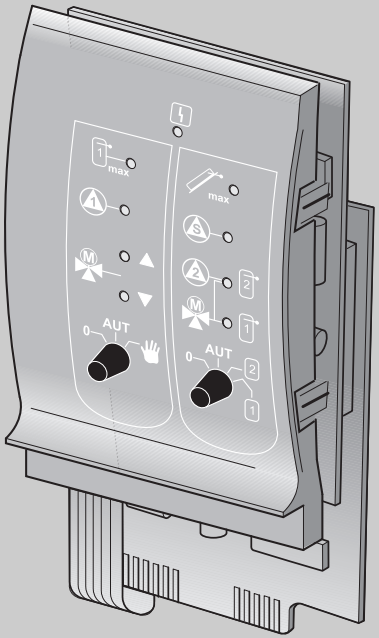
Installation and Service Instructions

Function module



FM443
Solar Module

For heating contractors

Read carefully prior to commissioning and service work

6 720 618 623 - 11/2008 US/CA

Buderus

Contents

1 Safety

1.1 About this manual

This section contains general safety instructions that you must observe when servicing the FM443 function module.

The other sections of the service instructions contain additional safety instructions that must also be observed. Read the safety instructions carefully before carrying out the activities described below.

If the safety instructions are not observed, serious or even fatal personal injury and damage to property and the environment may be caused.

1.2 Intended use

The FM443 function module can be installed in the control panels of the Logamatic 4000 control system.

For the system to operate perfectly you will require control panel software version 4.17 or higher.

1.3 Standards, regulations and directives

USER NOTE

Observe all regulations and standards applicable to installation and operation of the system in your country.

USER NOTE

All electrical components must be approved for the USA and Canada!

This product has been tested and certified and meets applicable standards for the US and Canadian markets.

1.4 Key to symbols

Two levels of danger are identified and signified by the following terms:

WARNING!

RISK OF LIFE

Identifies possible dangers emanating from a product that might cause serious injury or death if appropriate care is not taken.

CAUTION!

RISK OF INJURY/ SYSTEM DAMAGE

Indicates a potentially dangerous situation that could cause minor or moderately serious injuries or damage to property.

USER NOTE

Tip for optimum use of equipment and adjustment as well as useful information.

1.5 Please observe these notes

The FM443 function module has been designed and built in accordance with currently recognized standards and safety requirements.

However, damage resulting from improper service work cannot be completely prevented.

Before starting service work on the FM443 function module read these service instructions carefully.

WARNING!

RISK OF LIFE

due to electric shock!

- The installation, electrical wiring, commissioning, electrical connection, as well as maintenance and repairs must only be carried out by a trained contractor who adheres to all current technical regulations and requirements.
- The local regulations must be observed.

WARNING!

RISK OF LIFE

due to electric shock!

- Make sure that all electrical work is carried out by a trained contractor.
- Before opening the control panel: isolate all poles of the power supply and secure against accidental reconnection.

WARNING!

RISK OF LIFE

due to electric shock!

The risk of voltage transfers between the line voltage (120 V) and the low voltage wiring through accidental loosening of the wires at the terminals must be prevented.

- Therefore secure individual cables together in bundles (e.g. with cable ties) or strip off only a minimum of the outer insulation.

CAUTION!

**RISK OF INJURY/
SYSTEM DAMAGE**

due to operator error!

Operator errors can cause injury and damage to property.

- Ensure that children never operate the appliance unsupervised or play with it.
- Ensure that only personnel trained to operate the appliance correctly have access to it.

CAUTION!

DEVICE DAMAGE

through electrostatic discharge (ESD).

- Before unpacking the module, touch a radiator or a grounded metal water pipe to discharge any electrostatic charge in your body.

USER NOTE

Ensure that a circuit breaker is available to disconnect all poles from the mains power supply. If there is no circuit breaker, you will need to install one.

USER NOTE

Only use original Buderus spare parts. Damage caused by the use of parts not supplied by Buderus is excluded from the Buderus warranty.

1.6 Disposal

- Electronic components do not belong in household waste. Dispose of defunct modules correctly through an authorized disposal site.

2 Product description

USER NOTE

Before installing the FM443 function module, check the software version of the controller module (CM431) and MEC2 remote control (version 4.17 or higher).

For more information, contact your Buderus wholesaler.

You can install only one of the FM443 function modules into one control panel of the Logamatic 4000 control system.

The main function of the FM443 function module is to integrate a solar system with one or two solar consumers (e.g. tanks) into an existing control panel.

Installing the FM443 function module makes the following functions or connection options available:

- Change the operating mode.
- Integrate a solar consumer "1" (e.g. storage tank).
- Buffer bypass circuit for central heating.
- Tank series circuit.
- Integrate a solar heat meter (WMZ), available as an accessory from Buderus.
- Integrate a solar consumer "2" (e.g. swimming pool).
- Thermal disinfection of the pre-heat stage.

