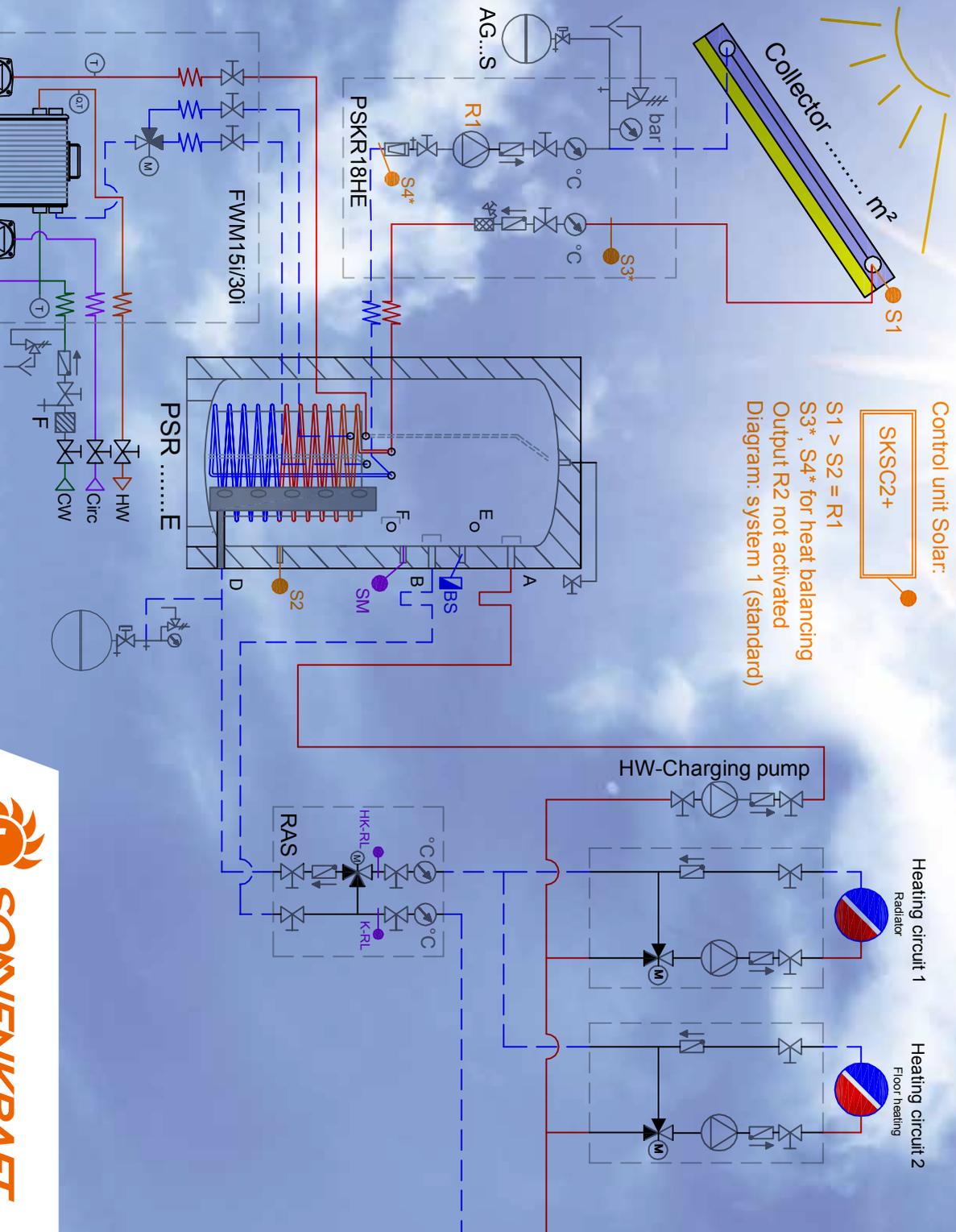
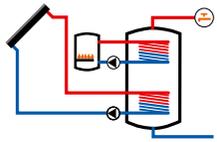


SONNENKRAFT DIAGRAM MANUAL

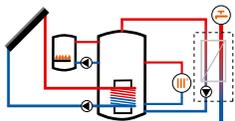


NOTE: ALL DIAGRAM MANUALS ERALIER THAN EDITION 120928-SM-GB BECOME VOID HEREWITH!



Hot water-Sets
Solar boiler DHW/ELB, until 15 m² collector area

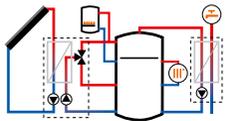
COMPACT E 1.0 - Solar hot water tank DHW



Heating-Sets:
Backup tank PSR with solar pumping station PSKR18HE and fresh water module FWM15i/30i, until 17,5 m² collector area

COMFORT E 1.0 - Oil-/Gas-/Pellets boiler, heating integration with RAS20, 1 collector field

COMFORT E 3.0 - Oil-/Gas-/Pellets boiler, heating integration with DWV25, 1 collector field



Heating-Sets:
Backup tank PSC with stratified charging module SLM50HE and fresh water module FWM15i/30i, until 55 m² collector area

COMFORT E plus 1.1 - oil-/gas-/pellets boiler, heating integration with HKM20, 1 collector field, PSC+PS parallel

COMFORT E plus 1.3 - gas-condensing boiler (Hot water valve in RL), heating integration with RAS20, 1 collector field

COMFORT E plus 1.4 - gas- condensing boiler (Hot water valve in VL), heating integration with RAS20, 1 collector field

COMFORT E plus 1.5 - oil-/gas-/pellets boiler, heating integration with RAS20, 1 collector field

COMFORT E plus 2.0 - oil-/gas-/pellets boiler, heating integration with HKM20, 2 collector fields, PSC+PS parallel

COMFORT E plus 3.1 - oil-/gas-/pellets boiler, heating integration with DWV25, 1 collector field, PSC+PS parallel

COMFORT E plus 4.0 - oil-/gas-/pellets boiler, heating integration with HKM20, 1 collector field, PSC+PS parallel, pool integration in the solar circuit

COMPACT E 1.0

Hot water set with solar hot water tank DHW; reheating with oil-/gas boiler

Control concept: (controller diagram system 1)

If the collector temperature (S1) is approx. 6°C higher than the tank temperature (S2), the solar pump (R1) charges the tank to a set maximum tank temperature (SMX = 60°C).

If you are operating the boiler manually, you can control tank recharging by means of the sensor S4 (as boiler sensor) (Controller diagram: System 8; differential control S4 > S3 with minimum temperature at S4; this variant does not allow heat quantity balancing).

For boilers fired automatically, tank recharging can be controlled with the charging pump via the boiler sensor (BS) of the boiler controller (possibly time-dependent and/or with priority control). You can also control the charging pump via the sensor S3 (Controller diagram: System 3).

