


Solar EM-S1 extension

ADIO electronics module
Function extension for connecting a solar thermal system


Solar EM-S1 extension




Safety instructions

-  Please follow these safety instructions closely to prevent accidents and material losses.

Safety instructions explained

-  **Danger**
This symbol warns against the risk of injury.

-  **Please note**
This symbol warns against the risk of material losses and environmental pollution.

Note
Details identified by the word "Note" contain additional information.

Target group

These instructions are exclusively intended for qualified contractors.

- Work on gas installations may only be carried out by a registered gas fitter.
- Work on electrical equipment may only be carried out by a qualified electrician.
- The system must be commissioned by the system installer or a qualified person authorised by the installer.

Regulations to be observed

- National installation regulations
- Statutory regulations for the prevention of accidents
- Statutory regulations for environmental protection
- Codes of practice of the relevant trade associations
- Relevant country-specific safety regulations

Safety instructions for working on the system

Working on the system

- Where gas is used as the fuel, close the main gas shut-off valve and safeguard it against unintentional reopening.
- Isolate the system from the power supply, e.g. by removing the separate fuse or by means of a mains isolator, and check that it is no longer live.
- Safeguard the system against reconnection.
- Wear suitable personal protective equipment when carrying out any work.

Safety instructions (cont.)**Danger**

Hot surfaces and fluids can lead to burns or scalding.

- Before maintenance and service work, switch OFF the appliance and let it cool down.
- Never touch hot surfaces on the boiler, burner, flue system or pipe-work.

**Please note**

Electronic assemblies can be damaged by electrostatic discharge. Prior to commencing work, touch earthed objects such as heating or water pipes to discharge static loads.

Repair work**Please note**


Repairing components that fulfil a safety function can compromise the safe operation of the system. Replace faulty components only with genuine Viessmann spare parts.

Auxiliary components, spare and wearing parts**Please note**


Spare and wearing parts that have not been tested together with the system can compromise its function. Installing non-authorised components and making non-approved modifications or conversions can compromise safety and may invalidate our warranty. For replacements, use only original spare parts supplied or approved by Viessmann.

Safety instructions for operating the system


If you smell gas


-  **Danger**
Escaping gas can lead to explosions which may result in serious injury.
- Do not smoke. Prevent naked flames and sparks. Never switch lights or electrical appliances on or off.
 - Close the gas shut-off valve.
 - Open windows and doors.
 - Evacuate any people from the danger zone.
 - Notify your gas or electricity supply utility from outside the building.
 - Have the power supply to the building shut off from a safe place (outside the building).

If you smell flue gas


-  **Danger**
Flue gas can lead to life threatening poisoning.
- Shut down the heating system.
 - Ventilate the installation site.
 - Close doors to living spaces to prevent flue gases from spreading.

What to do if water escapes from the appliance

-  **Danger**
If water escapes from the appliance there is a risk of electrocution. Switch OFF the heating system at the external isolator (e.g. fuse box, domestic distribution board).


-  **Danger**
If water escapes from the appliance there is a risk of scalding. Never touch hot heating water.

Condensate

-  **Danger**
Contact with condensate can be harmful to health. Never let condensate touch your skin or eyes and do not swallow it.

Flue systems and combustion air

Ensure that flue systems are clear and cannot be sealed, for instance due to accumulation of condensate or other external causes. Ensure an adequate supply of combustion air. Inform system users that subsequent modifications to the building characteristics are not permissible (e.g. cable/pipe-work routing, cladding or partitions).

-  **Danger**
Leaking or blocked flue systems, or an inadequate supply of combustion air can cause life threatening poisoning from carbon monoxide in the flue gas. Ensure the flue system is in good working order. Vents for supplying combustion air must be non-sealable.

Extractors

Operating appliances that exhaust air to the outside (extractor hoods, extractors, air conditioning units, etc.) can create negative pressure. If the boiler is operated at the same time, this can lead to a reverse flow of flue gas.

Safety instructions (cont.)**Danger**

The simultaneous operation of the boiler and appliances that exhausts air to the outside can result in life threatening poisoning due to a reverse flow of flue gas.










Fit an interlock circuit or take suitable steps to ensure an adequate supply of combustion air.

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Disposal of packaging

Please dispose of packaging waste in line with statutory regulations.

Symbols

Symbol	Meaning
	Reference to other document containing further information
	Step in a diagram: The numbers correspond to the order in which the steps are carried out.
	Warning of material losses and environmental pollution
	Live electrical area
	Pay particular attention.
	<ul style="list-style-type: none"> ▪ Component must audibly click into place. or ▪ Acoustic signal
	<ul style="list-style-type: none"> ▪ Fit new component. or ▪ In conjunction with a tool: Clean the surface.
	Dispose of component correctly.
	Dispose of component at a suitable collection point. Do not dispose of component in domestic waste.