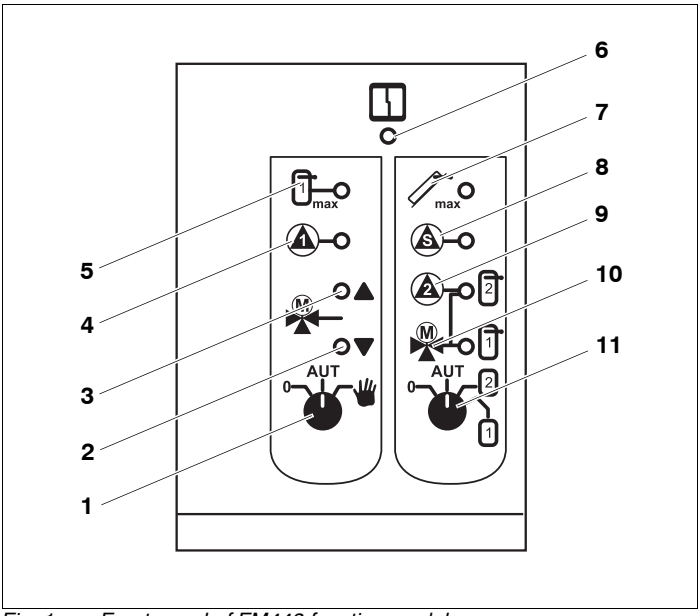


Fig. 1 Front panel of FM443 function module

1 Manual switch (solar circuit 1)

2 LED "Three-way valve" in case of buffer bypass circuit (central heating via tank)

3 LED "Three-way valve" in case of buffer bypass circuit (no central heating via tank)

4 Solar circuit pump 1*****

5 Maximum temperature storage tank 1

6 "Module Fault" LED (red) – general module fault

7 Maximum temperature of collector

8 Secondary solar circuit pump 2 or transfer pump enabled*****

9 Solar circuit pump 2 or 3-way valve 2 in solar circuit 2 position*****

10 3-way switching valve in solar circuit 1 position

11 Manual switch (solar circuit selection)

* *LED constantly ON: Pump running (100 %)*
LED "flickers": Pump modulates
LED OFF: Pump OFF

2.1 Inputs and outputs, connections

The low-voltage terminals and the 120 V outputs are on the top rear of the FM443 function module.

Colored labels with inscriptions matching the appropriate plugs are attached to the strips.

Plugs are color-coded.

Designation	Description
Netz	Power supply
PSS2	Solar circuit pump 2
SU	3-way switching valve (tank 1/tank 2)
PS2	Solar circuit 2 secondary pump
SPB	**Buffer bypass circuit:** 3-way switching valve
PSS1	Solar circuit pump 1

Tab. 1 Connections 120 V

USER NOTE

Ensure that you connect the FPB sensors correctly and install them in their correct positions depending on the type of system circuits (buffer bypass or storage tanks in series).

	Name	Description
FPB	FR	**Buffer bypass circuit:** return temperature sensor
	FP	**Buffer bypass circuit**: buffer storage tank temperature sensor
WMZ	⊥	Ground terminal
	FR	Return temperature sensor from solar circuit for heat metering
	FV	Supply temperature sensor from solar circuit for heat metering
	ZV	Flow meter from solar circuit for heat metering
Sensor	FSS2	Temperature sensor for solar consumer 2
	FSS	Temperature sensor for solar consumer 1
	FSK	Collector temperature sensor

Tab. 2 Low-voltage connections

2.2 Installation in the Logamatic 4000 control panels

USER NOTE

Position the FM443 function module as far to the right as possible in the control panel. This ensures that the heating zones are in a logical order. The heating zone modules should be installed in the control panel starting from the left side.

The FM443 function module can be installed in any free slot in the 4000 series control panels (e.g. slot 1 – 4 in Logamatic 43xx).

Possible slot assignments in the various control panels
43xx
1, 2, 3, 4

Tab. 3 Possible slot assignments

2.3 Positions of manual switches

CAUTION!

SYSTEM DAMAGE

if the manual switch is set to "Manual" for an extended period the solar system may be damaged or parts may be damaged.

- Use the "Manual" position for short periods only.

The various positions of the manual switch have different effects on the solar circuits or the two solar consumers.

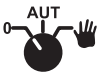
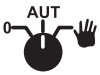
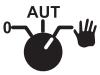
USER NOTE

In normal operation the manual switches should be in the AUT position.

2.3.1 Manual switch (solar circuit 1)

USER NOTE

If the manual switch is not in automatic mode, a message to that effect appears on the MEC2 remote control, and the "Module fault" LED on the module lights up.

Position	Effect
	Solar circuit 1 (solar circuit pump 1) and the bypass (3-way valve) are switched off. Use this setting only for commissioning or for maintenance or service work.
	Solar circuit 1 and the bypass are in automatic mode – this is the standard setting.
	Manual mode is activated. Solar circuit pump 1 is switched on. The bypass is not being controlled.

Tab. 4 Manual switch positions

If manual mode is activated:

- the warm medium of the solar thermal system (e.g. glycol: water mixture) can flow from the storage tank to the collector array.
- the cold medium (< 32 °F (0 °C)) of the solar thermal system (e.g. glycol: water mixture) can flow from the collector to the storage tank – the storage tank temperature drops, so that reheating may start, for example.
- the collector protection is disabled.
- the tank protection is disabled.
- the collector frost protection is disabled.

2.3.2 Manual switch (solar circuit selection)

USER NOTE

If the manual switch is not in automatic mode, a message to that effect appears on the MEC2 remote control, and the "Module fault" LED on the module lights up.

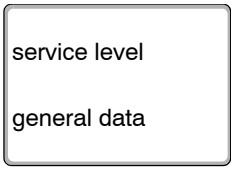
Position	Effect
	The selection of the solar circuit is switched off. Use this setting only for commissioning or for maintenance or service work.
	Automatic changeover to charging of the solar consumers on the FM443 function module (solar module) is active – this is the standard setting.
	If the corresponding solar yield is available, only solar consumer "2" (solar circuit 2) is loaded. The automatic changeover is disabled.
	If the corresponding solar yield is available, only solar consumer "1" (solar circuit 1) is loaded. The automatic changeover is disabled.

Tab. 5 Manual switch positions

3 The functions of the FM443

The following sections explain how to use and set the various functions via the MEC2 remote control.

3.1 Integrating the FM443 function module in the control panel



Calling up the service level

The service instructions for your Logamatic 4xxx control panel explain in detail how you operate the MEC2 remote control. The following provides a brief overview of the MEC2 operation.