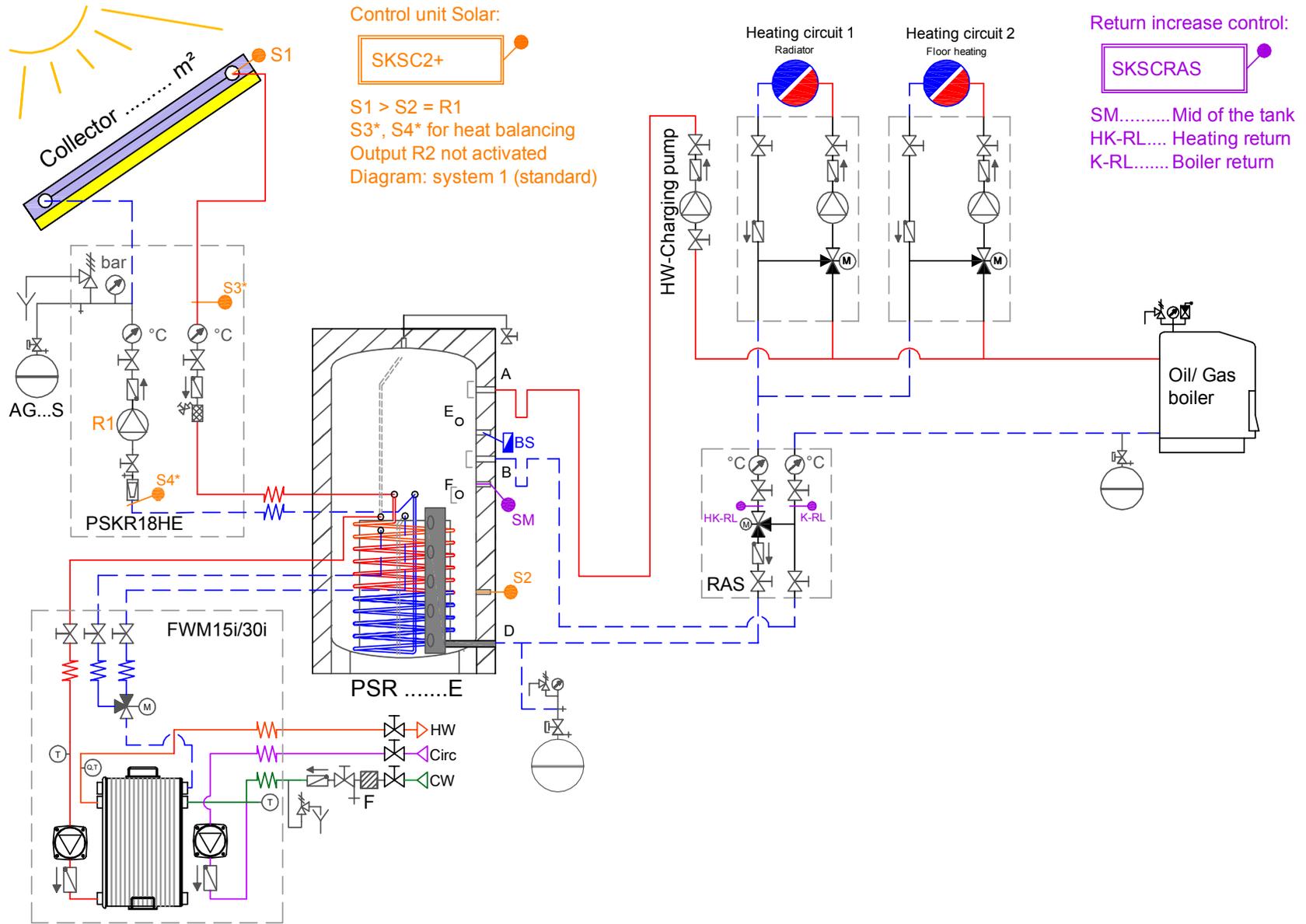
Heat quantity balancing can be activated if the sensors S3* and S4* are built in according to the diagram. The max. volume flow can be read on the Flow meter (switch pump R1 ON manually) and entered in the controller along with the data of the heat transfer medium (type and mixture ratio).

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC2 (download at <http://www.sonnenkraft.com> > partner area).

Recommendations for system hydraulics:

- A SONNENKRAFT service water mixer must be installed according to the hydraulics diagram and/or the installation instructions.
- Thermosiphon bends on all hot tank connections prevent excessive heat losses by "pipe-in-pipe circulation" (for design details, refer to the commissioning and maintenance manual).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid the pipe-in-pipe circulation (causes heat losses in the tank).
- For service water circulation pipes, build in a flushing connection between the pump and the reflux valves.
- Systems higher than 11m require an additional gravity brake in the solar circuit return.
- For systems with SKR500-collectors (up to 2 pcs.) there is required an additional flush connection (B*) at the VL-connection of the DHW-tank.

COMFORT E 1.0



COMFORT E 1.0

Water heating with backup tank PSR E; water heating with fresh water module; backup heating with return increase; reheating with oil-/gas-/pellets boiler

Control concept: (controller diagram system 1)

If the collector temperature (S1) is approx. 6°C higher than the backup tank temperature (S2), the solar pump (R1) charges the backup tank to a set maximum backup tank temperature (change SMX up to a max. of 85°C).

Heat quantity balancing can be activated if the sensors S3* and S4* are built in according to the diagram. The max. volume flow can be read on the Flow meter (switch pump R1 ON manually) and entered in the controller along with the data of the heat transfer medium (type and mixture ratio).

The charging pump recharges the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (BS) of the boiler controller.

The fresh water module FWM15/30i makes water heating very hygienic and it produces lowest RL-temperatures in the solar backup tank. When hot water is dispensed a flow switch sensor controls the speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation-set FWM15/30i-CFK (Hmax = 0,5 bar) can be build in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWMi is getting stratified via a switching valve in the middle tank area.

A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water pipeline system.

If the temperature of the backup tank (SM) is above the temperature of the heating circuit return (HK-RL), it will be lead with a variable amount over the hydraulic module RAS20 to the backup tank and thus the temperature level of the boiler return line (K-RL) is getting preheated to the corresponding nominal value.

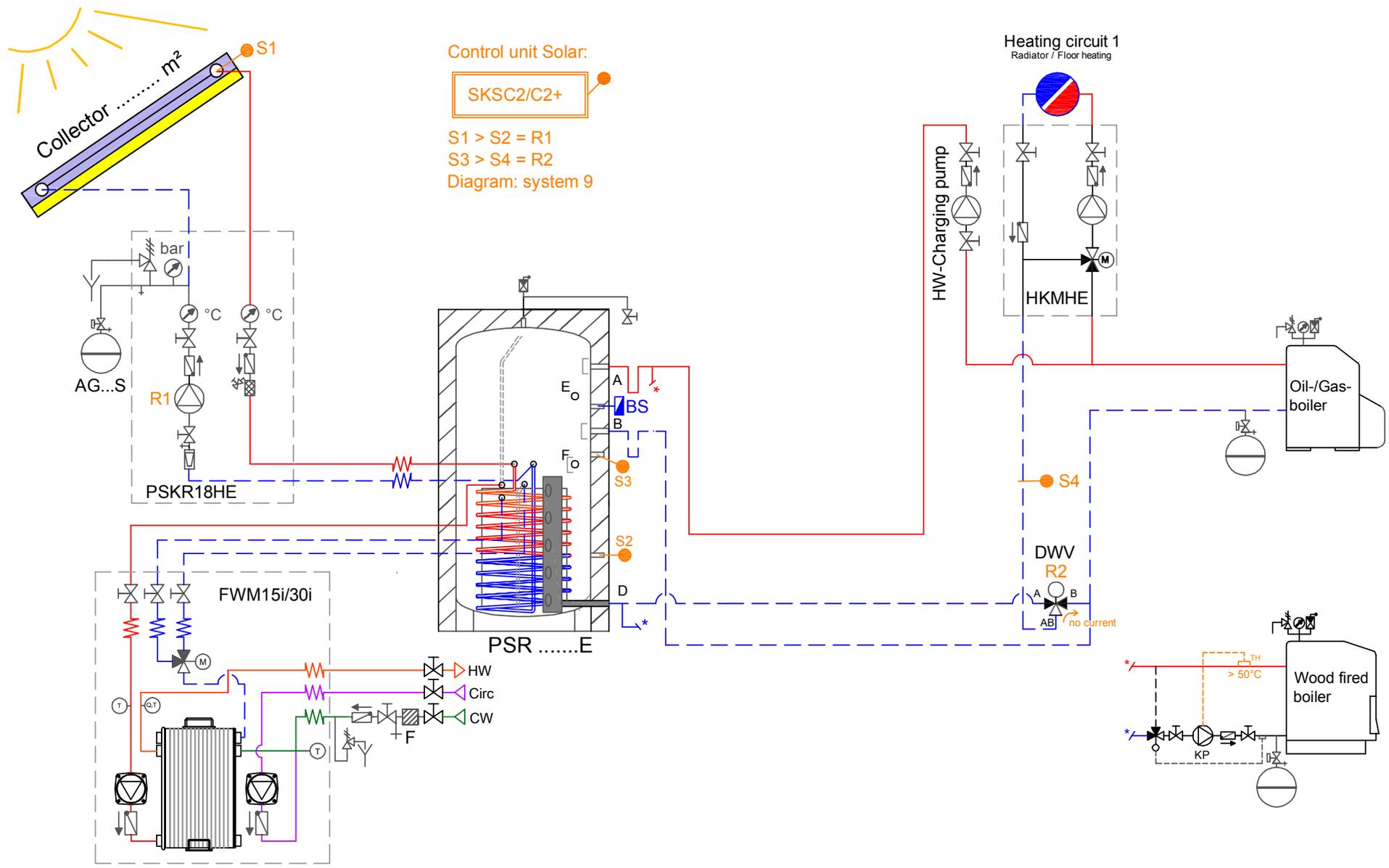
The heating circuit is controlled by the boiler control.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC2+/SKSCRAS (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- The hydraulic is especially suitable for condensing boilers or modulating heat pumps, because the solar pre-heating can be accordingly limited.
- Thermosiphon bends on all hot tank connections prevent excessive heat losses by "pipe-in-pipe circulation" (for design details, refer to the commissioning and maintenance manual).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank, can be laid near to the soil, contribute to avoid to the pipe-in-pipe circulation (causes heat losses in the tank).
- For service water circulation pipes, a flushing connection must be installed in front of the circulation-set!
- As customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the flow switch of the module functions properly.

