperature falls by 5 K.

5.2.3 Start optimisation

Start optimisation prevents too frequent cycling and reduces the power consumption. This is a self-learning function. Start optimisation is activated in the factory.

5.2.4 Switch-on lock functions

The switch-on lock functions prevent:

- Reactivation if the solar thermal system was switched off automatically when the set maximum tank temperature [T_S max] was reached (T_S light flashes).
- Pump operation with activated "intensified frost protection function" (star symbol flashes in the display – see "5.2.11 Frost protection function" [▸ 15]).
- Pump operation, if the solar panel temperature exceeds the adjustable value set by the heating expert by parameter [T_K permitted] (T_K light flashes).

After switching off the solar operating pump P_S as a result of the maximum storage tank temperature, continuing impingement of the sun's rays on the solar panel can cause temperatures of over 100°C. If the storage tank temperature falls below the release temperature ([T_S max] – 2 K), (e.g. by the removal of hot water), the solar operating pump P_S is only switched on again if the temperature at the solar panel falls below the value set with the parameter [T_K permitted] for the restart protection temperature by 2 K.

The function blocking time ensures that the solar operating pump P_S is only released again, after the occurrence of a switch-off condition, after expiry of the blocking time set in the parameter [time SP] (0 – 600 secs.).

This means:

- the cycling of the solar system can be minimised.
- the solar panel can achieve a higher temperature.
- when filling the solar system, the flow temperature does not fall below the switch-off condition and the system regulates itself more quickly.

INFORMATION

If the solar operating pump P_S is switched on at solar panel temperatures over 100°C (T_K perm > 100°C), the return water vapourises as soon as it reaches the solar panel. Similarly, a slightly increased consumption of storage tank water due to escaping steam is a normal operating condition.

The water vapour escapes in a depressurised manner into the solar storage tank in a correctly installed solar system, where it condenses again to a large extent. A slight increase in the consumption of buffer water, caused by the escaping unpressurized water vapour, is a normal operating condition.

5.2.5 Pump kick function

During extended shut-down periods, the solar operating pump PS is activated for a few seconds every 24 hours.

This prevents the solar operating pump from seizing up.

5.2.6 Manual operation

Exclusively for commissioning and test purposes, the system can be switched on manually for the time period saved in the parameter [H/A].

All the regulation functions are switched off and the solar operating pump P_S runs continuously, independent of the system temperatures, at the set output stage.

- Pressing (>1 s) both arrow keys simultaneously activates or deactivates manual operation.

CAUTION

Uncontrolled manual operation can lead to heat loss, excessively high storage tank temperatures and, under certain cold situations, even to frost damage.

INFORMATION

The manual mode cannot be activated with active "enhanced frost protection function" (star symbol in display flashing – see "5.2.11 Frost protection function" [▸ 15]).

5.2.7 Output calculation, maximum values, and yield count

INFORMATION

The balancing and calculation of the system operating data (e.g. solar heat yield) does not replace a calibrated thermal energy meter. These values may not be used for invoicing heating costs or similar legally valid accounting purposes.

If a FlowSensor is connected, the system operating data is calculated and balanced, such as the current heat output and the solar heat yield. The maximum and calculated values can be shown on the display (see "5.3 Adjustment and menu guide" [▸ 17]). Values greater than "0" which have not been deleted are still diplayed after disconecting or disabling the FlowSensors (without further updating).

5.2.8 FlowSensor

The FlowSensor (FLS) serves to measure the flow rate "V" and the feed temperature "T_V".
With the sensor connected and working:

- the measurement values "V" and "T_V" are displayed.
- the controller operates after the filling process with the real spread T_V - T_R.

If the system has detected the FlowSensor once, the display shows an error message if a sensor is faulty or is disconnected (see "6.1 Display of events" [▸ 25]). The system then works in the emergency mode without the FlowSensor.
If the controller detects, after a new installation or a technician reset, a FlowSensor, the value "20" is set automatically in the parameter [FLS active].
The correct parameter value for the FlowSensor fitted to the system must always be checked and adjusted if necessary. By entering the parameter value "0" you can deactivate the FlowSensor.
No error message is displayed if the FlowSensor is disabled by the heating technician. The controller now works without the measurement for the flow. The feed temperature "T_V" is set to be equal to the solar panel temperature "T_K".

Overview of FlowSensor

FlowSensor Type	Parameter value [FLS active]	Minimum flow Start phase "V1" in l/min	Minimum flow operating phase "V2" in l/min
As required	0	FLS deactivated - no flow rate	
FLS 12 (on request)	12	1.5	1,0
FLS 20 (included in scope of supply)	20[(a)]	2.0	1.5
FLS 100 (on request)	100	10.0	5.5

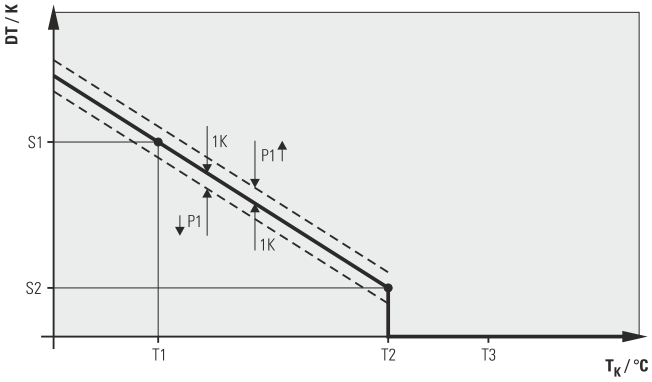
[(a)] automatically set value with detected FlowSensor

5.2.9 Speed regulation of the solar operating pump P_S

After reaching the switch-on conditions, the Solar R4 contoller activates:

- the actuation of the solar operating pump P_S at full output for filling the solar system. This takes place dependent on the set parameter value [time P2] in [secs]. If the correctly adjusted FlowSensor detects a steady flow before this time has expired, the solar system is completely filled with water.
- the actuation of the solar operating pump P_S at full output up to possible maximum flow rate of the system.

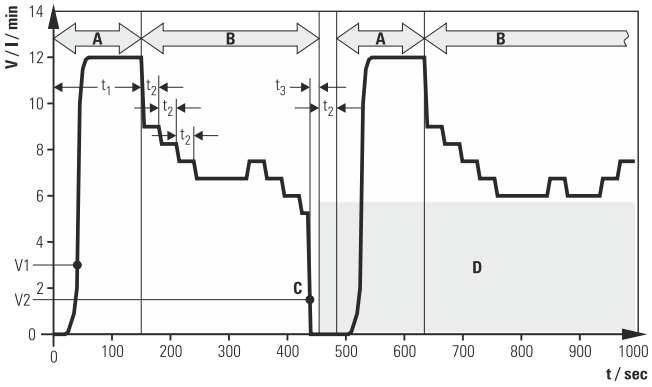
Pump output control as a function of temperature difference



DT Target spread (calculated for the operating point)
P_S Solar operating pump
S1 Upper target spread ([delta T 1])
S2 Lower target spread ([delta T 2])
T_K Collector temperature
T1 Frost protection temperature ([T frost])
T2 Booster temperature ([TK max])
T3 Switch on again protection temperature ([TK permitted])
— Target spread
- - Switching limits for pump modulation
↑ Pump output is increased
↓ Pump output is reduced

- the stepless output reduction of the solar operating pump P_S, until the calculated target spread "DT" maintains the set value in accordance with graph above, or until the flow rate falls below the minimum flow rate V2.

Example for modulation operation with flow-caused block of low pump stages on systems with FlowSensor



A Start phase
B Operating phase (modulation)
C Interrupted flow
D Low pump output stages are automatically blocked after a flow breakaway
P_S Solar operating pump
t Time
t1 Minimum running time of solar operating pump P_S at maximum output ([time P2])
t2 Stabilisation time
t3 Interruption detection period (10 s)
V Solar circuit flow
V1 Minimal flow rate in the start phase
V2 Minimal flow rate in the operating phase

- the stepless increase in output of the solar operating pump P_S after a safety period "t_2"
- Switches the pump to the next output stage after a safety period t2 has elapsed. If the flow rate falls below the value "V2", the controller detects a flow rate breakaway, the last valid output stage is saved as the minimum pump output value. Lower pump output stages are automatically blocked.

The temperature-dependent output regulation of the solar operating pump P_S then takes place between the determined minimum and maximum outputs. The spread of "T_V" and "T_R" (=T_V – T_R) is measured continuously and compared with the target spread "DT". If the temperature spread between "TV" and "TR" is too great, the pump output (max. 15 stages) and thus also the flow rate through the solar panel is increased until the target spread is achieved. If the spread is too small, the pump output is reduced. The current pump output is displayed during its active running time in the operating display [Flow rate], next to the throughput measured value in percent. A typical operating sequence of a modulating solar system is shown in "Example for modulation operation with flow-caused block of low pump stages on systems with FlowSensor".

INFORMATION

Controller is switched off and back on again:

- automatically blocked pump stages are released again.
- the system is automatically regulated again.
- manually blocked pump stages remain blocked (see "5.3.8 Manual setting of the pump speed regulation" [▸ 20]).

5.2.10 Total Reset Function

INFORMATION

A total reset deletes all individual settings and the event memory is deleted. All calculated values (info parameters) are set to zero.