The MEC2 remote control offers two operating levels (level 1 with closed flap and level 2 with open flap) plus one service level (accessible via password). The service level has various main menus and submenus for set up of the controls.

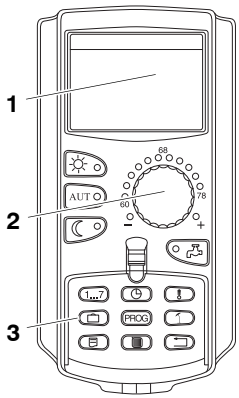


Fig. 2 MEC2 remote control

1 Display

2 Dial

3 Function keys

To enter the service level press this key combination (key code) until "service level – general data" is displayed.

Integration of FM443 function module at the MEC2 level

After you have installed the FM443 function module (→ see installation instructions "Modules for 4xxx control panels"), your control panel will detect it automatically when it is switched on.

USER NOTE

If the FM443 function module is not recognized automatically, you will need to install it manually once via the MEC2 remote control.

Manual integration of FM443 function module at the MEC2 level

Call up the service level.

Turn the dial until "service level – module selection" appears on the display.

service level

module selection

Press "Display" to select the main menu "module selection"

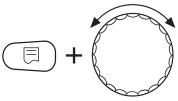
"module selection – Slot A" is shown on the display.

module selection
Slot A

boiler module
ZM434

Turn the dial to the position (slot) where the FM443 function module is installed.

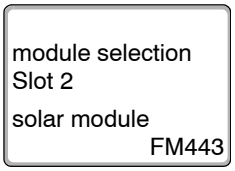
For example, the FM443 function module is to be installed in slot 2.



Hold "Display" down (the text on the bottom line begins to flash), and turn the dial until the FM443 function module appears on the display.

Release the "Display" button.

Press "Back".



The FM443 function module (solar panel) is installed in slot 2.

Press "Back" three times or close the operating flap to reach operating level 1.

3.2 Changing the operating mode

You can change the operating mode of the solar control. The operating modes are as follows:

- Manual ON ("day mode" button)
- Manual OFF ("night mode" button)
- Automatic operation ("AUT" button)

USER NOTE

With the operating mode "Manual ON" ("day mode" button), the collector protection function is switched on.

USER NOTE

When the flap on the MEC2 remote control is closed, it generally indicates the heating zone to which the MEC2 remote control is assigned. If the MEC2 remote control is not assigned to any heating zone, then the lowest installed heating zone is always indicated.

For more information see the technical documentation for your control panel.

Open the flap of the MEC2 remote control.

Press and hold the "heating zone" button.

Turn the dial until "select heat zone – solar" appears on the display.

Release the "heating zone" button.

Different operating modes

Press manual ON ("day mode" button) to set the solar control unit to "permanent on".

Press the "AUT" button to set the solar control to automatic.

Press manual OFF ("night mode" button) to switch off the solar control.

	Input range	Factory setting
Operating mode	automatic OFF ON	automatic

Manual ON

This operating mode has no control function, but it switches the solar system off if the collector field or the tank(s) have exceeded the maximum allowable temperature.
This way, the collector is protected against overheating.

If this operating mode is activated:

– the hot medium in the solar system (e.g. glycol water) can flow from the tank to the collector field.

– The cold medium (32 °F (< 0 °C)) of the solar thermal system (e.g. glycol: water mixture) can flow from the collector to the storage tank – the storage tank temperature drops, so that reheating may start, for example.

3.3 Solar consumer "1" – solar circuit 1

You can integrate a first consumer (e.g. storage tank) into the controls using the FM443 function module.

USER NOTE

Only integrate a storage tank water heater for DHW heating as solar consumer "1".

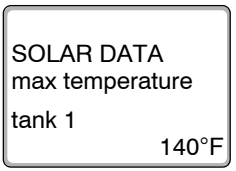
3.3.1 Set the maximum storage tank temperature

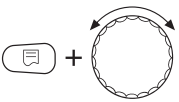
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to open the main "SOLAR DATA" menu.

Turn the dial until "SOLAR DATA – max temperature tank 1" appears on the display.





Press and hold the "Display" button and turn the dial.

The maximum tank temperature can now be set.

	Input range	Factory setting
max temperature tank 1	86 °F – 194 °F (30 °C – 90 °C)	140 °F (60 °C)

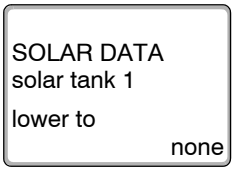
3.3.2 Setting the storage tank temperature lowering (optimization function)

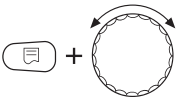
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to select the main menu "SOLAR".

Turn the dial until "SOLAR DATA – solar tank 1 lower to" appears on the display.





Press and hold the "Display" button and turn the dial.

The tank temperature reduction can now be set.

USER NOTE

The FM443 function module has an optimization function for increasing the solar yield. Depending on the solar yield the recharging temperature can be reduced to the value set here. This gives the solar storage tank a greater storage capacity.

	Input range	Factory setting
tank 1 lower to	none 86 °F – 129 °F (30 °C – 54 °C)	none

3.4 Buffer integration

With this parameter, you set how a buffer storage tank, if one is present, should be integrated into the system.

The buffer can be integrated as:

- none: not present (factory setting)
- buffer bypass
- dual-purpose (storage tank) SP1
- dual-purpose (storage tank) SP2

USER NOTE

If a buffer bypass switch is installed in the heating system, you must activate the "buffer-bypass" function using the MEC2 remote control.
If you have activated this function, then you must enter the corresponding switch-on and switch-off differences.