COMFORT E 3.0



COMFORT E 3.0

Heating-set with backup tank PSR E; water heating with fresh water module; backup heating with return increase; reheating with oil-/gas-/pellets-/wood fired boiler

Control concept: (controller diagram system 9)

If the collector temperature (S1) is approx. 6°C higher than the backup tank temperature (S2), the solar pump (R1) charges the backup tank to a set maximum backup tank temperature (SMX = 85°C).

The heat quantity balancing cannot be activated here. A heat volume meter can just be integrated in the solar-RL/-VL.

The charging pump recharges the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (BS) of the boiler controller.

The fresh water module FWM15/30i provides a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch activates the variable speed charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area.

A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water pipeline system.

If the temperature of the backup tank (S3) is approx. 5°C higher than the temperature of the heating circuit return (S4), the latter is channeled via the switching valve DWV (R2) to the backup tank and thus the temperature level of the boiler return is accordingly preheated. If the backup tank is only approx. 3°C warmer than the temperature of the heating return, the switching valve is getting deactivated again ("no-current method") and the heating circuit is heated by the boiler only.

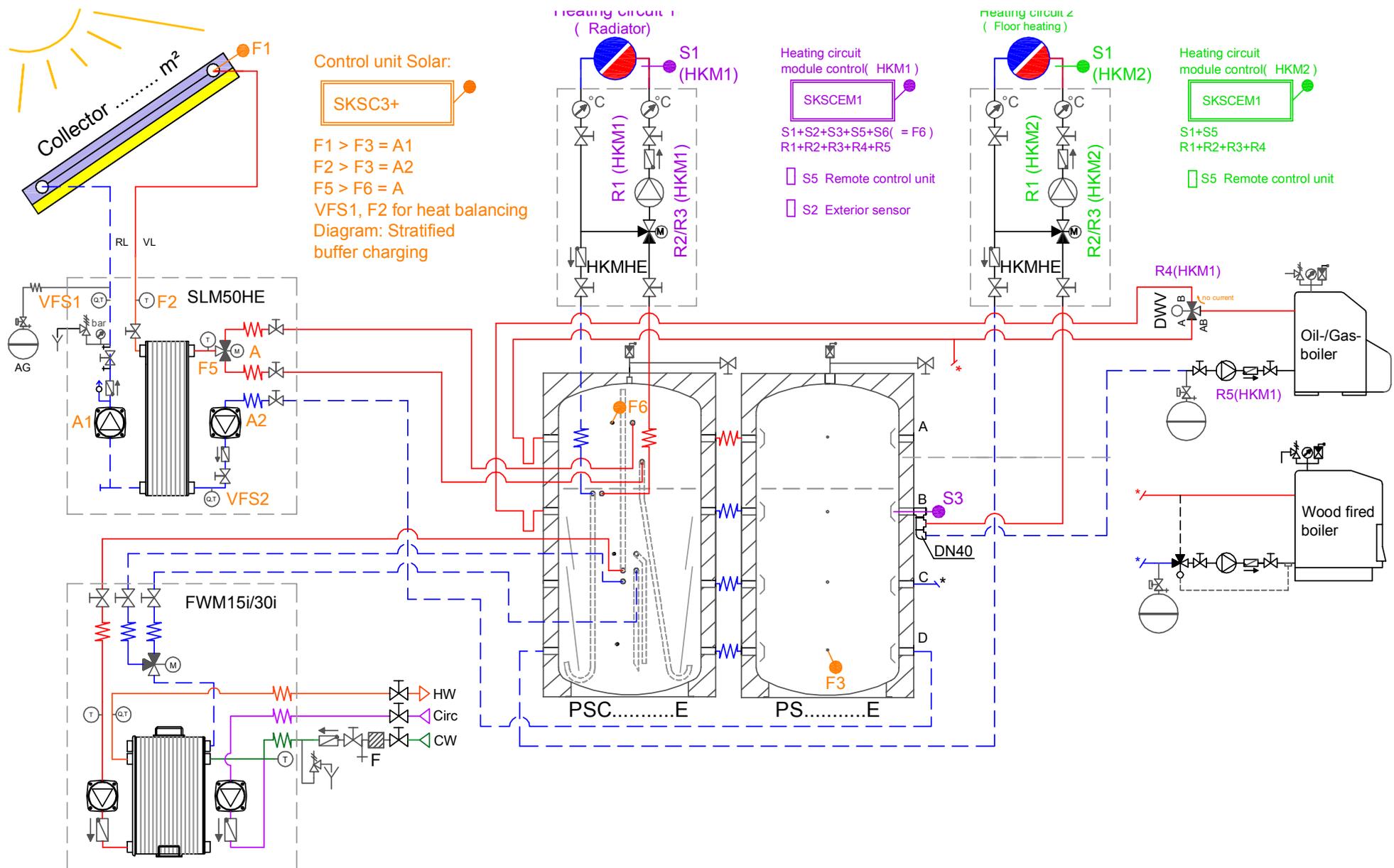
The heating circuit is controlled by the boiler control.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC2+ (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- Thermosiphon bends on all hot tank connections prevent excessive heat losses by "pipe-in-pipe circulation" (for design details, refer to the commissioning and maintenance manual).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank, can be laid near to the soil, contribute to avoid to the pipe-in-pipe circulation (causes heat losses in the tank).
- The constant use of the solid fuel boiler can strongly reduce the solar yield.
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the flow switch of the module functions properly.

COMFORT E Plus 1.1



COMFORT E Plus 1.1

Heating-set with backup tank PSC E; water heating with fresh water module;
backup heating with heating circuit module; reheating with oil-/gas-/pellets-/wood fired boiler

Control concept: (Controller diagram: stratified buffer charging)

If the collector temperature (F1) is approx. 7°C higher than the backup tank temperature (F3), the solar pump (A1) is activated (Start spd.1 = 80%). If the flow temperature in the stratified charging module (F2) is approx. 5°C higher than the backup tank temperature (F3), the backup charging pump (A2) charges the backup tank to a set maximum backup tank temperature of approx. 90°C. The speed control of the pumps A1 and A2 tries to bring the temperature for backup charging to approx. 63°C and keep it there. If the secondary flow temperature in the stratified charging module (F5) is approx. 3°C higher than the upper backup tank temperature (F6), the backup tank is charged layer by layer by way of the diverter valve (A) in the upper part of the tank. The heat quantity measurement (WMZ 2/3 = YES) is automatically activated.