If this total reset function is triggered via the menu path, the total thermal yield remains. This value is also deleted using the quick access via the button combinations.

The device reacts to a total reset with a new start (self-test), all parameters are reset to the factory settings and then all the blocked pump output stages are released. The reset takes place:

- Via menu path: Activation by heating expert in the setting menu [System].
- By quick access: Simultaneous pushing of the OK and arrow keys.

5.2.11 Frost protection function

As soon as the solar panel temperature "T_K" falls below [T frost"] (factory determined frost protection temperature), the frost protection function is activated. It remains activated for 24 h after the limit temperature has been exceeded.

While frost protection is active a star icon is shown in the standard temperature display.

The solar system only starts up with active frost protection if the switch-on condition is fulfilled and the solar panel temperature "T_K" exceeds the value "T_K save" (factory setting 70°C).

The solar operating pump P_S, after switching on, runs at least for the time defined in the parameter time P2, even if the switch-off temperature condition is reached before that.

If necessary, (e.g. for long connecting lines outdoors), this minimum start run time can be extended by the heating expert by an adjustable time ([time frost]). This prevents the build-up of ice in the connecting pipe.

The status of the frost protection function [FR active] shows whether the function is activated or deactivated (see "5.3.3 Setup menu" [▸ 18]).

The heating engineer can switch the function on or off manually.

The position of the solar panel temperature sensor can be adjusted in the parameter [TKpos].

For optimising the frost protection, the solar panels must be installed with the sensor position "Bottom".

The parameter [TKpos] must be set to the actual mounting position of the solar panel temperature sensor (see "5.3.7 Setting the mounting position of the solar panel temperature sensor" [▸ 20]).

Enhanced frost protection function

As soon as the Solar R4 controller detects a solar panel temperature "T_K" below -5°C (non-adjustable parameter [T frost off]), the enhanced frost protection function becomes active. This completely blocks the pump operation - also in manual mode.

The function remains active for another 24 hours after exceeding this threshold temperature.

The enhanced frost protection function is indicated by a flashing star symbol on the display of the Solar R4 controller.

The function cannot be switched off manually.

5.2.12 Leak protection function

If, after switching on the solar operating pump P_S and expiry of the filling time [time P2], a minimum flow rate "V1" in accordance with FlowSensor selection (see "5.2.8 FlowSensor" [▸ 14]) is not detected on the FlowSensor, there may be:

- a defect of the FlowSensors or
- a leak in the solar system.

To prevent all of the buffer water from being pumped out of the system in the event of a leak, the solar operating pump P_S is shut down for 2 hours and the error message "W" appears flashing in the left column of the display.

If this fault occurs 3 times in a row, without the minimum flow rate "V1" being reached, the solar operating pump P_S switches off permanently and the error message "F" appears in the left-hand column on the display.

- Replace the defective FlowSensor or repair the leak.
- Cancel the error message by switching off and on at the main switch.

The system is ready for operation once more.

5.3 Adjustment and menu guide

Overview of measurement points

Shows an overview of the available measuring points and the associated display formats.

Measuring point	Designation Display	Measuring range	Resolution	Sensor
T_K	Collector temperature	-30 to 250°C	1 K	Pt 1000 Temperature sensor
T_R	Return flow temperature	0 to 100°C	1 K	PTC Temperature sensor
T_S	Storage tank temperature	0 to 100°C	1 K	PTC Temperature sensor
T_V	Flow temperature	0 to 100°C	1 K	FlowSensor (all types) with voltage output 0.5 to 3.5 V
V	Flow	0.0 to 12.0 l/min	0.1 l/min	FlowSensor FLS 12 with voltage output 0.36 to 3.5 V
		0.0 to 20.0 l/min		FlowSensor FLS 20 with voltage output 0.36 to 3.5 V
		0.0 to 100.0 l/min		FlowSensor FLS 100 with voltage output 0.36 to 3.5 V

Info parameter (maximum values and calculated values)

Summarises the views of the calculated parameters.

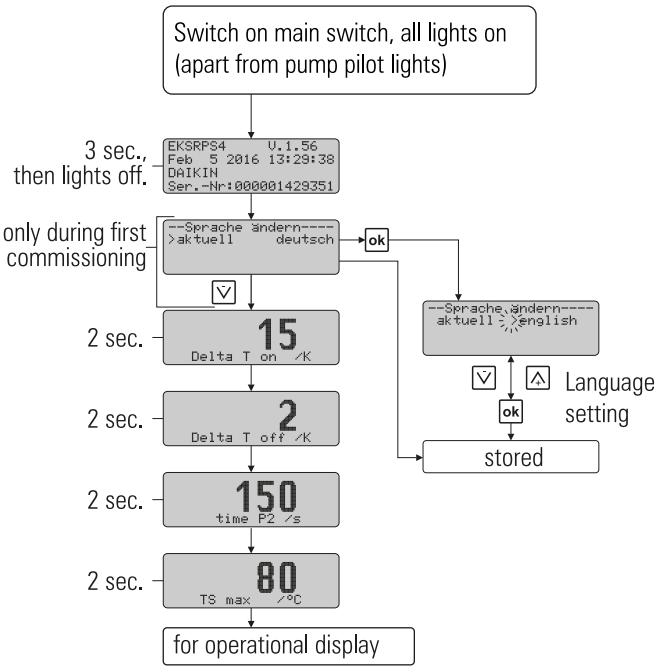
Parameter	Designation	Value range	Resolution	Remark
TK max	Max. measured collector temperature	-30 to 250°C	1 K	–
TK min	Min. measured collector temperature	-30 to 250°C	1 K	–
V max	Maximum flow rate	0.0 to 12.0 l/min	0.1 l/min	Maximum flow measured during filling
		0.0 to 20.0 l/min		
		0.0 to 40.0 l/min		
		0.0 to 100.0 l/min		
P_S	Self test	0,0 to 99.9 kW	0.1 kW	Maximum value from 5 min output average
P_S(15h)	Peak value of the day	0,0 to 99.9 kW	0.1 kW	Maximum value of the peak output within the last 15 hours
W(15h)	Daily thermal yield	0.0 to 999.9 kWh	0.1 kWh	Thermal yield within the last 15 hours
W	Total thermal yield (in kWh or in MWh)	0.0 to 9999.9 kWh	0.1 kWh	Total solar heat yield calculated from instantaneous output
		10.000 to 99.999 MWh	0.001 MWh	
P	Momentary output	0,0 to 99.9 kW	0.1 kW	Mean value during the last minute
DT	R Reset	1 to 23 K	1 K	Nominal temperature difference T_V–T_R at modulation operation (calculated)
P1	Output stage in normal mode	0 to 100 %	1 %	–
Level min	Smallest released output stage P1	1 to 10 0 to 100 %	1; 1 %	Only accessible for an expert (see "5.3.3 Setup menu" [▶ 18])
Level on	Running time for the solar operating pump P_S	0 to 99999 h	1 h	Only accessible for an expert (see "5.3.3 Setup menu" [▶ 18])

5.3.1 Fast access

After switching on, the Solar R4 controller carries out a self-test, where the display elements are switched on individually and the setting parameters of the user level are displayed. The following testing steps are carried out, and the results displayed for about 2 seconds:

- Immediately after switching on, the start display appears which shows the installed software version and the serial number of the device.
- During initial commissioning, the desired display language is queried.
- After this, the current parameter settings which the user can change are displayed.
- When the operating display appears, the self test is complete.
- The functions of the solar operating pump P_S and their operating status lights can only be tested manually, for safety reasons (see "5.2.6 Manual operation" [▶ 14]).

Turn on the main switch, all lights on (apart from pump pilot lights)



5.3.2 Operating display

The operating display shows system temperatures, maximum and calculated values. After the start display, the Solar R4 contoller is automatically in operating display mode, an operating value is displayed and the associated indicator lights up.

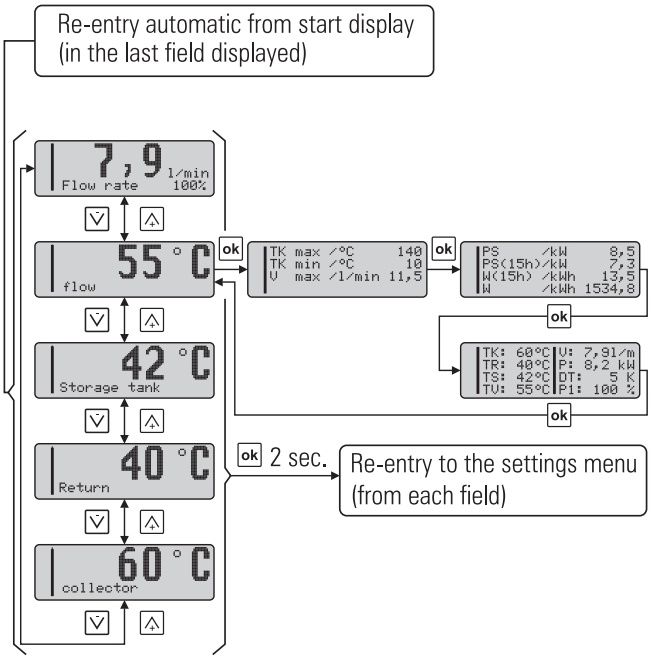
- You can navigate between the four temperature measured values and the flow measured value (see "5.4.2 Additional settings for your solar system" [▶ 23]) by pushing the arrow keys.
- Pressing the Info key displays the maximum values and the calculated values (see "5.3 Adjustment and menu guide" [▶ 17]).