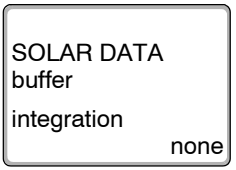
3.4.1 Setting buffer integration

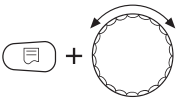
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to select the main menu "SOLAR".

Turn the dial until "SOLAR DATA – buffer integration none" appears on the display.





Press and hold the "Display" button and turn the dial.

Now you can set the integration of the buffer tank.

	Input range	Factory setting
buffer integration	none buffer-bypass pendulum DHW 1 pendulum DHW 2	none

No buffer integration

If you set the integration to "none", then the module assumes that no buffer tank is to be taken into consideration.

Buffer bypass

If you set "buffer-bypass" for the integration, the module assumes that the solar system will also be used for heating and the buffer tank should be integrated to increase the return temperature of a standard heat source.

Buffer integration as dual-purpose tank

If you set "pendulum DHW 1/DHW 2" for the integration, the module assumes that not just the solar system provides its energy to the buffer tank, but the standard heat source also supplies its energy into the buffer tank and the system is supplied entirely or partially from the buffer tank.

Here it is possible to distinguish whether tank 1 or tank 2 should function as a dual-purpose tank.

3.4.2 Setting buffer and bypass flow

Depending on the temperature difference between the buffer tank (sensor FPB-FP) and the system return (sensor FPB-FR), the buffer bypass control controls the operation of the 3-way valve.

Buffer integration: flow rate through buffer tank
Buffer tank bypass: flow bypassing the buffer
(directly into the return of the boiler or of the low loss header)

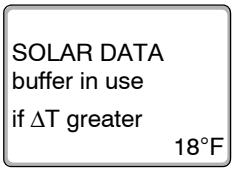
If the temperature in the buffer tank is greater than the temperature in the system return by the amount specified under "buffer in use if ΔT greater" then the flow rate is managed through the buffer tank. The buffer tank is flowed through as long as the temperature difference buffer tank/system return does not exceed the set value for "bypass in use if ΔT greater". If this temperature difference is underrun, then there is a switch to the bypass as long as the changeover threshold "buffer in use if ΔT greater" is not reached again, etc.

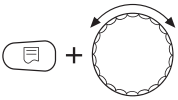
USER NOTE

The changeover threshold for the bypass flow must always be smaller than the changeover threshold for the buffer flow.

If you have activated the buffer bypass changeover, then you can set the changeover thresholds for buffer and bypass flow on the "SOLAR DATA" menu.

Turn the dial one click clockwise until "SOLAR DATA – buffer in use if ΔT greater" appears on the display.



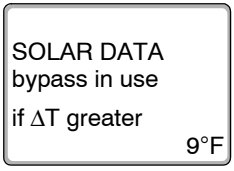


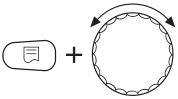
Press and hold the "Display" button and turn the dial.

Now you can set the changeover temperature difference for the buffer flow.

	Input range	Factory setting
buffer in use if ΔT greater	13 °F – 36 °F (7 °C – 20 °C)	18 °F (10 °C)

Turn the dial one click clockwise until "SOLAR DATA – bypass in use if ΔT greater" appears on the display.





Press and hold the "Display" button and turn the dial.

Now you can set the changeover temperature difference for the bypass flow.

	Input range	Factory setting
bypass in use if ΔT greater	9 °F – 27 °F (5 °C – 15 °C)	9 °F (5 °C)

3.5 Solar circuit heat meter

If a heat meter set is installed in the solar circuit, you can show its values on the display of the MEC2 remote control. This applies differently for the heat amount of the first and second solar consumers.

The heat quantity of the second solar consumer is calculated from the pump run time.

USER NOTE

This function can only be used in connection with the heat meter. This set is available from Buderus as an accessory.

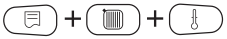
USER NOTE

Ensure that you connect the WMZ sensor correctly (→ Tab. 2, page 10).

Activate the "BTU counter" function.

If you have activated this function ("yes") then you must set the corresponding glycol content of the solar circuit.

3.5.1 Activating heat metering

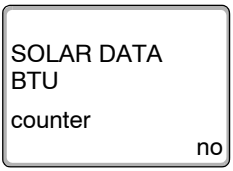


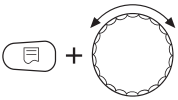
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to open the main "SOLAR DATA" menu.

Turn the dial until "SOLAR DATA – BTU counter" appears on the display.





Press and hold the "Display" button and turn the dial.

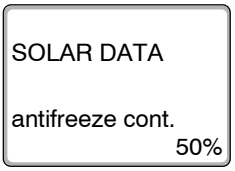
The heat amount recording can now be activated.

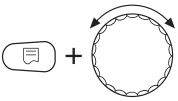
	Input range	Factory setting
BTU counter	yes no	no

3.5.2 Setting glycol content

If heat metering has been activated, the glycol content must be set in the "SOLAR DATA" menu level.

Turn the dial one click clockwise until the display shows "SOLAR DATA – antifreeze cont.".





Press and hold the "Display" button and turn the dial.

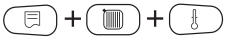
The glycol content can now be set.

USER NOTE

If a solar circuit is operated with glycol water, the glycol content must be measured. The solar yield is calculated from the specific heat capacity of the medium in the solar circuit and the flow.

	Input range	Factory setting
antifreeze cont.	0 % 30 % 40 % 50 %	50 %

3.5.3 Activate statistics function

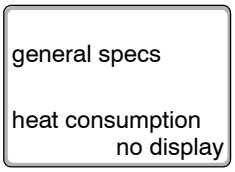


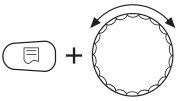
Call up the service level.

Turn the dial until "service level – general data" appears on the display.