The boiler pump (R5) and the diverter valve DWV (R4) recharges the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (F6) of the heating circuit control unit SKSCEM1.

The fresh water module FWM15/30i allows a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch controls the variable speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area.

A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water network.

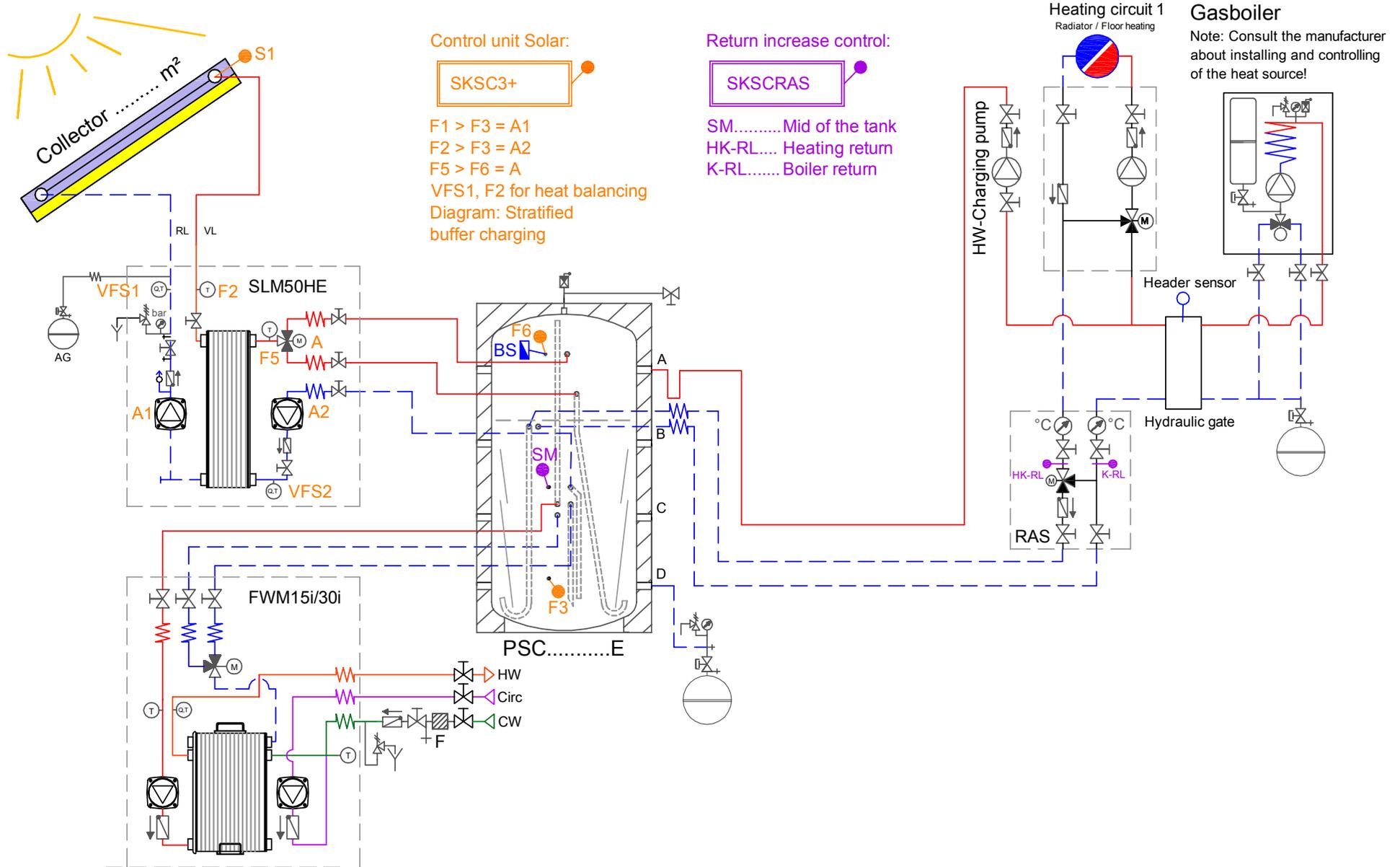
The heating circuit is controlled by means of the flow sensor (S1 (HKM1/2)) and exterior sensor (S2 (hKM1/2)) on the basis of weather conditions. By the backup sensor (S3 (HKM1)) the boiler requirement and the buffer charging pump (R5 (hKM1/2)) is activated or rather deactivated again if the temperature falls below the set minimum.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC3+ and/or SKSCEM1 (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- Thermosiphon bends on all hot tank connections prevent excessive heat losses through "pipe-in-pipe circulation" (see commissioning and maintenance manual for design details).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid pipe-in-pipe circulation (heat losses at standstill).
- The constant use of the solid fuel boiler can strongly reduce the solar yield.
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As is customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the module functions properly.

COMFORT E Plus 1.3



COMFORT E Plus 1.3

Heating-set with backup tank PSC E; Water heating with fresh water module;
Backup heating with controlled return increase; reheating with gas condensing boiler (Hot water-switching in RL)

Control concept: (Controller diagram: stratified buffer charging)

If the collector temperature (F1) is approx. 7°C higher than the backup tank temperature (F3), the solar pump (A1) is activated (Start spd.1 = 80%). If the flow temperature in the stratified charging module (F2) is approx. 5°C higher than the backup tank temperature (F3), the backup charging pump (A2) charges the backup tank to a set maximum backup tank temperature of approx. 90°C. The speed control of the pumps A1 and A2 tries to bring the temperature for backup charging to approx. 63°C and keep it there. If the secondary flow temperature in the stratified charging module (F5) is approx. 3°C higher than the upper backup tank temperature (F6), the backup tank is charged layer by layer by way of the diverter valve (A) in the upper part of the tank. The heat quantity measurement (WMZ 2/3 = YES) is automatically activated.

The charging pump recharges the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (BS) of the gas boiler control.

The fresh water module FWM15/30i allows a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch controls the variable speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area.

A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water network.

If the temperature of the backup tank (SM) is above the temperature of the heating circuit return (HK-RL), it will be lead with a variable amount over the hydraulic module RAS20 to the backup tank and thus the temperature level of the boiler return line (K-RL) is getting preheated to the corresponding nominal value.