The left-hand column of the display serves as a status indicator. It means:

- "1" in the first line, solar operating pump P_S normal operation active.
- "2" in the 2nd line, solar operating pump P_S active with maximum output (booster).
- "B" in the 3rd. line, burner blocking contact is active (see "5.3.10 Burner blocking contact" [▶ 21]) or a fault status (see "6 Troubleshooting" [▶ 25]
- "H" in the 4th. line, manual operating mode.

INFORMATION

As long as no manual adjustments are made or an event (see "6.1 Display of events" [▶ 25]) produces a different display, the actuated measured value or information display remains active. It is reactivated again, even after parameter changes or "Switching OFF-ON". If info parameters are displayed, no measuring point indicator light is activated.



5.3.3 Setup menu

The Solar R4 controller parameters are displayed and changed in the menu.

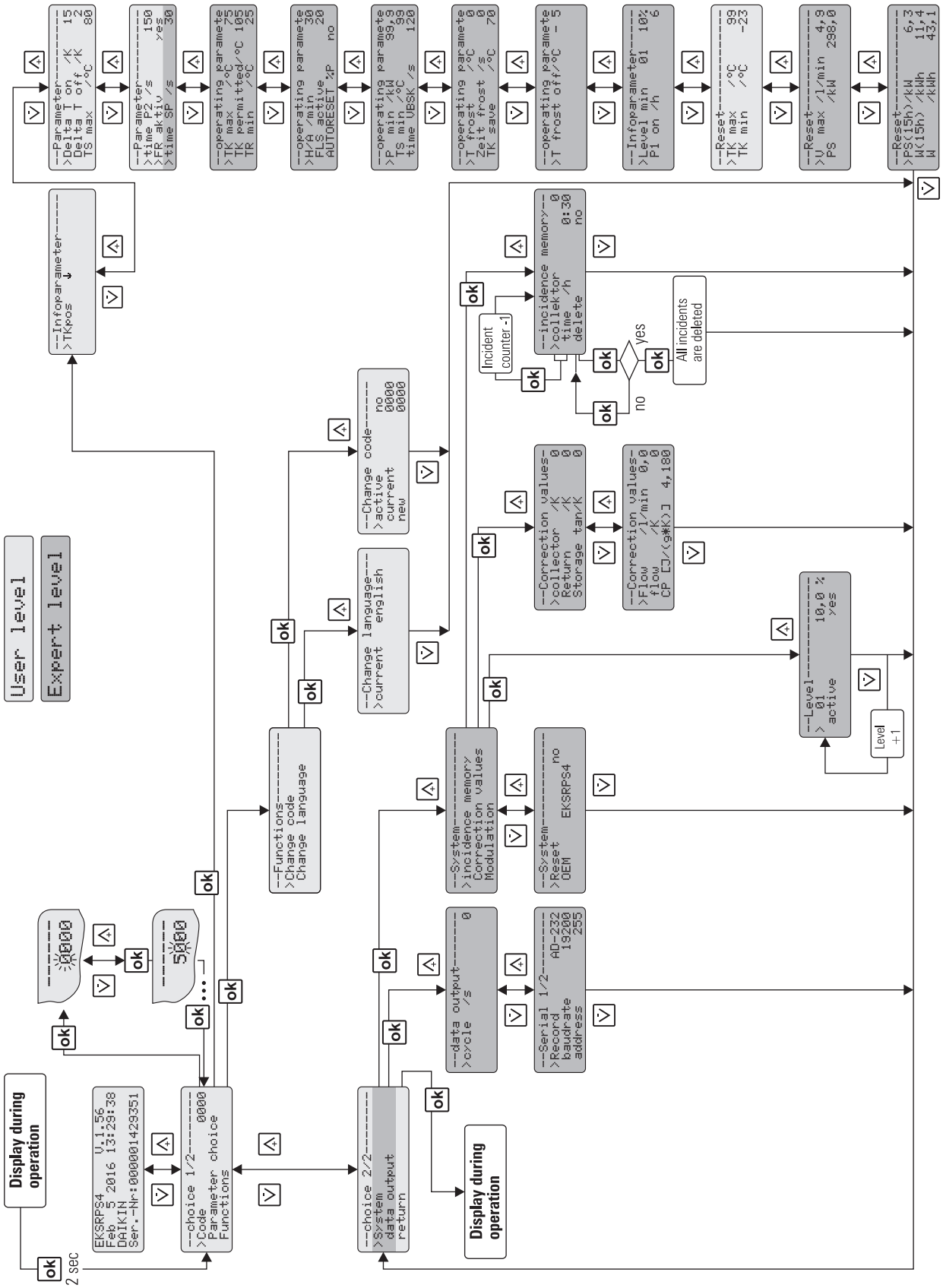
- Pressing the OK key once (>2 s) either activates the menu or returns to the operating display. Briefly pressing the key confirms a selection, opens the next menu item, or displays [stored] for approx. 1 second after a value has been changed.
- In the selected parameter display, pressing the OK key switches over to the parameter changing mode.

In the menu the active menu path is displayed in the first line, a cursor (">") in the left column indicates the next lower menu path or a parameter. The control unit starts working with the changed parameter value(s) immediately.

The display always returns to the operating display mode after 10 minutes, provided that no key is pressed during this time. Briefly pressing an arrow key changes the value by one step, and continuous pressing speeds up the change.

Once the desired parameter has been changed and the entire parameter list has been scrolled down, you return to the selection menu [Selection 2/2] and from there to the operating display. The control system immediately operates with the changed parameter values. The control system generally returns to the operating display mode if no key is pressed for approximately 10 minutes.

Setup menu overview



5.3.4 Password input

The Expert level of the setup menu is protected by a password, which must be entered at the beginning of the setup menu. Also the Operator level can be protected. The user level and the expert level are shown in different colours (see overview "5.3.3 Setup menu" [▸ 18]).

Alternative quick access to the setting menu:

After switching the controller on, during the start display, long push on the up arrow key (+).

As long as the system is being operated manually, no further password entry is required. Passwords remain valid for about 10 minutes after the last key has been pressed. After entering the password for the required level, the following display appears for about 2 seconds:

- [user OK],
- [specialist OK] or,
- [Code wrong].

User password

This password is not activated in the factory setting of the Solar R4 controller. By entering a 4-digit number code, all the parameters adjustable in Operator level are protected against unauthorised access (child protection or caretaker function). The parameters of the Operator level can only be changed with the correct Operator password or if password protection has been disabled.

A user password can be activated and changed or reassigned in the following menu path: [choice 1/2] -> [Functions] -> [Change code] (see overview "5.3.3 Setup menu" [▸ 18]).

- Enter old password in data box [current 0000] and new one in the data box [new 0000]. Hereby, every digit must be confirmed with the OK key.
- If the new password is issued again, enter the new password in both the data box [current 0000] and in data box [new 0000].

When the user password is activated, the menu path shows: [choice 1/2] only [Code 0000]. The user password only becomes active after 10 min or after the Solar R4 controller is restarted.

Technician password

The password is entered in the menu path: Enter [choice 1/2] under [Code 0000]. It activates all important systems parameters in the settings menu for technicians (see overview "5.3.3 Setup menu" [▸ 18]).

5.3.5 Language selection

During initial commissioning, or after a totalreset, the display (see "5.3.1 Fast access" [▸ 18]) is retained during the start and a language choice is requested.

- Use the arrow keys to select your language, and confirm it with the OK key.

It is possible to select a different language later on via the menu item: [choice 1/2] -> [Functions] -> [Change language] (see "5.3.3 Setup menu" [▸ 18]).

Alternative quick access to the language selection:

Simultaneous pushing of the OK key and the up arrow key (+).

5.3.6 Setting and resetting parameters

Setting the parameters is in accordance setup menu (see "5.3.3 Setup menu" [▸ 18]). All adjustable parameters are shown with access level, adjustment range and factory setting in "Standard parameter settings, recommended setting ranges". In the menu path: [choice 1/2] -> [Parameter choice] -> [Reset] the maximum and calculated values can be reset (see "5.4.1 Standard parameter settings, recommended setting ranges" [▸ 22]). Hereby, the selected max. value is set to zero immediately with the OK key.

The arrow key "Down" cancels this operation, and the cursor goes back to the left. The OK key confirms the selection. Repeated pressing of the key "Down" takes you to the field [choice 2/2]. Actuation of [return] navigates to the operating display.

Using the menu path: [choice 2/2] -> [System] -> [Reset] you can trigger total reset function. The system is then restarted (see "5.2.10 Total Reset Function" [▸ 15]).