Press "Display" to select the main menu "general specs"

Turn the dial until "general specs – heat consumption no display" appears.





Press and hold the "Display" button and turn the dial.

Now you can set the display of the solar data for the statistics function.

	Input range	Factory setting
heat consumption	none burner* solar	none

* *only for single-stage floorstanding boilers without EMS*

3.6 Pump function – secondary circuit pump

The solar module has a pump output, which, depending on use, can be programmed with different functions.

The pump can be integrated with the following functions:

- none: not present (factory setting)
- secondary tank 2 (secondary storage tank 2)
- complete loading (heating of the pre-heat stage)
- reloading circ (tank sequence switching)

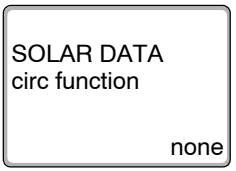
3.6.1 Setting buffer integration

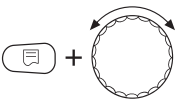
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to select the main menu "SOLAR".

Turn the dial until "SOLAR DATA – circ function none" appears on the display.





Press and hold the "Display" button and turn the dial.

Now you can set the pump function.

	Input range	Factory setting
circ function	none secondary tank 2 compl. loading reloading circ	none

No pump function

If for the pump function "none" is set, the module assumes that no pump is connected and this output is not activated by the FM443 function module.

Secondary tank 2

If for the pump function "secondary tank 2" is set, the pump connected works as secondary pump for the loading of the second solar consumer; that is, the second consumer is operated via a heat exchanger.

Complete loading

If "compl. loading" is selected, the pump is used to heat the solar pre-heat stage of a bivalent solar storage tank to 140 °F (60 °C) once a day in order to avoid the formation of legionella bacteria and for thermal disinfection of the solar pre-heat stage.

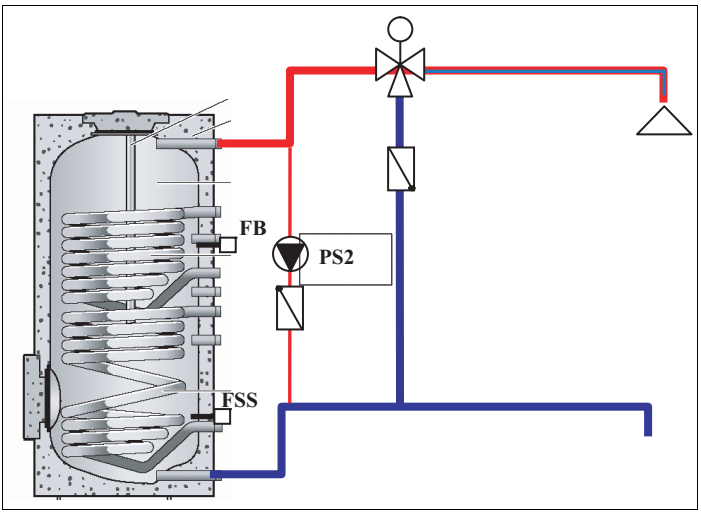


Fig. 3 Compl. loading with switching with a solar storage tank

Reloading circulator

If "reloading circ" is selected, the pump is used in serial tank systems to load from the solar storage tank to the boiler fired storage tank. This means that as soon as the solar storage tank is warmer than the storage tank heated by the boiler, the pump PS2 is switched on and the tanks are reloaded.

In addition, with the help of this pump, the solar storage tank (that is, the solar pre-heat stage) is heated up to 140 °F (60 °C) once a day in order to avoid the formation of legionella bacteria and for thermal disinfection of the solar pre-heat stage.

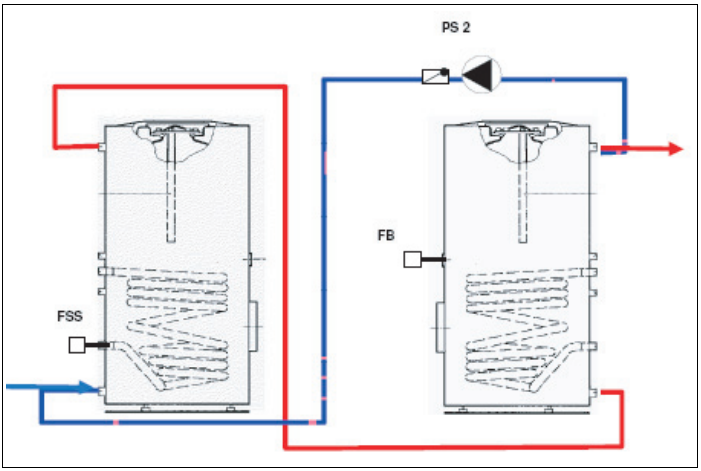


Fig. 4 Reloading for tank sequence switching

3.6.2 Setting reloading circ start-up

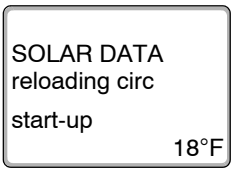
Reloading will be started as soon as a higher temperature is measured on the FSS solar sensor than is set on the FB hot water sensor.

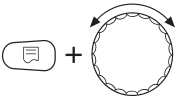
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to select the main menu "SOLAR".

Turn the dial until "SOLAR DATA – reloading circ start-up 18°F" (10°C) appears on the display.





Press and hold the "Display" button and turn the dial.

You can now set the start-up temperature difference for the reloading circulator.

	Input range	Factory setting
reloading circ start-up	9 °F – 27 °F (5 °C – 15 °C)	18 °F (10 °C)

3.6.3 Setting reloading circ shut down

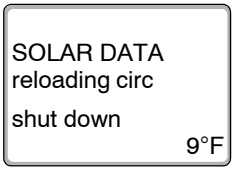
If the temperature on the FSS solar sensor approaches the temperature of the FB hot water sensor, the reloading ends.