Intended use

The device serves to control heating systems with solar DHW heating.

Commercial or industrial use for a purpose other than heating the solar circuit shall be deemed inappropriate.

Intended use presupposes that a permanent installation in conjunction with permissible components designed for this purpose has been carried out.

All other use is deemed inappropriate. Any resulting losses are excluded from the manufacturer's liability.

Any usage beyond this must be approved by the manufacturer in each individual case.

Intended use also includes adherence to maintenance and inspection intervals.

System examples

For available system examples, see www.viessmann-schemes.com

Spare parts lists

Information about spare parts can be found at www.viessmann.com/etapp or in the Viessmann spare part app.



Wall mounting

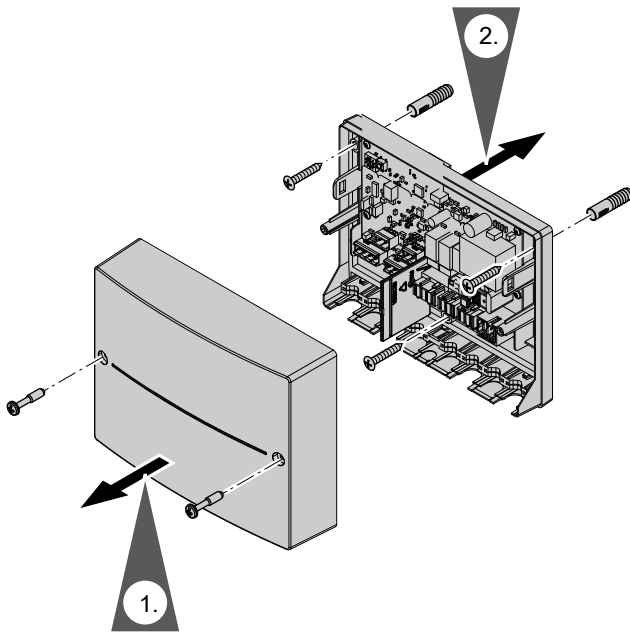


Fig. 1

Overview of electrical connections

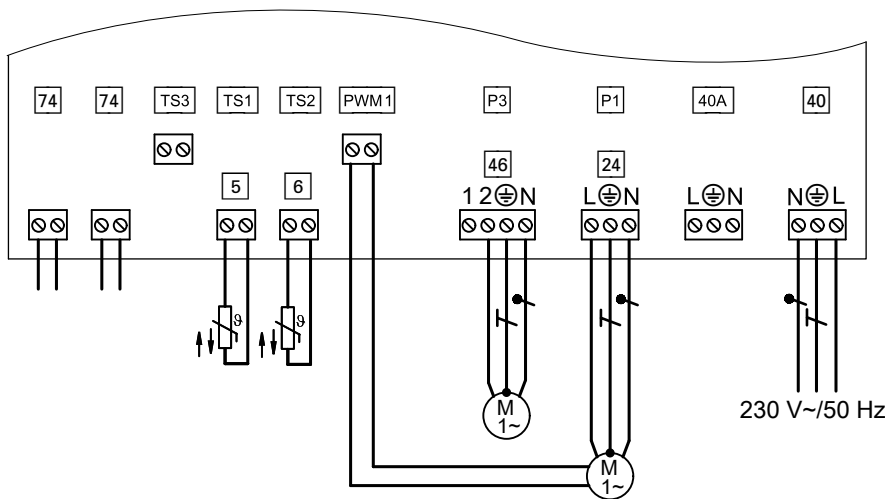


Fig. 2

Plug 230 V~

- P1 [24] Solar circuit pump
Only use a circulation pump with PWM control.
- P3 [46] Transfer pump
- [40] Power supply
- [40A] Power supply for accessories

Extra low voltage connections

- PWM1 Speed control, solar circuit pump
- TS1 [5] Cylinder temperature sensor NTC 10 kΩ
- TS2 [6] Collector temperature sensor NTC 20 kΩ
- TS3 No function
- [74] PlusBus

! **Please note**
Electronic assemblies can be damaged by electrostatic discharge.
Prior to commencing any work, touch earthed objects such as heating or water pipes to discharge static loads.

Note
Apply strain relief to on-site cables.
Secure individual wires directly to each plug using cable ties.
Seal any unnecessary apertures with cable grommets (not cut open).