INFORMATION

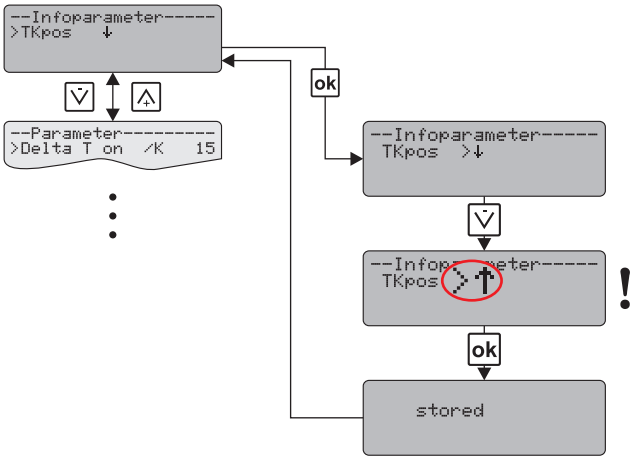
A total reset deletes all individual settings and the event memory is deleted. All calculated values (info parameters) are set to zero.

If this total reset function is triggered via the menu path, the total thermal yield remains. This value is also deleted using the quick access via the button combinations.

5.3.7 Setting the mounting position of the solar panel temperature sensor

INFORMATION

Only if the solar panel temperature sensor has been mounted at the top on existing solar installations, will you need to change the factory setting "↓" of the parameter [TKpos].



5.3.8 Manual setting of the pump speed regulation

With certain output stages of the speed-regulated solar operating pump P_S noise problems can sometimes arise. The current power of the selected stage is displayed as a percentage in the bottom line [Flow] of the operating display (see "5.3.2 Operating display" [▸ 18]).

- Make a note of the problematic output stage.
- Using the menu path: Navigate [choice 2/2] -> [System] -> [Modulation] to [Level] (see "5.3.3 Setup menu" [▸ 18]).

Up to 10 speed levels can be deactivated here. In addition to the ordinal number of the power level (starting with 01 for the lowest power) and the activity status, the percentage power of the respective level is displayed here under [Performance].

- Set noise-intensive stage under the parameter [active] to [no].

  This stage is skipped when controlling the solar operating pump (PS). The blocking remains even after the control is switched ON/OFF. It can be cancelled by setting the [active] parameter to [yes] or by using the general reset function.

5.3.9 Correction values for measuring points

INFORMATION

These settings are only accessible after entering the expert password.

If the measured value of a sensor deviates from the real value, it can be adjusted using a correction value.

- Using the menu path: [choice 2/2] -> [System] -> [Correction values] select the correction parameter (see "5.3.3 Setup menu" [▶ 18]) and change in accordance with the following table:

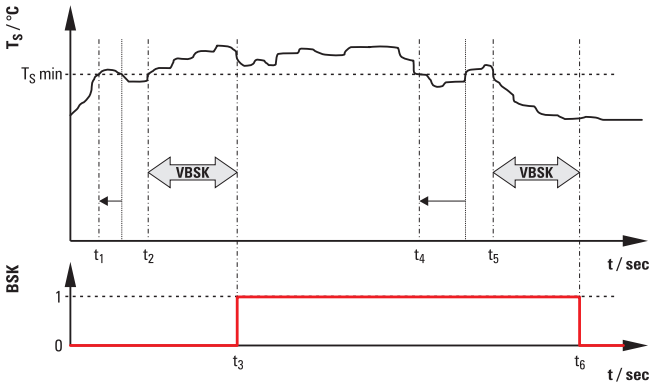
Designation/ [Display]	Measurement & adjusting range	Factory value	Increment
Solar panel temperature/ [collector]	-9 to +9	0 K	1 K
Return flow temperature/ [Return]	-9 to +9	0 K	1 K
Storage tank temperature/ [Storage tank]	-9 to +9	0 K	1 K
Feed temperature/ [flow]	-9 to +9	0 K	1 K
Flow rate/ [Flow]	-2 to +2	0 l/min	0.1 l/min

5.3.10 Burner blocking contact

This contact controls an external heat generator in such a way that under favourable weather conditions, the storage tank is not heated by the external source. For this purpose, the connecting cable BSKK is required, which is available as an accessory. If the solar system reaches a momentary output, adjustable by the heating expert (menu path: [choice 1/2] -> [Parameter choice] -> [P min]) or if the storage tank has heated up to the adjustable minimum storage tank temperature set by the heating expert (operating parameter [T_S min] (see "5.4.1 Standard parameter settings, recommended setting ranges" [▶ 22]), the burner is deactivated via a contact. The parameter setting for the burner blocking contact is described in setup menu (see "5.3.3 Setup menu" [▶ 18]).

The parameter [time VBSK] allows to set a delay for the switching time of the burner blocking contact. The burner blocking contact only switches after expiry of the set delay time when the minimum storage tank temperature [T_S min] is exceeded or if the set minimum momentary output for burner stop [P min] is exceeded.

The following example shows a fictional sequence of the storage tank temperature.



0 Not active
1 Active
t Time
t1...t6 Discrete times
BSK Burner blocking contact
T_S Storage tank temperature
T_S min Minimum temperature for burner stop
VBSK Burner blocking contact delay

At time "t_1 the minimum burner stop temperature, defined in the operating parameter T_S min", is exceeded for the first time. Since the storage tank temperature "T_S" shortly afterwards falls back below this value, this does not lead to activation of the burner blocking contact.

Since the storage tank temperature "T_S" is constantly exceeded at time "t_2", this leads to activation of the burner blocking contact, with the delay "VBSK" at time "t_3". In a similar way, the burner blocking contact is only deactivated at time "t_6".

5.4 Recommended settings

5.4.1 Standard parameter settings, recommended setting ranges

The following table summarises the factory settings and the possible and recommended setting ranges of the Solar R4 controller system parameters.

Parameter	Designation	Access level	Setting range	Recommended setting range	Factory setting	Increment
TKpos	Solar panel	Specialist	↑ ↓	Real mounting position	↓	—
Delta T on	Switch-on temperature difference	Operator	3...80 (>"Delta off")	10 to 15 K	15 K	1 K
Delta T off	Switch-off temperature difference		1...14 (>"Delta on")	2 to 5 K	2 K	1 K
TS max	Maximum storage tank temperature		20 to 85°C	75 to 85°C	80°C	1 K
Time P2	Minimum run time of the solar operating pump P_S at maximum output		10 to 999 s	Filling time +20 s	150 s	1 s
AUTORESET %P	Release blocked pump stages every 24 hours	Specialist	Yes/No	—	No	—
FLS active	FlowSensor activation		0 to 100	FLS 12: 12 FLS 20: 20 FLS 100: 100	With FLS: 20	0, 12, 20, 100
FR active	Status frost protection function		Yes/No	—	No	—
H/A	Automatic return from manual to automatic operation		1 to 900 min	—	30 min	1 min
P min	Min. output for burner stop		0,0 to 99.9 kW	—	99.9 kW	0.1 kW
T frost	Threshold solar panel temperature for activation of the frost protection function		0 to 10°C	—	0°C	1 K
T frost off	Threshold temperature for activation of the enhanced frost protection function for solar panels		-5	—	-5°C	—
TK max	Booster temperature (maximum solar panel temperature)		20 to 110°C	—	75°C	1 K
TK save	Minimum solar panel temperature for release of pump operation with active frost protection function		50 to 150°C	—	70°C	1 K
TK permitted	Restart protection temperature (max. permissible operating solar panel temperature)		90 to 250°C	—	95°C	1 K
TR min	Minimum return temperature		10 to 60°C	—	25°C	1 K
TS min	Minimum storage tank temperature for burner stop		0 to 99°C	—	99°C	1 K
time frost	Additional start run time of the solar operating pump P_S with active frost protection function		0 to 600 s	—	0 s	1 s
time SP	Blocking time solar operating pump P_S		0 to 600 s	—	30 s	10 s
time VBSK	Delay burner blocking contact		10 to 600 s	—	120 s	10 s

INFORMATION

During commissioning, the system parameters must be adjusted individually to suit the installed system and might need fine tuning during subsequent operation. Usually, the system will operate with the default settings.

The following instructions help with determining the setting values and guarantee optimum heat yield with low power consumption:

- Set the switch-on temperature difference [Delta T on] so that the system remains in operation after switching on under constant irradiation conditions and does not switch off again immediately when heat is removed due to the collector cooling down. The lower the value that can be selected, the longer the operating times and the greater the achievable heat gains. If the switch-on temperature difference is set too low, the collector cools down during filling to such an extent that the temperature falls below the switch-off temperature difference.

  The pumps are switched off immediately, resulting in lower heat yield and higher power consumption.

- Adjust the switch-off temperature difference [Delta T off] so that the heat yield obtainable at the switch-off point is higher than the electrical power required to drive the pump.

  Since the power consumption of the solar operating pump P_S is almost independent of the size of the connected solar panel array, but the recoverable heat output depends directly on the number of collectors, the parameter value is set higher for a small number of collectors and lower for several collectors.
- Set the running time [Time P2] for the maximum output of the solar operating pump PS so that the entire cross-section of the flow line is filled with water in every operating condition.
- Determine the required time based on the duration of air noise perception from the time the solar operating pump PS is switched on until the flow enters the storage tank and add a safety margin of 20 seconds to the measured time. The filling time depends on the set flow rate, the number of collectors, the system height, and the length of the connecting line.
- The maximum storage temperature [TS max] is set according to the individual conditions. The higher the value of the parameter, the higher will be the available heat storage capacity and thus the output potential of the Daikin solar system.

WARNING

Temperatures above 60°C can occur in the solar storage tank.