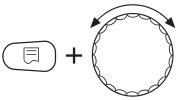
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to select the main menu "SOLAR".

Turn the dial until "SOLAR DATA – reloading circ shut down 9°F" (5°C) appears on the display.





Press and hold the "Display" button and turn the dial.

You can now set the start-up temperature difference for the reloading circulator.

	Input range	Factory setting
reloading circ shut down	4 °F – 18 °F (2 °C – 10 °C)	9 °F (5 °C)

3.7 Heat-up of the pre-heat stage

If "compl. loading" or "reloading circ" has been selected, it is possible to also heat the solar pre-heat stage (the lower half of a bivalent storage tank) during thermal disinfection and/or the daily heating to 140 °F (60 °C) to avoid the formation of legionella bacteria.

The following settings are possible:

- Off:
  no heating of the pre-heat stage (factory setting).
- Disinfection:
  the pre-heat stage is only heated up during the thermal disinfection.
- Heat-up:
  the pre-heat stage is only heated up during the daily heating up to 140 °F (60 °C).
- Disinfection + heat up:
  the pre-heat stage is heated up during the thermal disinfection and during the daily heating up to 140 °F (60 °C).

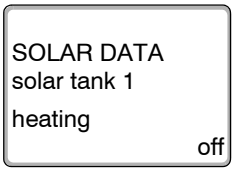
3.7.1 Solar tank 1 – heating

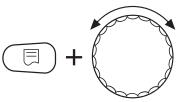
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to select the main menu "SOLAR".

Turn the dial until "SOLAR DATA – solar tank 1 heating off" appears on the display.





Press and hold the "Display" button and turn the dial.

Now you can set the heating of the pre-heat stage.

USER NOTE

The settings for daily heating and thermal disinfection are made using the hot water function (→ Service instructions for the control panel).

	Input range	Factory setting
solar tank 1 heating	off disinfection heat up disinf.+ heat up	off

3.8 Solar consumer "2" – solar circuit 2

If you want to integrate a second solar consumer (e.g. swimming pool or buffer storage tank) into the controls via the FM443 function module, you must activate the "2nd consumer" function.

The second consumer can be loaded by a 3-way valve or a separate pump.

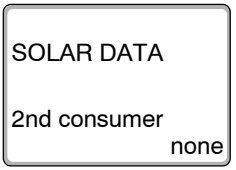
3.8.1 Activating second solar consumer

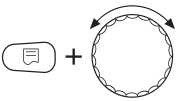
Call up the service level.

Turn the dial until "service level – solar" appears on the display.

Press "Display" to open the main "SOLAR DATA" menu.

Turn the dial until "SOLAR DATA – 2nd consumer" appears on the display.





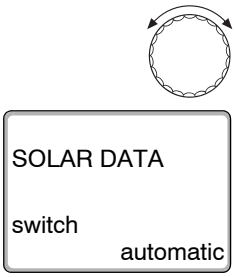
Press and hold the "Display" button and turn the dial.

The second consumer can now be activated.

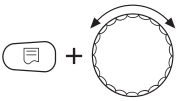
	Input range	Factory setting
2nd consumer	none 3-way valve separate circ	none

3.8.2 Setting switching options

If the second solar consumer has been activated, the switching must be set in the "SOLAR DATA" menu level.



Turn the dial until "SOLAR DATA – switch" appears on the display.



Press and hold the "Display" button and turn the dial.

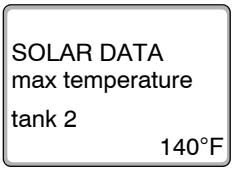
The various switching options can now be set.

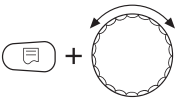
	Input range	Factory setting
switch	automatic always tank 1 always tank 2	automatic

3.8.3 Set the maximum storage tank temperature

If the second solar consumer has been activated, the maximum tank temperature must be set in the "SOLAR DATA" menu level.

Turn the dial until "SOLAR DATA – max temperature tank 2" appears on the display.





Press and hold the "Display" button and turn the dial.

The maximum tank temperature can now be set.

	Input range	Factory setting
max temperature tank 2	68 °F – 194 °F (20 °C – 90 °C)	140 °F (60 °C)

4 Relay test

The "relay test" menu can be used to check that the external components (e.g. pumps) are correctly connected.

CAUTION!

SYSTEM DAMAGE

The installation does not function during the relay test. All functions are disconnected from the control.

- Leave this function at the end of the relay test to prevent system damage.

Relay test

If you have activated the "relay test solar" function, then you can switch the pumps connected to the FM443 function module on or off individually.

If the "relay test" function is activated:

– the warm medium of the solar thermal system (e.g. glycol: water mixture) can flow from the storage tank to the collector array.

– the cold medium (32 °F (< 0 °C)) of the solar thermal system (e.g. glycol: water mixture) can flow from the collector to the storage tank – the storage tank temperature drops, so that reheating may start, for example.

– the collector protection is disabled.

– the tank protection is disabled.

– the collector frost protection is disabled.

4 Relay test

Call up the service level.

Turn the dial until "service level – relay test" appears on the display.

Press "Display" to open the main "RELAY TEST" menu.

The display shows "RELAY TEST – boiler".

Turn the dial until "RELAY TEST – solar" appears on the display.

Press "Display" to open the "RELAY TEST – solar" submenu.

The function (on/off) of the following relays can be tested:

- 3-way changeover valve
- bypass
- prim. circ SP1
- prim. circ SP2
- sec. circ SP2

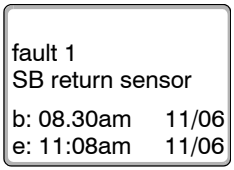
5 Fault log

The "fault log" menu can be used to show the last four fault messages of the heating controller.