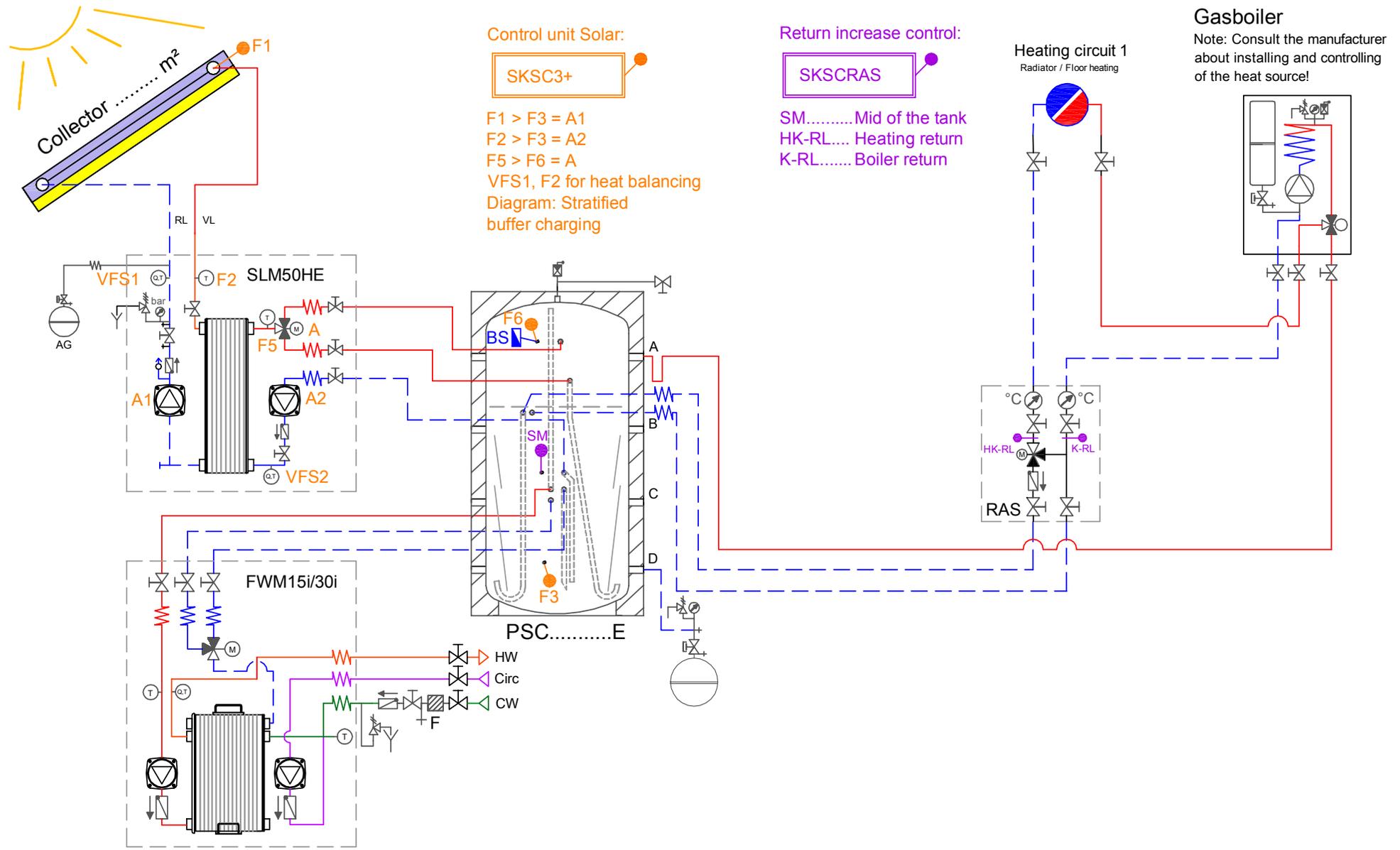
The heating circuit is controlled by the boiler control.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC3+ and/or SKSCRAS (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- The hydraulic is particularly suited for condensing boilers, because the solar pre-heating can be limited accordingly.
- Thermosiphon bends on all hot tank connections prevent excessive heat losses through "pipe-in-pipe circulation" (see commissioning and maintenance manual for design details).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid pipe-in-pipe circulation (heat losses at standstill).
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As is customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the module functions properly.

COMFORT E Plus 1.4



COMFORT E Plus 1.4

Heating-set with backup tank PSC E; Water heating with fresh water module;
Backup heating with controlled return increase; reheating with gas condensing boiler (Hot water-switching in VL)

Control concept: (Controller diagram: stratified buffer charging)

If the collector temperature (F1) is approx. 7°C higher than the backup tank temperature (F3), the solar pump (A1) is activated (Start spd.1 = 80%). If the flow temperature in the stratified charging module (F2) is approx. 5°C higher than the backup tank temperature (F3), the backup charging pump (A2) charges the backup tank to a set maximum backup tank temperature of approx. 90°C. The speed control of the pumps A1 and A2 tries to bring the temperature for backup charging to approx. 63°C and keep it there. If the secondary flow temperature in the stratified charging module (F5) is approx. 3°C higher than the upper backup tank temperature (F6), the backup tank is charged layer by layer by way of the diverter valve (A) in the upper part of the tank. The heat quantity measurement (WMZ 2/3 = YES) is automatically activated.

The charging pump recharges the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (BS) of the gas boiler control.

The fresh water module FWM15/30i allows a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch controls the variable speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area.
A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water network.

If the temperature of the backup tank (SM) is above the temperature of the heating circuit return (HK-RL), it will be lead with a variable amount over the hydraulic module RAS20 to the backup tank and thus und the temperature level of the boiler return line (K-RL) is getting preheated to the corresponding nominal value.

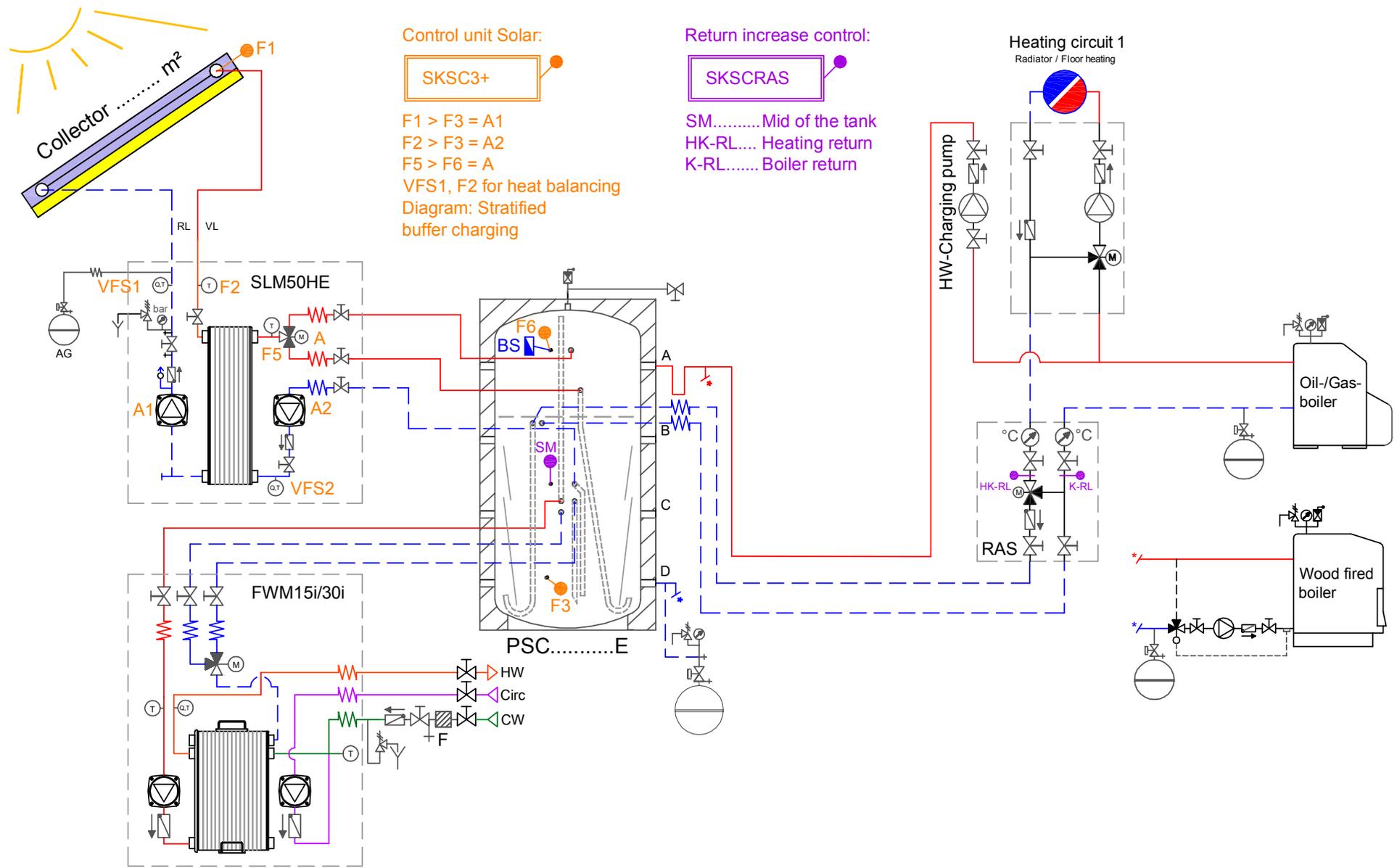
The heating circuit is controlled by the boiler control.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC3+ and/or SKSCRAS (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- The hydraulic is particularly suited for condensing boilers, because the solar pre-heating can be limited accordingly.
- Thermosiphon bends on all hot tank connections prevent excessive heat losses through "pipe-in-pipe circulation" (see commissioning and maintenance manual for design details).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid pipe-in-pipe circulation (heat losses at standstill).
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As is customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the module functions properly.