Install anti-scald protection.

- Anti-scald protection VTA32
- Screw connection kit 1"

- A startup process with steam formation in the collectors often causes operator uncertainty. To prevent boiling noises and steam escape, the restart protection temperature [TK permitted] is preset at the factory. The Solar R4 controller only switches on the solar operating pump PS once the collector temperature has fallen below the set parameter value by 2 Kelvin. The system thus starts up without evaporation in the collector. On a cloudless day, however, this can lead to the system not switching back on until late afternoon, even though the storage tank temperature allows further heating.

  In order to maximise energy input, set the [TK permitted] to a value greater than 100°C and thus deactivate the restart protection function.

  In this case the system operator should be advised of audible bubbling noises and steam knocking during filling.

5.4.2 Additional settings for your solar system

The following setting instructions apply only to basic settings with FlowGuard installed:

- Activate manual mode.
- After filling the system completely, set the water flow rate so that each solar panel is transited at 90 to 120 l/h. Influence the flow rate either by setting the speed stage at the solar operating pump P_S or/and by setting the FlowGuard (regulating valve with flow indication). Reference values for correct valve and pump stage settings are in the following table:

Number of solar panels	Nominal flow in l/min	Desired flow in l/hour
2	3.0 to 4.0	180 to 240
3	4.5 to 6.0	270 to 360
4	6.0 to 8.0	360 to 480
5	7.5 to 10.0	450 to 600

- Switch off the Solar R4 controller after completing the setting.

INFORMATION

For rapid and safe filling of the system, always set the solar operating pump P_S to a high speed stage if the installation height H, the height difference between the installation surface of the solar storage tank and the top edge of the solar panel does not exceed 10 m and a sufficient flow rate is still achieved.

INFORMATION

Even with the correct flow rate setting, the switch-on temperature difference [Delta T on], and the best weather conditions, the solar system occasionally shuts down. As the sun rises or sets and the storage tank temperature increases, the collector temperature slowly decreases after the pumps are switched on, and the shutdown condition is reached. Due to the continuing solar radiation will increase the temperature of the solar panels, the pumps will operate and the system will cycle because the solar radiation is no longer sufficient for continuous operation. The FlowSensor reduces this effect by pump speed regulation.

5.4.3 Setting recommendation for the post-heating via external heat sources or by the electrical immersion heater, burner blocking contact

For the highest performance potential:

- Heat the solar storage tank only infrequently and then only to a just adequate temperature via the external heat source or electrical immersion heater.
- Limit reload times by using of time programs:
  - Determine the optimum times for "normal use" by regular consumption habits.
  - Enable supplementary heating for 1/2 to 2 hours before usual usage time depending on the external source.
- The charging time should be limited so that the tank does not need to be directly heated after a normal consumption cycle.

INFORMATION

The optimum charging temperature depends on personal needs; frequently a storage tank temperature of 50°C is adequate. An average shower requires about 30 to 50 l of hot water with an outlet temperature of 40°C. The cold water that flows into the storage tank when taking a shower must be heated in the solar storage tank in a through-flow heating manner.

- If greater volumes of hot water are used and to maintain comfortable temperatures during periods of unusual use, set the temperature in the hot water zone to a sufficiently high level or enable the heat generator for supplementary heating, e.g. by switching to a different timer programme.

Setting the storage tank charging temperature

- Set the hot water target temperature so that there is sufficient hot water available for drawing off (e.g. for one shower) at the lowest possible setting value. This setting will guarantee the maximum heating of the hot water by the solar installation for a certain withdrawal quantity.

Heating via an external heat generator

Depending heating requirements (related to the building's insulation standard, outdoor temperature, and desired room temperatures) and the installed collector surface, it might be advisable to prevent heating from an external heat generator by connecting the burner blocking contact. This can be done even if the heating control system generates a heat request:

- Set the operating parameters [P min], [T_S min] and [time VBSK] in such a way that the external heat generator does not heat (see "5.3.10 Burner blocking contact" [▶ 21]),
  - If a minimum heating output is provided by the solar panels, or
  - The storage tank has reached a sufficiently high temperature.

5.4.4 Tips for optimised user behaviour

Hot water demands and user behaviour are highly individual.

The higher the desired storage tank temperature is, and the longer the periods for non-solar charging heating have been adjusted, the more will the storage potential for solar heat generation be limited. Careful consumption behaviour, adapted to the particular strengths of the solar system minimises the energy consumption for non-solar charging processes.

- Use modern and convenient shower heads with flow rates of 5 – 7 l/min. The lower flow rate (hot water consumption per minute) results in a reduced need for supplementary heating, and therefore a larger amount of hot water at a higher temperature.
- Reduce the consumption times. Lower energy consumption.
- Start filling the bathtub only with hot water. After the domestic water stored in the solar storage tank has been drawn off, the hot water outlet temperature drops slightly and the water is mixed in the bath. In this way, the storage capacity is used in an optimal manner with a minimum charging temperature and an adequate amount of hot water is available.

5.4.5 Domestic water hygiene

If no hot water is used for several days and the storage temperature of the Solaris system does not reach at least 60°C, for hygiene reasons (Legionella protection) it is recommended, for hygiene reasons (Legionella protection), to heat the water once to above 60°C or to drain the stored hot water (25 l).

6 Troubleshooting

6.1 Display of events

Event code	Plain text display	Description	Status display (flashing)	Lamp (flashing)	Consequence
0	Collector	Collector sensor: Short-circuited or interruption	K	TK	Long-term switch-off of P_S
1	Return	Return flow sensor: Short-circuited or interruption	R	TR	
2	Storage tank	Storage tank sensor: Short-circuited or interruption	S	TS	
3	Flow rate	FlowSensor: Short-circuited or interruption	D		Operation without FlowSensor
4	flow	FlowSensor: Short-circuited or interruption	V		
5	A/D	Internal A/D converter fault	G		Long-term switch-off of P_S
6	Supply	Internal equipment fault of the supply voltage	G		
7	Reference	Internal equipment fault of the reference voltage	G		
8	RESET	Overall reset was carried out			Parameters to factory settings, calculated values and event entries deleted (see "5.2.10 Total Reset Function" [▶ 15])
12	Startflow	Minimum flow rate V1 (see "5.2.8 FlowSensor" [▶ 14]) not achieved in the start phase after expiry of [time P2] (description see "5.2.1 Pump operation" [▶ 13] and "5.2.12 Leak protection function" [▶ 16])	W		Switch-off of P_S for 2 h, then ready for operation again or status "F"
			F	TV	Permanent shutdown of P_S, if event occurs 3x in a row without intermediate successful start.
13	TS > TS max	Storage tank maximum temperature ([TS max]) exceeded (description see "5.2.1 Pump operation" [▶ 13] and "6 Troubleshooting" [▶ 25])		TS	Temporary switch-off of P_S
14	TR >> TS	$T_R - T_S > 10$ K and $T_R > 40°C$ (description see "6 Troubleshooting" [▶ 25])		TR	
15	TK > TK permitted	Permitted solar panel maximum temperature ([TK permitted]) exceeded - (description see chapter "5.2.1 Pump operation" [▶ 13] and "6 Troubleshooting" [▶ 25])		TK	
16	Interruption	Flow break down during operating phase detected (V < V2, see "5.2.9 Speed regulation of the solar operating pump P_S" [▶ 15])			Temporary switch-off of P_S (at least for stabilisation time), blocking of the current and the lower pump modulation stage, and the one below, refilling by P_S for [time P2] at next start condition.
202	P-on Reset	Switch on			Restart, all parameter settings and info parameters are retained, automatically blocked pump performance levels are released again.
204	Brown-Out	Reset caused by improper reduction in the mains voltage			Restart according to Code 202.
205	Watchdog	Reset caused by external interference influences (e.g. over-voltages caused by thunderstorms)			Restart according to Code 202.

Using the menu path: [choice 2/2] -> [System] -> [incidence memory] and after entering the expert password (see "5.3.4 Password input" [▶ 20] and "5.3.3 Setup menu" [▶ 18]) you can display the events occur during operation. For this purpose, the Solar R4 controller has a simple fault diagnosis system. The event log contains the type and time of the event. The event is displayed in clear text and using the code, the time since the start of the event is displayed in hours.
The individual events can be scrolled through using the Info button, starting with the most recent. If the parameter [delete] in menu path: [choice 2/2] -> [System] -> [incidence memory] is set on [yes], all events are deleted. Deletion of individual events is not possible. An overview of possible entries in the event memory is given in the table above.

Sensor-specific error messages
The Solar R4 controller reacts as follows when the cable is broken or in the event of a short circuit in the sensors or sensor cables:
- A flashing code letter in the display indicates the fault in the status column and a message appears.
- The light corresponding to the sensor flashes.
- In addition, the control unit automatically intervenes in system operation.

All other sensor values remain accessible via the arrow keys.