Call up the service level.

Turn the dial until "service level – fault log" appears on the display.

Press "Display" to select the main menu "fault log".



The following faults can be displayed:

- bypass buffer sensor
- bypass return sensor
- heat consumption supply sensor
- heat consumption return sensor
- collector sensor
- sensor bottom tank 1
- sensor bottom tank 2
- differential selection
- volume flow reading

6 Fault

USER NOTE

The "Fault" column lists all faults that may occur in the interaction among the FM443 function module, the solar consumers and a heat meter.

The terms in the "Fault" column show the messages as they appear on the MEC2 remote control display.

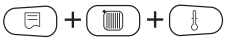
Fault	Effect on control characteristics	Possible causes of fault	Remedy
bypass buffer sensor	The bypass is not being controlled.	Buffer sensor defective. Buffer sensor not connected or not correctly connected. FM443 or control defective.	Check the sensor connection to the FM443 function module (FPB-FP). Check the sensor on the bypass for breaks or incorrect installation position. Check the device fuse.
bypass return sensor	The bypass is not being controlled.	Return sensor defective. Return sensor not connected or not correctly connected. FM443 or control defective.	Check the sensor connection to the FM443 function module (FPB-FR). Check the sensor on the bypass for breaks or incorrect installation position. Check the device fuse.

Fault	Effect on control characteristics	Possible causes of fault	Remedy
heat consumption supply sensor	Heat quantity not metered.	Supply sensor defective. Supply sensor not connected or not correctly connected. FM443 or control defective.	Check the sensor connection to the FM443 function module (WMZ-FV). Check the sensor on the bypass for breaks or incorrect installation position. Check the device fuse.
heat consumption return sensor	Heat quantity not metered.	Return sensor defective. Return sensor not connected or not correctly connected. FM443 or control defective.	Check the sensor connection to the FM443 function module (WMZ-FR). Check the sensor on the return of the solar system for breaks or incorrect installation position. Check the device fuse.
collector sensor	Tank 1 and tank 2 are not solar-heated.	Collector sensor defective. Collector sensor not connected or not correctly connected. FM443 or control defective.	Check the sensor on the bypass for breaks or incorrect installation position. Check the device fuse.
sensor bottom tank 1	Tank 1 is not solar-heated.	Tank 1 sensor is defective. Tank 1 sensor is not connected or incorrectly connected. FM443 or control defective.	Check the sensor on tank 1 for breaks or incorrect installation position. Check the device fuse.

Fault	Effect on control characteristics	Possible causes of fault	Remedy
sensor bottom tank 2	Tank 2 is not solar-heated.	Tank 2 sensor is defective. Tank 2 sensor is not connected or incorrectly connected. FM443 or control defective.	Check the sensor on tank 2 for breaks or incorrect installation position. Check the device fuse.
differential selection	FM443 function module is switched off.	The values set by the user are not logical. The activation threshold is less than the deactivation threshold for tank 1, tank 2 or bypass.	Check the settings of the FM443 function module using the MEC2 remote control.
volume flow reading	Heat quantity not metered.	Flow meter defective or not correctly connected. FM443 function module defective. The hydraulic system is defective.	Is the flow meter connected correctly to the FM443? Check the function of the solar module. Replace the FM443 function module if necessary.

7 Monitor data

Current solar control values (monitor data) can be read with the main "act system data" menu.



Call up the service level.

Turn the dial until "service level – act system data" appears on the display.

Press "Display" to select the main menu "DISPLAY".

The display shows "DISPLAY – boiler".

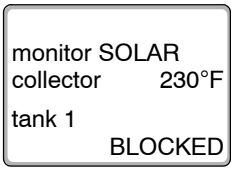
Turn the dial until "monitor SOLAR" appears on the display.

Press "Display" to open the "monitor SOLAR" submenu.

The current values and system status can be read in the submenu.

7.1 Solar consumer "1" – solar circuit 1

7.1.1 Collector temperature, operating mode



The display shows the current collector temperature and the operating mode of tank 1.

	Possible displays
tank 1	BLOCKED STAND STILL LOW FLOW HIGH FLOW MANUAL ON

BLOCKED

Tank 1 is not heated because:

- the collector temperature is too high or
- the tank temperature is too high or
- tank 1 is deactivated or
- another tank is being heated or
- there is an error in the FM443 function module.

STAND STILL

The solar yield of the collector is insufficient to load tank 1.

LOW FLOW

Tank 1 is heated at a greater temperature difference (low flow).

HIGH FLOW

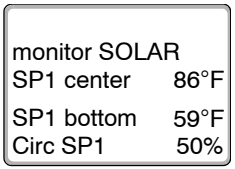
Tank 1 is heated at a lower temperature difference (high flow).

MANUAL ON

The control is in "MANUAL ON" mode.

This means that the solar circuit pump 1 will be activated at 100 %. All control functions of the FM443 function module are deactivated but for control of the collector maximum temperature.

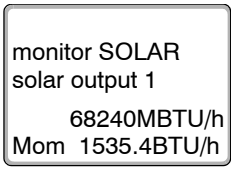
7.1.2 Temperatures in tank 1, status of solar circuit pump 1



The display shows the current temperatures in tank 1 and the status of solar circuit pump 1.

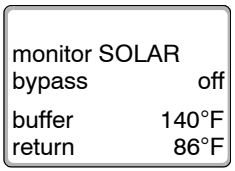
"SP1 center"	=	Temperature of DHW heating
"SP1 bottom"	=	Temperature of solar tank bottom
"Circ SP1"	=	Modulation degree of solar circuit pump 1

7.1.3 Solar yield



The display shows the total and momentary solar yield of solar circuit 1.