COMFORT E Plus 1.5



COMFORT E Plus 1.5

Heating-set with backup tank PSC E; Water heating with fresh water module;
Backup heating with controlled return increase; reheating with oil-/gas-/pellets-/ wood fired boiler

Control concept: (Controller diagram: stratified buffer charging)

If the collector temperature (F1) is approx. 7°C higher than the backup tank temperature (F3), the solar pump (A1) is activated (Start spd.1 = 80%). If the flow temperature in the stratified charging module (F2) is approx. 5°C higher than the backup tank temperature (F3), the backup charging pump (A2) charges the backup tank to a set maximum backup tank temperature of approx. 90°C. The speed control of the pumps A1 and A2 tries to bring the temperature for backup charging to approx. 63°C and keep it there. If the secondary flow temperature in the stratified charging module (F5) is approx. 3°C higher than the upper backup tank temperature (F6), the backup tank is charged layer by layer by way of the diverter valve (A) in the upper part of the tank. The heat quantity measurement (WMZ 2/3 = YES) is automatically activated.

The charging pump recharges the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (BS) of the gas boiler control.

The fresh water module FWM15/30i allows a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch controls the variable speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area.
A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water network.

If the temperature of the backup tank (SM) is above the temperature of the heating circuit return (HK-RL), it will be lead with a variable amount over the hydraulic module RAS20 to the backup tank and thus und the temperature level of the boiler return line (K-RL) is getting preheated to the corresponding nominal value.

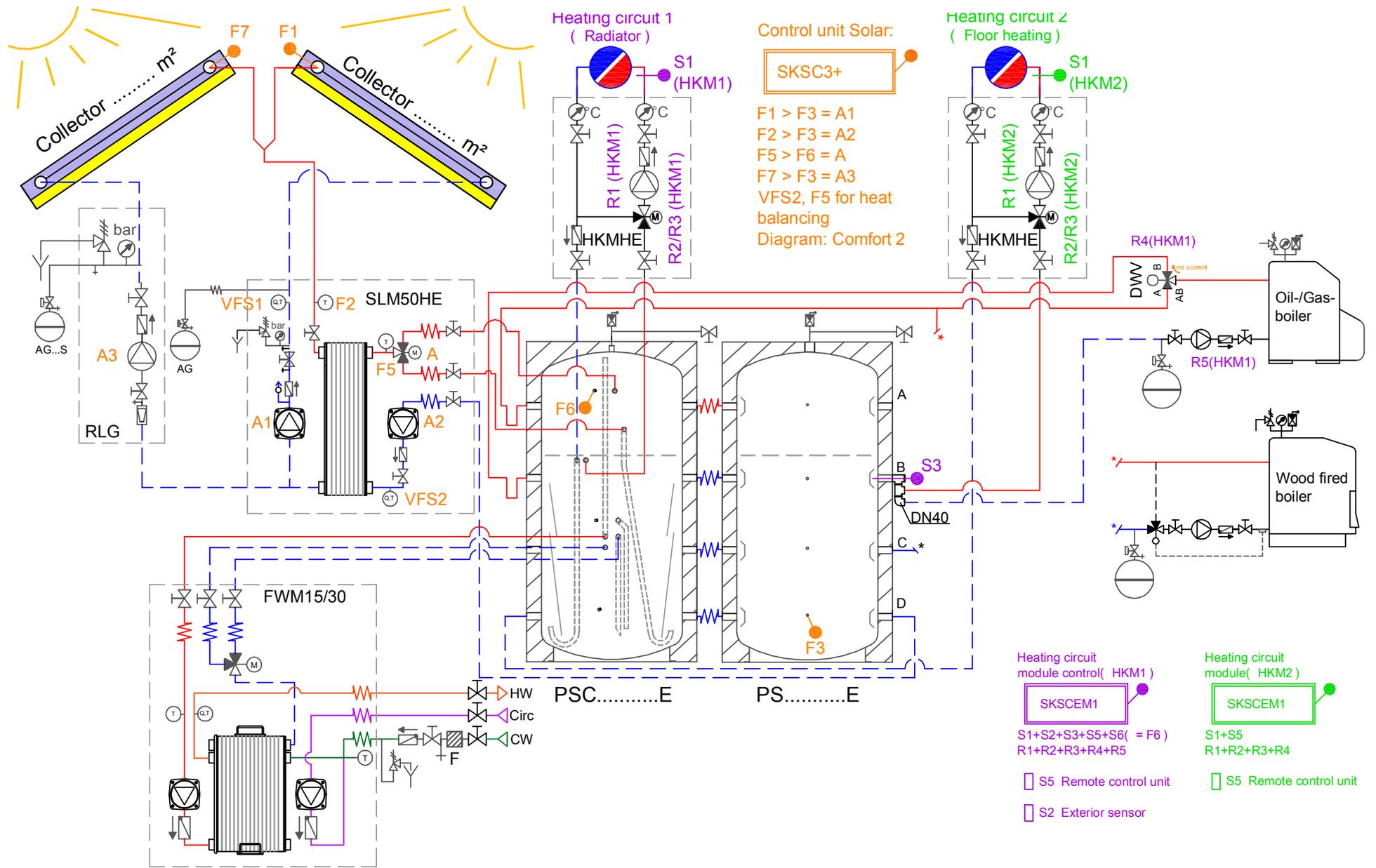
The heating circuit is controlled by the boiler control.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC3+/SKSCRAS
(download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- The hydraulic is particularly suited for condensing boilers, because the solar pre-heating can be limited accordingly.
- Thermosiphon bends on all hot tank connections prevent excessive heat losses through "pipe-in-pipe circulation" (see commissioning and maintenance manual for design details).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid pipe-in-pipe circulation (heat losses at standstill).
- The constant use of the solid fuel boiler can strongly reduce the solar yield.
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As is customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the module functions properly.

COMFORT E Plus 2.0



COMFORT E Plus 2.0

Heating-set with backup tank PSC E + PS E parallel connected (2 separate collector fields); Water heating with fresh water module; Backup heating with heating circuit module; reheating with oil-/gas-/pellets-/ wood fired boiler

Control concept: (Controller diagram: Comfort 2)

If the collector temperatures (F1 and/or F7) is approx. 10°C higher than the backup tank temperature (F3), the solar pump (A1 and/or A3) is activated (Start spd.1/3 = 80%). If the flow temperature in the stratified charging module (F2) is approx. 5°C higher than the backup tank temperature (F3), the backup charging pump (A2) charges the backup tank to a set maximum backup tank temperature (F3 = 85°C or F6 = 90°C). The speed control of the pumps A1, A2 and A3 tries to bring the temperature for backup charging to approx. 63°C and keep it there. If the secondary flow temperature in the stratified charging module (F5) is approx. 3°C higher than the upper backup tank temperature (F6), the backup tank is charged layer by layer by way of the diverter valve (A) in the upper part of the tank. The heat quantity measurement (WMZ 2/3 = YES) is automatically activated.

The boiler pump (R5) and the switching valve DWV (R4) recharge the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (F6) of the heating circuit control unit SKSCEM1.

The fresh water module FWM15/30i allows a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch controls the variable speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area.
A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water network.