Sensor	Cause of the fault	Status (blinks)	Display	Lamp (flashing)	Consequence
Collector temp.	Interruption	K	uuuu	T_K	Permanent shutdown of P_S
	Short circuit		——	T_K	
Return flow temp.	Interruption	R	uuuu	T_R	
	Short circuit		——	T_R	
Storage tank temp.	Interruption	S	uuuu	T_S	
	Short circuit		——	T_S	
Inflow temp.	Voltage drop	V	——	without lamp	Operation without FlowSensor
FlowSensor	Voltage drop	D	——	without lamp	

6.2 Troubleshooting

Operating events similar to faults

The storage tank temperature "T_S" in the solar storage tank reaches the value set in the parameter [TS max]:

- Pumps are switched off, the system is drained. On the Solar R4 controller, the T_S light flashes, the display shows the measured storage tank temperature. As soon as the tank temperature drops more than 2 K, normal system operation is resumed.

INFORMATION

In this case, short-term evaporation in the collectors is possible. The unpressurised steam escapes into the tank. On rare occasions, small volumes of water vapour come out of the solar storage tank for short periods.

Temperature in the solar panel is higher than the restart protection temperature [TK permitted]:

- Pumps are switched off. In the Solar R4 controller, the TK light flashes. If the set switch-on inhibit temperature falls by more than 2 K, normal system operation is enabled automatically.

Failures

DANGER: RISK OF ELECTROCUTION

Live parts can cause an electric shock cause life-threatening burns and injuries if touched.

- Electrical installations must always be carried out by qualified electrical technicians in conformity with the relevant electrical guidelines and the regulations of the electric utilities company to prevent hazards from damaged electric wiring.
- Repair of damaged electrical components of the EKSRPS4A regulation and pump unit must only be carried out by heating engineers authorised and recognized by the energy supply company.
- Before beginning the repair work, disconnect the EKSRPS4A regulation and pump unit from the power supply (fuse, shut off main switch) and secure against unintentional restart.
- Comply with the relevant occupational safety regulations.

DANGER: RISK OF BURNING/SCALDING

Danger of burning from hot surfaces.

- Let the device cool down for a reasonably long time before maintenance and inspection work.
- Wear protective gloves.

In the status column of the Solar R4 controller, the T_R light flashes.

Return temperature "T_R" is greater than 40°C and is 10 K higher than the storage temperature "T_S". The solar operating pump P_S is switched off. The cause is a defective or incorrectly connected sensor.

- Install the sensor correctly or replace it; normal system operation will be resumed.

In the status column of the Solar R4 controller, "W" flashes.

The minimum flow rate start phase "V1" at the FlowSensor (see "5.2.8 FlowSensor" [▶ 14]) is not achieved after switching on the solar operating pump P_S and expiry of the time defined via the parameter [time P2] (see "5.2.9 Speed regulation of the solar operating pump P_S" [▶ 15]).

The system goes to temporary blocking for 2 hours (solar operating pump P_S is switched off), but tries to restart automatically after the blocking time.

If this event occurs three times in a row, without intermediate starting, the solar operating pump P_S is switched off and the status "F" is set.

In the status column of the Solar R4 controller, "F" flashes.

The minimum flow rate start phase "V1" at the FlowSensor (see "5.2.8 FlowSensor" [▶ 14]) is not achieved after switching on the solar operating pump P_S and expiry of the time defined via the parameter [time P2] (see "5.2.9 Speed regulation of the solar operating pump P_S" [▶ 15]).. The solar operating pump P_S is switched off.

- If a leak is suspected, examine the solar system, rectify faults and then release the block by "Switching OFF/ON" on the controller.

If the system cannot be filled (**Status "F"**), even though the solar operating pump P_S is actuated by the Solaris R4 controller, the following faults can be the cause:

1 Air drawn down when the system was running idle is in the solar operating pump P_S.
   - Check that the solar operating pump P_S is running. The automatic vent must always be working! Check the sealing cap and loosen it if necessary (do not remove).

2 Check the installation for leaks.
   - Check the installation for leaks and rectify if necessary. Follow instructions in chapter "4 Commissioning" [▸ 12].

3 Increase start run time [time P2] (see "5.4.1 Standard parameter settings, recommended setting ranges" [▸ 22]).

4 Check the installation for blockage. During frosty conditions, ice plugs can form in faulty connecting lines.

5 Check valve position on storage tank connection elbow.

If the **display shows nothing** and the main switch is in the illuminated "ON position":

- Replace the control unit (electronic fault).

If the main switch is not illuminated in the "ON" position, there is no power supply to the control unit.

- Check the plug connection of the mains plug and the mains connection (fuse, switch).

If water vapour is continuously coming out of the solar storage tank **when exposed to sunlight**, the flow rate is too small.

- In this case, the system settings must be checked.

Special notes on electric sensors

INFORMATION

Only original Daikin replacement parts must be used.

- Evaluate the system settings of the Solar R4 controller.
- Remove casing of the Solar R4 controller and remove and disconnect the relevant sensors.
- Examine the contact positions of the affected sensors, and measure the resistance (or the DC voltage for flow temperature and flow rate sensors) on the sensor end.

When the fault has been rectified, the system automatically resumes normal operation and is in the operating mode.

The resistance or DC voltage values of the sensors are listed in the sensor characteristics (see "9.3 Sensor characteristics" [▸ 31]). Internal faults in the controller electronics that can be diagnosed are displayed in the display in accordance with table (**Status "G"**) see "6.1 Display of events" [▸ 25]. They also cause a safety switch-off of the pump. Switching the system off and then on again after 2 minutes might remedy the fault if not, the control unit must be replaced.

7 Disposal

Old units must be disposed of in compliance with local and national regulations. The components are designed for easy disassembly, with clearly marked plastics to facilitate proper sorting, recycling, or disposal.

- Units are marked with the following symbol:

This means that electrical and electronic products may NOT be mixed with unsorted household waste. Do NOT try to dismantle the system yourself: dismantling the system, treatment of the refrigerant, of oil and of other parts MUST be done by an authorised installer and MUST comply with applicable legislation.

Units MUST be treated at a specialised treatment facility for reuse, recycling and recovery. By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health. For more information, contact your installer or local authority.

7.1 Temporary shutdown

CAUTION

A decommissioned heating system can freeze and be damaged during frost.

- Drain the heating system that is shut down if there is danger of frost.

CAUTION

Pumps that are switched off for a long time can become stuck.

With temporarily shut-down solar systems, the protection function from stucked pumps (pump kick function) is also deactivated.

- Check for correct pump function when starting up again. Stucked pumps can usually be freed up manually.

By turning off at the main switch of the Solar R4 controller or by removing the plug from the mains, you can shut down the Daikin solar system temporarily.

If there is a danger of frost:

- the Daikin solar system must be taken into operation again

or

- suitable antifreeze measures must be applied to the connected heating system and hot water storage tank (e.g. draining).

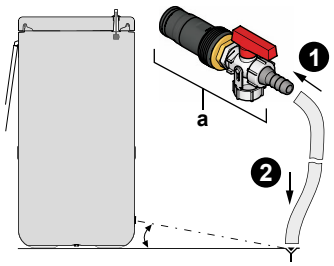
INFORMATION

If the risk of frost only lasts for a few days, draining the Daikin hot water tank is not necessary due to its excellent thermal insulation, provided the tank temperature is regularly monitored and does not fall below +3°C. However, this does not provide frost protection for the connected heat distribution system!

Draining the storage tank

1 Separate all power circuits of the solar and heating system from the power supply and secure against unintentional switching on again.

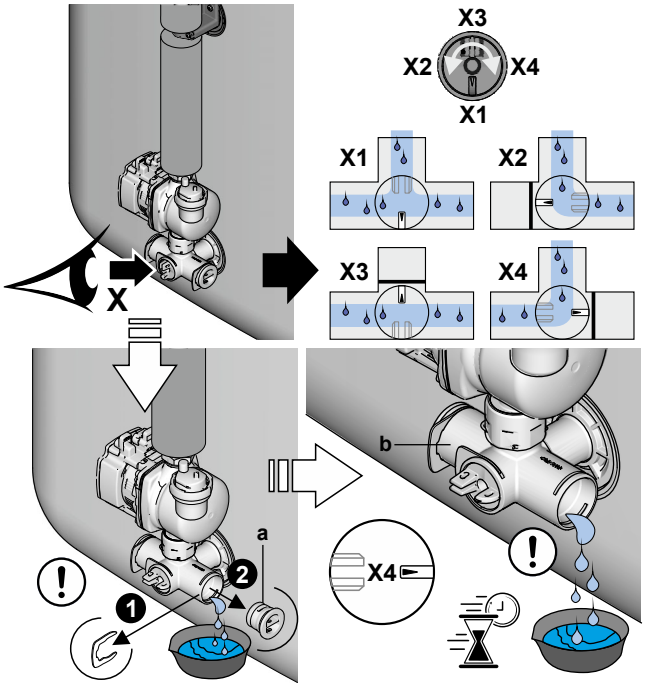
2 Connect the drain hose to the **KFE filling connection,** filling and draining cock and route to a waste water drainage point which is at least at ground level.



a KFE filling connection (accessory KFE BA)

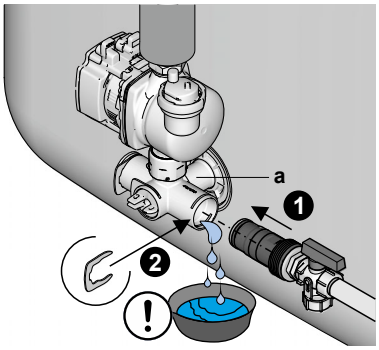
3 Adjust the valve insert on the connecting angle so that the path to the blind plug is blocked off.