7.2 Buffer bypass circuit



The display indicates the status of the 3-way valve (buffer bypass switching) as well as the temperatures of the buffer tank and the heating return.

	Possible displays
bypass	off direct tank

off

The buffer bypass switching is switched off or was not activated via the MEC2 remote control.

The relevant outputs are not actuated by the solar control.

The position of the 3-way valve depends on the installed valve type in this case. Check whether the 3-way valve was correctly installed on the building.

direct

The return temperature of the heating system is higher than the temperature in the lower part of the buffer or combi storage tank.

The heater return is sent directly to the boiler.

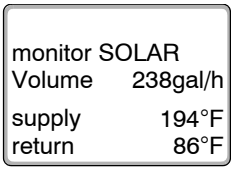
The 3-way valve is in the "bypass" position.

tank

The return temperature of the heating system is lower than the temperature in the buffer or in the lower part of the combi storage tank.

The heater return is sent through the buffer or combination tank for preheating by the 3-way switching valve.

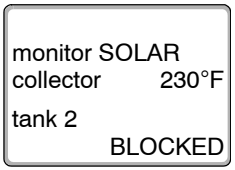
7.3 Solar circuit heat meter



The display shows the current flow of the flow meter (heat meter kit) and the corresponding supply and return temperatures of the solar circuit.

7.4 Solar consumer "2" – solar circuit 2

7.4.1 Collector temperature, operating mode



The display shows the current collector temperature and the operating mode of tank 2.

	Possible displays
tank 2	BLOCKED STAND STILL HIGH FLOW switch check MANUAL ON

BLOCKED

Tank 2 is not heated because:

- the collector temperature is too high or
- the tank temperature is too high or
- tank 2 is deactivated or
- another tank is being heated or
- there is an error in the FM443 function module.

STAND STILL

The solar yield of the collector is insufficient to load tank 2.

HIGH FLOW

Tank 2 is heated at a lower temperature difference (high flow).

switch check

The requirements for a "switch check" are:

- solar consumer "2" is heated and
- solar consumer "1" is at standstill (the required temperature difference for heating the tank is not present).

Under these conditions the solar control checks whether solar consumer "1" can be heated (it has precedence).

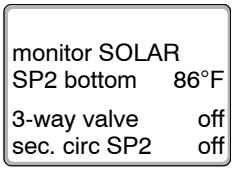
This check is repeated at regular intervals (factory setting, WE = 30 minutes) until the solar consumer "1" can be loaded again.

MANUAL ON

The control is in "MANUAL ON" mode.

This means that solar circuit 2 is actuated. All control functions of the FM443 function module are deactivated but for control of the collector maximum temperature.

7.4.2 Temperatures in tank 2, status of solar circuit pump 2 or 3-way switching valve and solar circuit 2 secondary pump

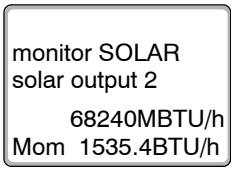


The display shows as an example the current temperature in tank 2 as well as the operating mode of pumps and valves.

"SP2 bottom" = Temperature of solar tank 2
"3-way valve" = Status of the 3-way valve
"sec. circ SP2" = Solar circuit 2 secondary pump

	Possible displays
3-way valve	SP1 (tank 1) SP2 (tank 2) off
prim. circ SP2	on/off
sec. circ SP2	on/off

7.4.3 Solar yield



The display shows the total and momentary solar yield of solar circuit 2.

8 Sensor curve

- Disconnect the power to the system before every measurement.

Troubleshooting

- Remove the sensor terminals.
- Check the resistance at the sensor lead ends using an ohmmeter.
- Check the sensor temperature with a thermometer.

Using the diagram you can check whether temperature and resistance correlate.

Collector sensor (FSK) curve

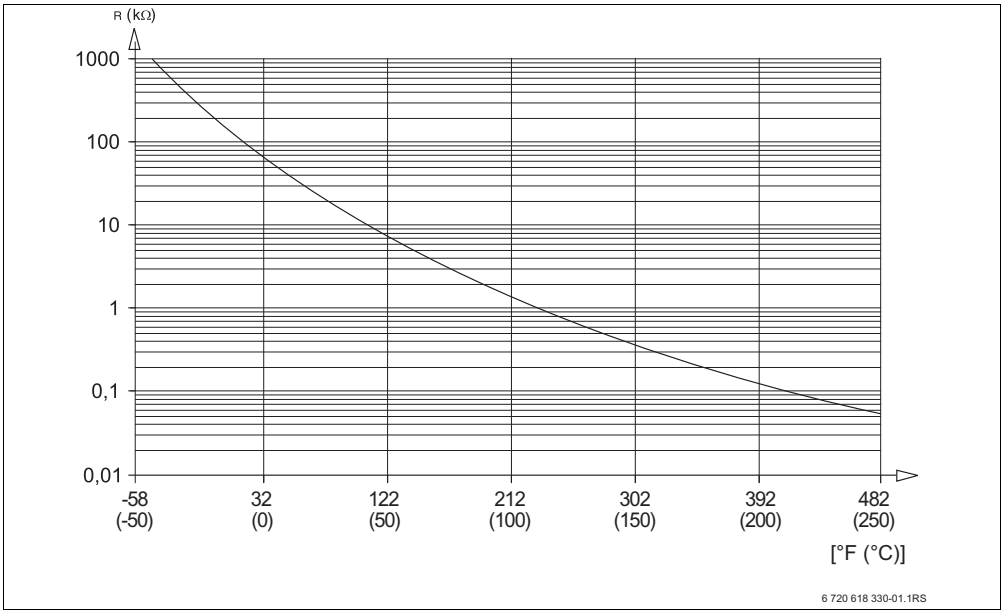


Fig. 5 Collector sensor (FSK) curve

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