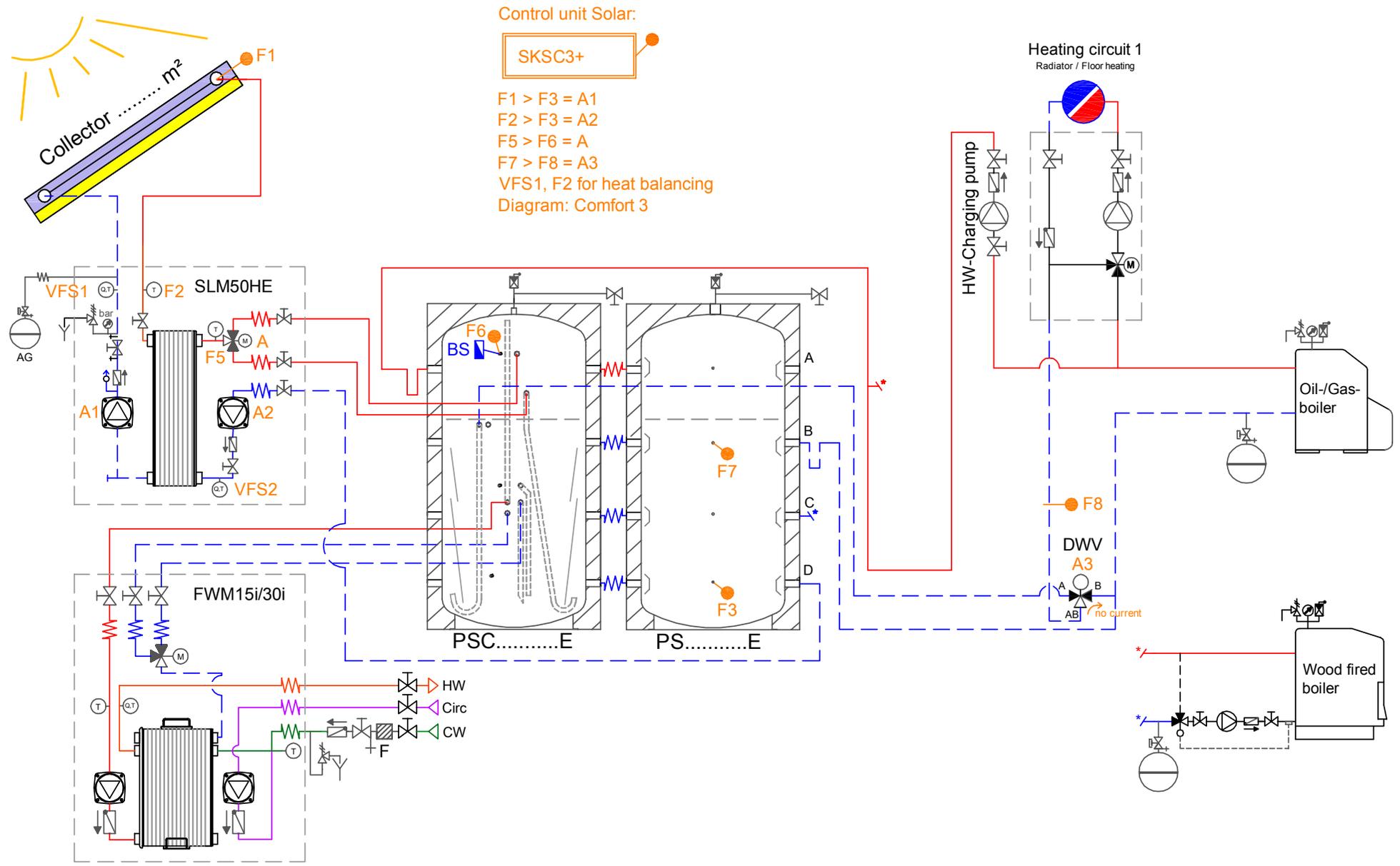
The heating circuit is controlled on the basis of weather conditions by the flow sensor (S1 (HKM1/2)) and the exterior sensor (S2 (HKM1/2)). The backup sensor (S3 (HKM1/2)) submits a requirement to the boiler via the controller output (R5 (HKM1/2)) and the backup charging pump (R5 (HKM1/2)) is activated or respectively deactivated after falling below the set minimum temperature.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to Controller Manual SKSC3+ / SKSCEM1 (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- Thermosiphon bends on all hot tank connections prevent excessive heat losses through "pipe-in-pipe circulation" (see commissioning and maintenance manual for design details).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid pipe-in-pipe circulation (heat losses at standstill).
- The constant use of the solid fuel boiler can strongly reduce the solar yield.
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As is customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the module functions properly.
- The common solar flow and the Y-connection piece should be executed one pipe dimension larger than the solar return. Otherwise there may be unwanted hydraulic operating conditions at simultaneous operation of the two solar pumps.
- For optimal commissioning (flushing, vent) both collector fields need their own air vents.

COMFORT E Plus 3.1



COMFORT E Plus 3.1

Heating-set with backup tank PSC E + PS E parallel connected; Water heating with fresh water module; Backup heating with return increase; reheating with oil-/gas-/pellets-/wood fired boiler

Control concept: (Controller diagram: Comfort 3)

If the collector temperature (F1) is approx. 7°C higher than the backup tank temperature (F3), the solar pump (A1) is activated (Start spd.1 = 80%). If the flow temperature in the stratified charging module (F2) is approx. 5°C higher than the backup tank temperature (F3), the backup charging pump (A2) charges the backup tank to a set maximum backup tank temperature of approx. 90°C. The speed control of the pumps A1 and A2 tries to bring the temperature for backup charging to approx. 63°C and keep it there. If the secondary flow temperature in the stratified charging module (F5) is approx. 3°C higher than the upper backup tank temperature (F6), the backup tank is charged layer by layer by way of the diverter valve (A) in the upper part of the tank. The heat quantity measurement (WMZ 2/3 = YES) is automatically activated.

The charging pump recharges the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (BS) of the gas boiler control.

The fresh water module FWM15/30i allows a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch controls the variable speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water, deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area.

A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water network.

If the temperature of the backup tank (F7) is approx. 5°C higher than the temperature of the heating return (F8), the latter is channeled to the backup tank by means of the switching valve DWV (A3) and thus the temperature level of the boiler return preheated accordingly. If the backup tank is only approx. 3°C warmer than the heating return, the switching valve is deactivated again ("no-current") and the heating circuit heated by the boiler only.