4 Remove the blanking plug from the connecting elbow and place a suitable collection trough beneath the unit.



a Blind plug
X Valve insert

5 Insert the **KFE filling connection (KFE BA)** into the connecting angle and secure using a retaining clip.



a Connecting angle

6 Open the KFE cock on the **KFE filling connection (KFE BA)**.

7 Adjust the valve insert on the connecting angle so that the flow to the drain hose is opened and drain the water content of the storage tank.

7.2 Final shutdown

- Take the Daikin solar system out of service (see "7.1 Temporary shutdown" [▸ 27]).
- Disconnect the EKSRPS4A control and pump unit from all electrical and water connections.
- Dismantle the EKSRPS4A control and pump unit in accordance with the assembly instructions (see "3 Installation" [▸ 6]) in reverse order.
- Dispose of the EKSRPS4A control and pump unit correctly.

Recommendations for disposal

Thanks to the environmentally friendly design of the solar system, Daikin has complied with requirements for environmentally disposal. During disposal, only waste that can be recycled or thermally recycled is generated.

The materials used that are suitable for recycling can be sorted into individual types.

The designation of the product means that electrical and electronic products may not be disposed of together with unsorted residential waste.

Proper disposal in compliance with the respective national regulations of the country of use is the responsibility of the user/owner.

- Disassembly of the system, handling of coolant, oil and other parts may only be carried out by a qualified fitter.
- Disposal may only be carried out by an organization that specialises in reuse, recycling and recovery.

Further information is available from the installation company or the responsible local authorities.

8 Hydraulic system connection

8.1 Schematics

WARNING

Temperatures above 60°C can occur in the solar storage tank.

Install anti-scald protection.

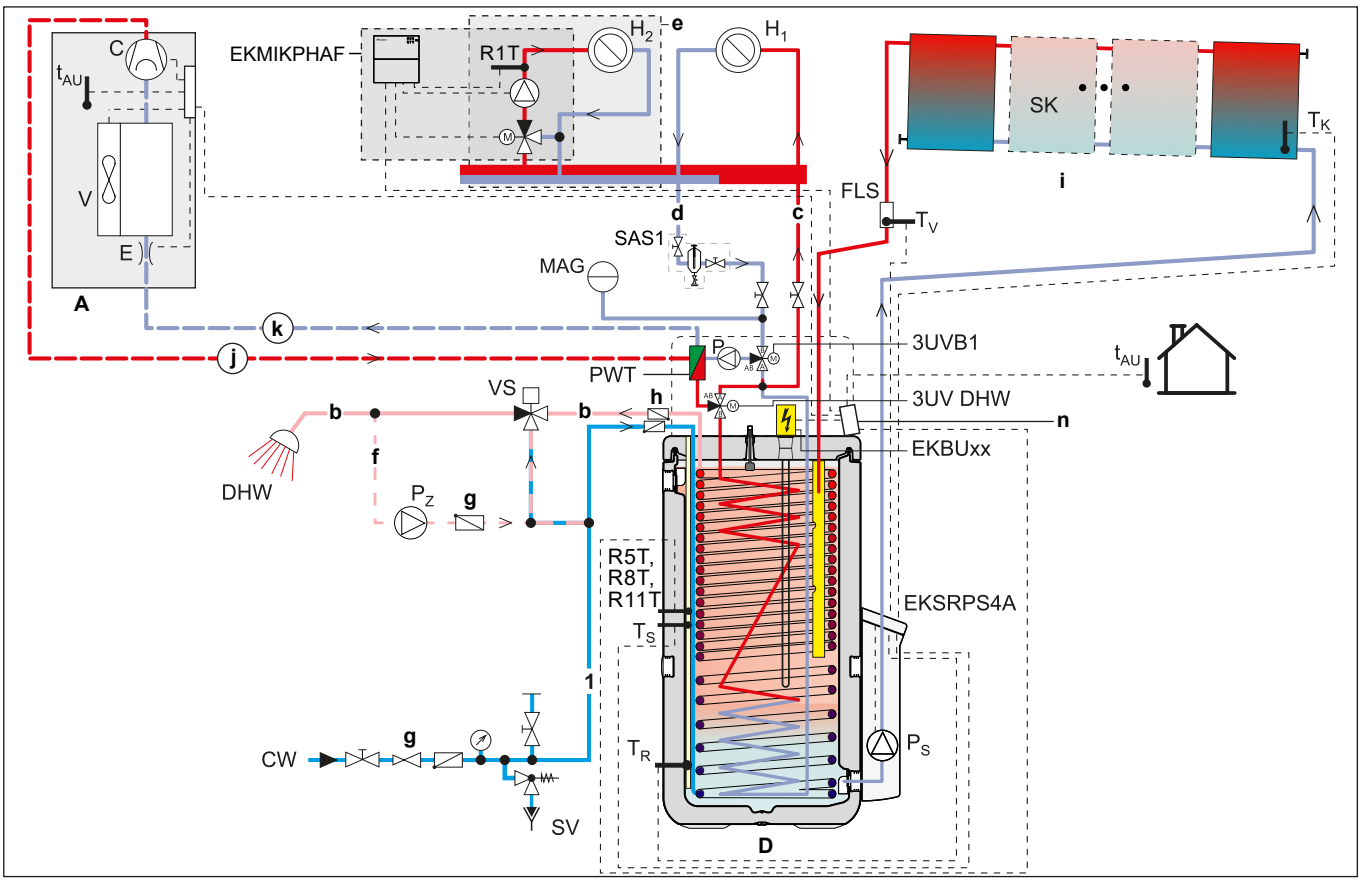
- Anti-scald protection VTA32
- Screw connection kit 1"

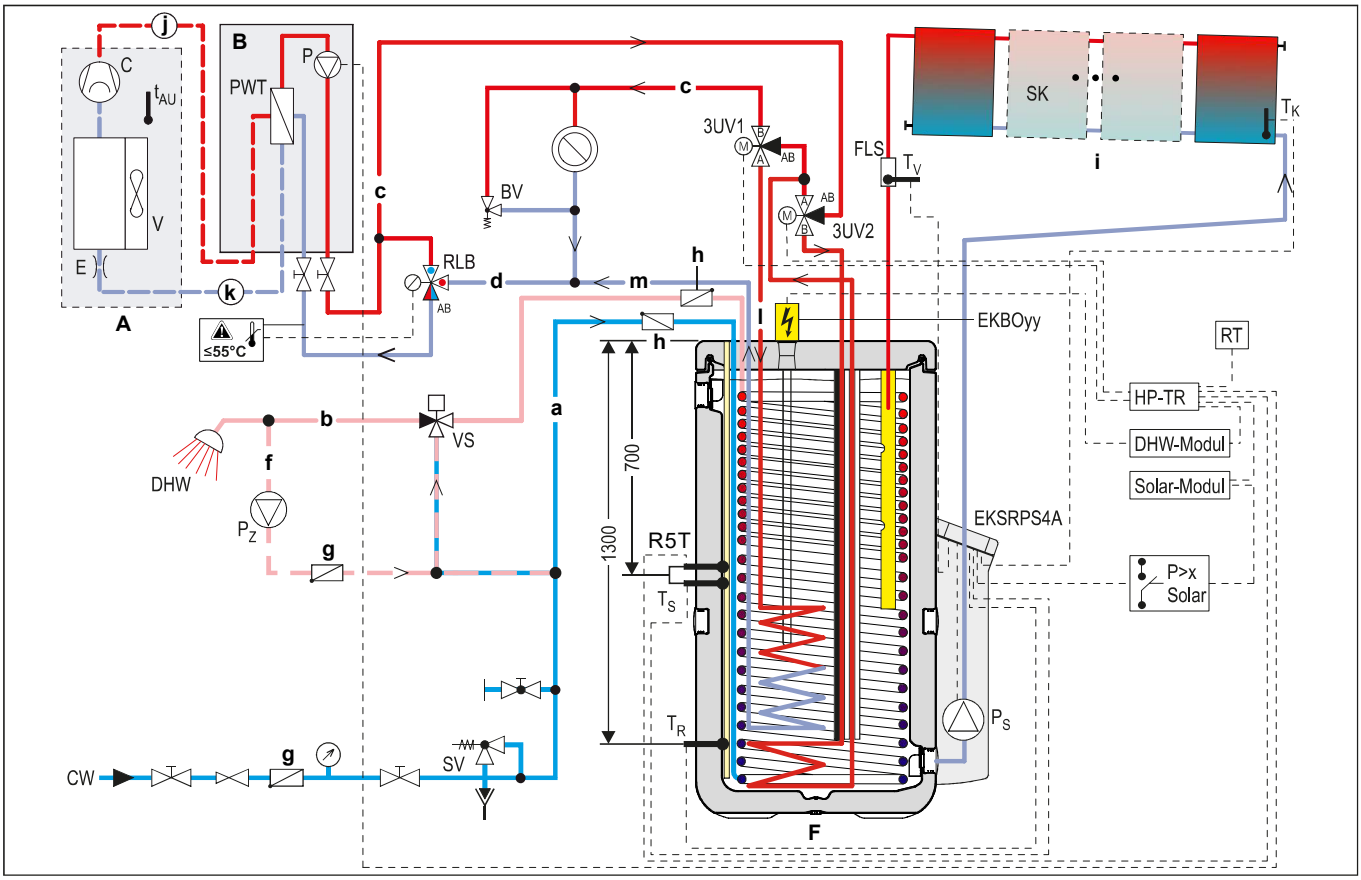
CAUTION

The Daikin units can also be optionally equipped with circulation brakes made of plastic. These are suitable for operating temperatures up to 95°C. If a heat exchanger is operated at temperatures greater than 95°C, another circulation brake must be installed in the building.