Installation sequence

Rotary switch S1

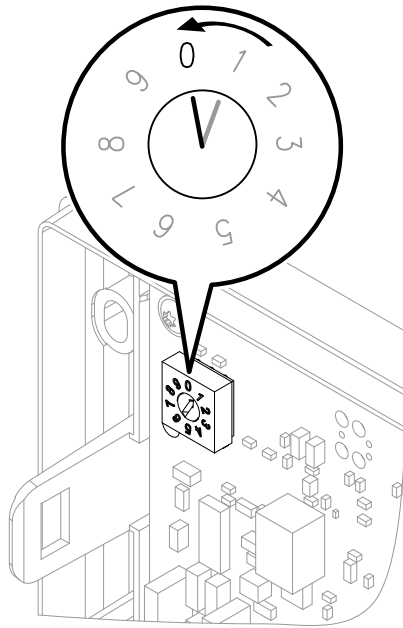


Fig. 3

Set rotary switch S1 to **0** (factory setting is 1).

Note

The rotary switch can be found on the PCB of the electronics module.

Connecting the PlusBus to the heat generator

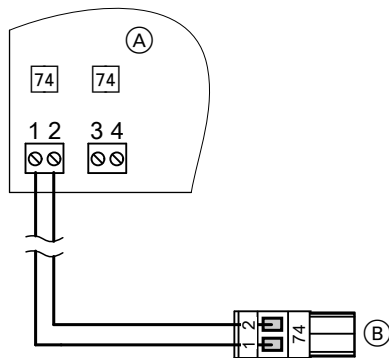


Fig. 4

- (A) Extension (electronics module)
- (B) PlusBus to heat generator

Note

For connection to heat generators with external plug, luster terminals or spring-loaded terminals for bus connection, disconnect plug 74. Connect the wires directly.



Heat generator installation and service instructions

Power supply

Power supply at heat generator

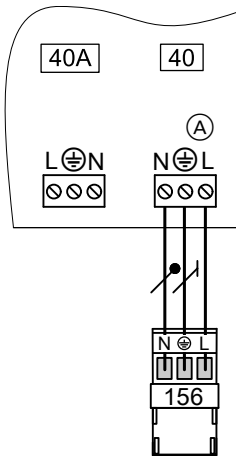


Fig. 5 Example: Power supply with plug 156


- (A) Extension (electronics module)
- 40 Power supply
- 40A Power supply for further accessories
- 156 Plug for heat generator accessories power supply

Create the power supply connection.


Route the power cable to the heat generator and connect to plug 156. Observe fuse protection of the output at the heat generator.

If power is supplied to a further accessory, use plug 40A provided

 Heat generator installation and service instructions


 **Danger**
Incorrect core assignment can result in serious injury and damage to the appliance.
Never interchange cores "L" and "N".

If there is no plug 156 at the heat generator:

- Use a separate power supply. See the following chapter.
- Or
-  Heat generator installation and service instructions


Separate power supply

If the power supply for the extension is **not** made at the heat generator.

 **Danger**
Incorrect electrical installations can lead to serious injury from electrical current and result in appliance damage.

Connect the power supply and implement all safety measures (e.g. RCD circuit) in accordance with the following regulations:

- IEC 60364-4-41
- VDE regulations
- Connection conditions of the local grid operator

 **Danger**
The absence of system component earthing can lead to serious injury from electric current if an electrical fault occurs.
The appliance and pipework must be connected to the equipotential bonding of the building.

Isolators for non-earthed conductors

- The mains isolator (if installed) must simultaneously isolate all non-earthed conductors from the mains with a minimum contact separation of 3 mm.
- If **no** mains isolator is installed, all non-earthed conductors must be isolated from the power supply by the upstream circuit breaker with a minimum contact separation of 3 mm.

Power supply (cont.)

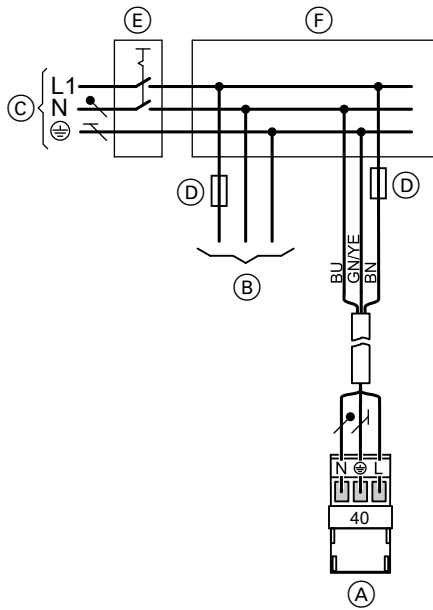


Fig. 6

- (A) Power supply, extension (electronics module)
- (B) Power supply for heat generator
- (C) Power supply 1/N/PE, 230 V/50 Hz
- (D) Fuse (max. 16 A)
- (E) Mains isolator, 2-pole, on site
- (F) Junction box (on site)

Connect the power supply in accordance with the diagram.

If the power supply to the appliance is connected with a flexible cable, ensure that the live conductors are pulled taut before the earth conductor in the event of strain relief failure. The length of the earth conductor wire will depend on the design.



Danger

Incorrect core assignment can result in serious injury and damage to the appliance. Never interchange cores "L" and "N".