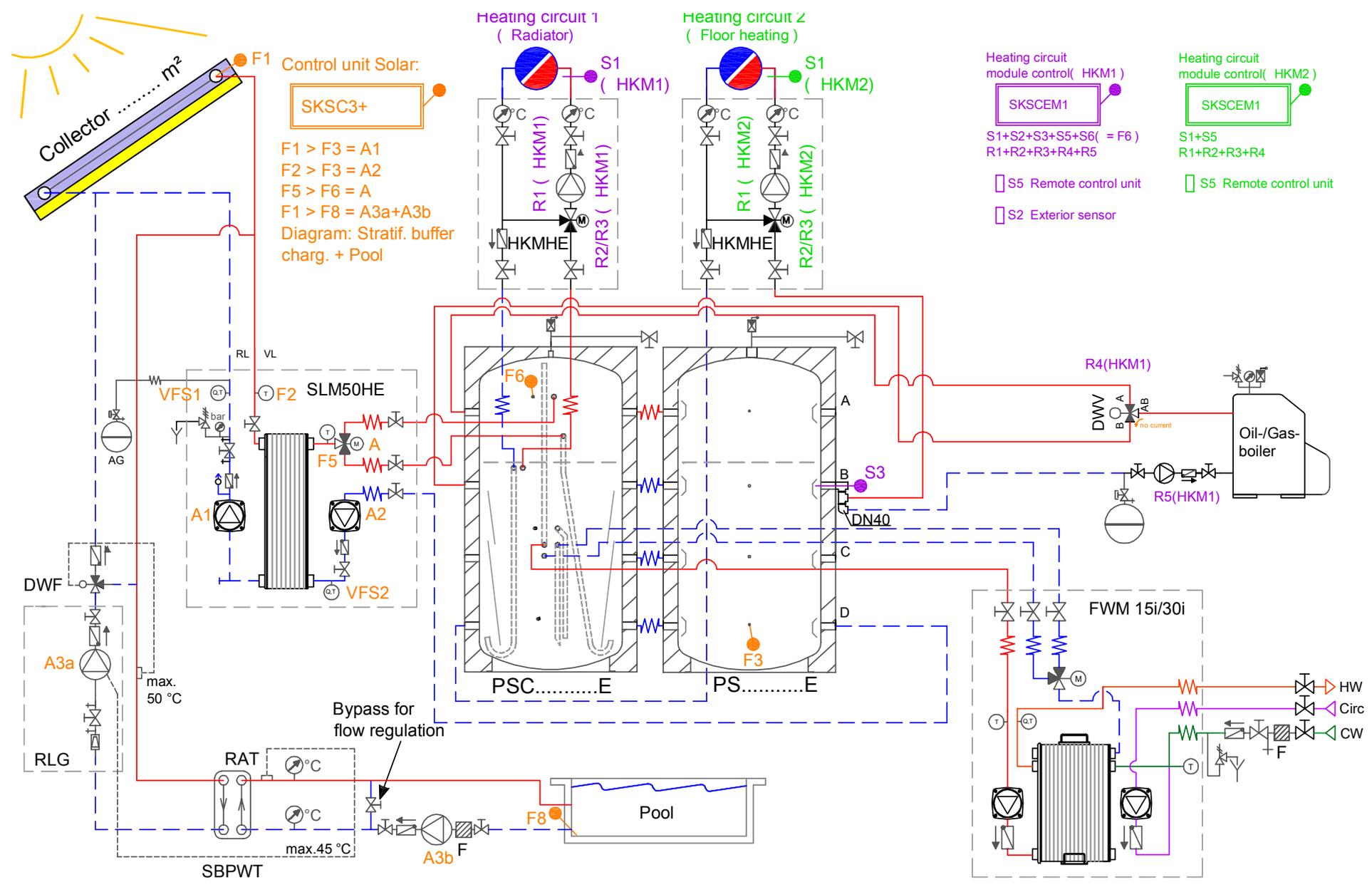
The heating circuit is controlled by the boiler control.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to controller manual SKSC3+ (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- Thermosiphon bends on all hot tank connections prevent excessive heat losses through "pipe-in-pipe circulation" (see commissioning and maintenance manual for design details).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid pipe-in-pipe circulation (heat losses at standstill).
- The constant use of the solid fuel boiler can strongly reduce the solar yield.
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As is customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the module functions properly.

COMFORT E Plus 4.0



COMFORT E Plus 4.0

Heating-set with backup tank PSC E + PS E parallel connected; Water heating with fresh water module; Backup heating with heating circuit module; pool heating directly via solar circuit; reheating with oil-/gas-/pellets boiler

Control concept: (Controller diagram: stratified buffer charging + Pool)

If the collector temperature (F1) is approx. 7°C higher than the backup tank temperature (F3), the solar pump (A1) is activated (Start spd.1 = 80%). If the flow temperature in the stratified charging module (F2) is approx. 5°C higher than the backup tank temperature (F3), the backup charging pump (A2) charges the backup tank to a set maximum backup tank temperature of approx. 90°C. The speed control of the pumps A1 and A2 tries to bring the temperature for backup charging to approx. 63°C and keep it there. If the secondary flow temperature in the stratified charging module (F5) is approx. 3°C higher than the upper backup tank temperature (F6), the backup tank is charged layer by layer by way of the diverter valve (A) in the upper part of the tank. The heat quantity measurement (WMZ 2/3 = YES) is automatically activated, however it only measures the solar yield in the direction of the backup tank.

If the maximum backup tank temperature (F3 = $\leftarrow T1_{1max}$) has been reached and the collector temperature (F1) is approx. 7°C higher than the swimming pool temperature (F8), the swimming pool is heated by means of the pumps A3a and A3b (use relay to connect in parallel) and the plate heat exchanger until it reaches the set maximum swimming pool temperature ($\leftarrow T3_{max} = 30^{\circ}C$), (SBA act. = Yes).

As is customary the backup tank is charged primarily (SLM message A3 = 1), therefore the swimming pool charging (A3) is switched off for approx. 2 min every 15 min. During this waiting time, the system checks whether the collector temperature can reach a sufficient temperature level to charge the backup tank and if necessary it is getting charged primarily again.

The fresh water module FWM15/30i allows a hygienic hot water preparation and generates lowest RL-temperatures in the solar buffer. When hot water is dispensed a flow switch controls the variable speed controlled charging pump, which channels the hot backup water across the plate heat exchanger and heats the cold water to the set service water temperature (settings from 30°C to 65°C are available).

In addition the circulation set FWM15/30i-CFK (Hmax = 0,5 bar) can be built in. Activation via automatically learning function, timer or tapping of hot water,

deactivation via temperature sensor in the circulation unit. In the circulation operation the hot return from the FWM is getting stratified via a switching valve in the middle tank area. A manually activatable disinfection mode (80 °C for max. 60 minutes) can sterilize the hot water network.

The boiler pump (R5) and the switching valve DWV (R4) recharge the backup tank for the fresh water module FWM15/30i primarily via the boiler sensor (F6) of the heating circuit control unit SKSCEM1.

The heating circuit is controlled by means of the flow sensor (S1 (HKM1/2)) and the exterior sensor (S2 (hKM1/2)) on the basis of weather conditions. The backup sensor (S3 (HKM1/2)) generates a requirement to the boiler via the controller output (R5 (HKM1/2)); the backup charging pump (R5 (HKM1/2)) is activated and deactivated again if the temperature falls below the set minimum.

For details on further controller options such as minimum collector temperature, emergency collector shut-off, recooling etc., refer to controller manual SKSC3+/SKSCEM1 (download at <http://www.sonnenkraft.com> > private home).

Recommendations for system hydraulics:

- Thermosiphon bends on all hot tank connections prevent excessive heat losses through "pipe-in-pipe circulation" (see commissioning and maintenance manual for design details).
- As an alternative to the U-siphon bends, the connection lines between boiler, consumer net and tank can be laid near to the soil, to avoid pipe-in-pipe circulation (heat losses at standstill).
- For service water circulation pipes, a flushing connection must be installed in front of the circulation set!
- As is customary for hot water tanks, the cold water connection of the FWM15/30i must have a boiler safety group. A filter ensures that the module functions properly.



SONNENKRAFT Solar Systems GmbH • Industriepark • 9300 St. Veit/Glan

Tel.: +43 (0)4212 450 10 - 400 • Fax: +43 (0)4212 450 10-477 • E-mail: international@sonnenkraft.com

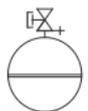
Legend of symbols used:



Shut-off unit



Thermostatic circulation valve



Expansion tank with cap valve



Automatic rapid deaerator

BS



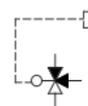
Boiler sensor for heating control



Electromotive three-way mixer



Flow volume meter



Thermal three-way valve with distributive function



Drain valve



ETI

Air vent

F1



Temperature sensor

F1



Temperature sensor

S1



Temperature sensor



F

Fine filter



Pump



Boiler safety group

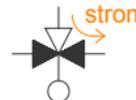


Air separator

bar



Manometer



Electromotive three-way valve with distributive function and spring return



Backup tank connecting hose
Corrugated pipe tank connection



TH

Thermostat with electric switching contact



Reflux valve and gravity brake



Flushing device



Flow measuring unit



Choking valve



°C

Thermometer

TBM



Thermostatic service water mixer
(For installation, see installation instructions)



SKSRV

Volume measuring instrument for heat volume counting

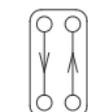


Plate heat exchanger