INFORMATION

A selection of diagrams of the most common installed systems is shown below. The arrangements shown are only examples, and are no substitute for careful system planning.





Short name	Meaning
a	Cold water distribution network
b	Hot water distribution network
c	Heating inlet flow

Short name	Meaning
d	Heating return flow
e	Mixing circuit
f	Circulation

Short name	Meaning
g	Non return valves
h	Check valve, return valve
i	Solar circuit
j	Gas pipe (refrigerant)
k	Fluid pipe (refrigerant)
l	Storage tank inlet flow
m	Storage tank return flow
n	User interface heatpump
3UV1	3-way switch valve (DHW)
3UV2	3-way switch valve (cooling)
3UVB1	3-way switch valve (heating, internal circuit regulated)
3UV DHW	3-way switch valve (DHW + heating support regulated)
A	Daikin Altherma Outdoor unit
B	Indoor unit: Daikin Altherma wall-mounted unit
BV	Bypass valve
C	Refrigerant compressor
CW	Cold water
D	Indoor unit: Daikin Altherma floor standing unit with integrated ECH₂O tank
DHW	Domestic hot water
E	Expansion valve
EKBOyy	Electric immersion heater (Booster Heater)
EKBUxx	Electric immersion heater (Backup-Heater)
EKMIKPHAF	Bizone kit with hydraulics
EKSRPS4A	Regulation and pump unit for solar systems
F	Domestic hot water storage tank
FLG	FlowGuard Regulating valve with flow rate indicator
FLS	Flow sensor, FlowSensor FLS 20 or alternative type (see "5.2.8 FlowSensor" [▸ 14] (Flow and inlet flow temperature measurement)
H1,H2….Hx	Heating circuits
HP-TR	Main regulator heat pump
MAG	Membran expansion vessel
P_S	Solar operating pump
P	Circulation pump
PWT	Panel heat exchanger (condenser)
R1T	Mixer circuit flow temperature sensor
R5T, R8T, R11T	DHW storage tank temperature sensor (supplied with EKEPRHLT*)
RLB	Return flow temperature limiter
RT	Room thermostat
SAS1	Sludge and magnetic separator
SK	Solar panel field
SV	Safety pressure relief valve
t_{AU}	Outdoor temperature sensor
T_K	Solar collector temperature sensor
T_R	Solar return flow temperature sensor
T_S	Solar storage tank temp. sensor
T_V	Solar flow temperature sensor
V	Fan (vaporiser)
VS	Anti-scald protection VTA32

8.2 Connection of a pressure solar panel system

If the structural conditions do not permit mounting the solar panels above the storage tank or if the connecting line cannot be installed with a continuous gradient between the storage panel and the storage tank, you **cannot use** the depressurised Daikin solar system (DrainBack) and thus **the regulation and pump unit EKSRPS4A.**

Instead, the heating system can be executed with the Daikin solar pressure system. The following solar components can be used equally in both systems:

- Solar high-performance flat solar panels EKSV21P, EKSV26P, EKSH26P
- Solar On-roof, flat roof and in-roof mounting packages
- Solar domestic hot water storage tank

Other system components must only be used under system-specific conditions.

9 Technical data

9.1 Product Fiche

Energy labelling Regulation: (EU) 811/2013

Ecodesign Regulation: (EU) 813/2013

Solar devices pumps + controls	Model names		EKSRPS4A
Auxiliary	Solpump	[W]	32.5
	Solstandby	[W]	2
Annual auxiliary electricity consumption Qaux		[kWh/a]	92
Details and precautions on installation, maintenance and assembly can be found in the installation and or operation manuals. Energy labels and product fiches for addition combinations, packages and other products can be found on https://www.daikin.eu. Sound power in heating mode, measured according to the EN12102 under conditions of the EN14825. This data is for comparison of Energy efficiencies according to Energy label directive 2010/30/EC, for correct selection of products for your application, contact your dealer. Depending on your application and the product selected an additional supplementary heater may have to be installed.			

9.2 Regulation and pump unit EKSRPS4A

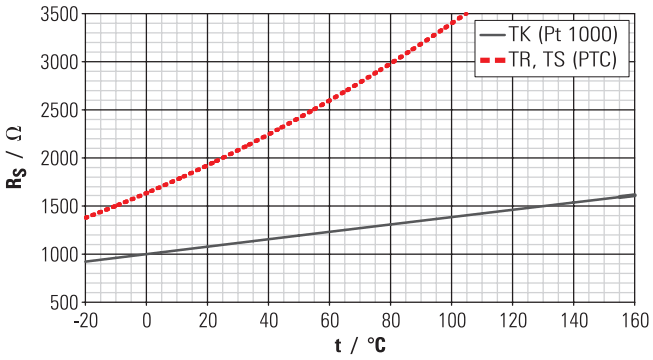
	Regulation and pump unit EKSRPS4A
Dimensions H x W x D	230 x 815 x142 mm
Operating voltage	230 V / 50 Hz
Solar operating pump	Grundfos UPM3 15-145
Maximum electrical power consumption EKSRPS4A	During start: 65 W (115 W)[a] In normal mode: 15-65 W (modulated) (30-115 W)[a]
Solar R4 controller	Digital differential temperature controller with plain text display
Max. electric power consumption of the control unit	2 W
Solar panel temperature sensor	Pt 1000
Storage tank and return flow temperature sensor	PTC
Feed temperature and flow sensor	FLS 20 (alternatively FLS 12, FLS 100)

[a] The details in brackets apply if a second pump is installed.

9.3 Sensor characteristics

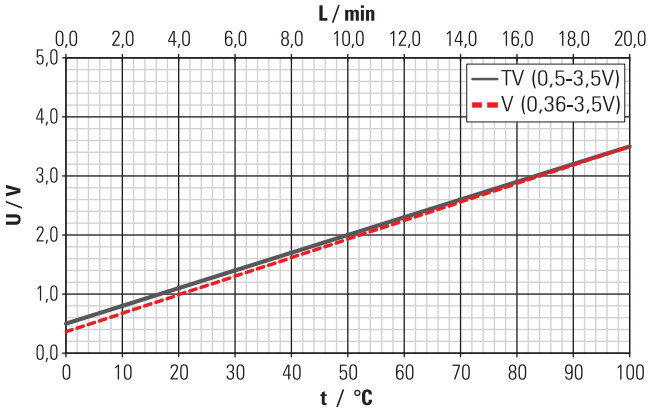
Switch-on inhibit temperature																
Solar sensor	Sensor type	Measured temperature in °C														
		-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
		Sensor resistance in Ohm according to standard or manufacturer's indications														
TR, TS	PTC	1386	1495	1630	1772	1922	2080	2245	2418	2598	2786	2982	3185	3396		
TK	Pt 1000	922	961	1000	1039	1077	1116	1155	1194	1232	1270	1308	1347	1385	1423	1461
FlowSensor		Sensor output voltage in V														
TV	(0.5, - 3.5 V)			0.5	0.80	1.10	1.40	1.70	2.00	2.30	2,60	2,90	3.20	3,50		
Flow rate																
FlowSensor		Measured flow in l/min														
		0,0	2.0	4.0	6,0	8,0	10.0	12,0	14.0	16.0	18,0	20.0				
		Sensor output voltage in V														
V	(0.36, - 3.5 V)	0,36	0,67	0,99	1,30	1.62	1.93	2.24	2.56	2.87	3,19	3,50				

Resistance characteristics of the solar sensors



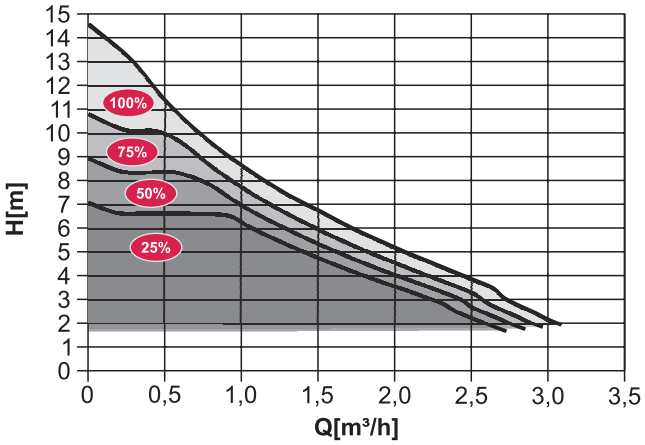
R_S Sensor resistance (PTC, Pt 1000)
t Temperature

Characteristic curve of the FlowSensor



L Flow rate
U Sensor output voltage
t Temperature

9.4 Pump characteristic curve



4P810379-1 0000000Q

DAIKIN EUROPE N.V.
Zandvoordestraat 300, B-8400 Oostende, Belgium

4P810379-1 2025.04