Please note

Incorrect phase sequence can cause damage to the appliance. Ensure phase equality with the heat generator power supply.

Colour coding to IEC 60757

BN Brown

BU Blue

GNYE Green/yellow

Connecting several accessories

Power supply and PlusBus connection

Power supply to all accessories via heat generator control unit

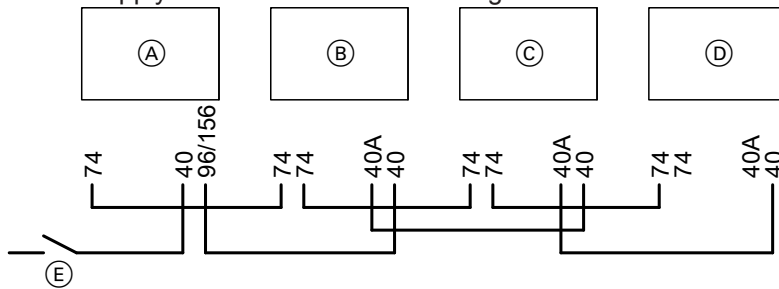


Fig. 7

Some accessories with direct power supply

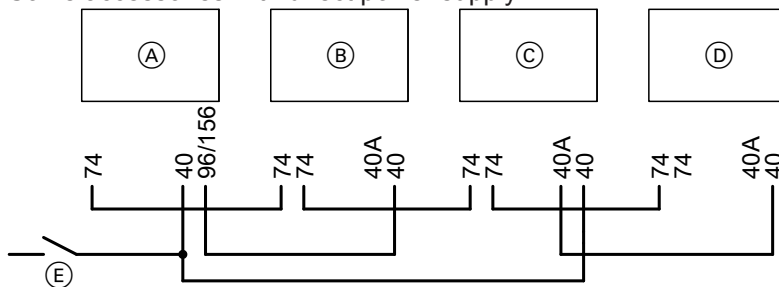


Fig. 8

- (A) Heat generator control unit
- (B) Mixer extension kit for heating circuit with mixer M2 (ADIO electronics module)
- (C) Mixer extension kit for heating circuit with mixer M3 (ADIO electronics module)
- (D) Further accessories
- (E) ON/OFF switch
- 40 (A) Power supply
- 74 PlusBus
- 96/156 Accessories power supply in the control unit of the heat generator

- In the following circumstances, use the output for the accessories only to switch an on-site relay:
An actuator (e.g. circulation pump) with a higher power demand than the fuse rating required for the accessories is connected at the accessories output.
- In the following circumstances, connect one or more accessories directly to the mains supply via an ON/OFF switch:
The max. permissible total current of the control unit for the heat generator is exceeded.

Note

*In this event, the accessories concerned **cannot** be isolated with the ON/OFF switch on the control unit.*

Configuring the solar EM-S1 extension

The parameters for the solar EM-S1 extension are set at the heat generator control unit.



Heat generator installation and service instructions

Faults displayed with a fault code



Meaning of the fault codes

Heat generator installation and service instructions

Faults displayed without a fault code

Fault	Cause	Remedy
Solar yield too low	Temperature sensors interchanged.	Check temperature sensor connections.
	Air in the solar circuit	Vent the solar circuit. Check flow rate.
	Inadequate flow rate	<ul style="list-style-type: none"> ▪ Check flow rate. ▪ Check connection of output 24 (see page 19). ▪ Check hydraulic connections. ▪ Ensure check valves are operating correctly.
	Incorrect circulation	Check the system characteristics.
Solar circuit pump not running or runs constantly.	Temperature sensors interchanged.	Check temperature sensor connections.
	Solar circuit pump faulty or incorrectly connected	Check solar circuit pump connection (see page 19). Carry out an actuator test.
Solar control unit switched off	Fuse F1 has responded.	Check fuse F1. See page 19. Disconnect consumers. Connect again in sequence. While doing so, observe the behaviour of fuse F1.

Repairs

Check the function of the connected components by means of an actuator test:



Heat generator installation and service instructions

Checking the solar circuit pump at output P1

Characteristics of the circulation pump (see the following chapter):

- Pump always off:
 - High limit safety cut-out has responded. Reset the high limit safety cut-out.
 - Output P1 faulty
Replace extension.
 - Solar circuit pump faulty
Replace solar circuit pump.
- Pump always on:
 - PWM connection faulty
 - Output P1 always live.
Replace extension.

Variable speed circulation pump with PWM control

Whenever a demand is present, a voltage of 230 V~ must always be applied to output P1. The pump speed is governed by means of a control signal via PWM connection.

If the PWM connection is interrupted, the circulation pump must be switched off. If the circulation pump runs at maximum speed when the PWM connection is interrupted, an incorrect circulation pump has been installed.

Checking the temperature sensors

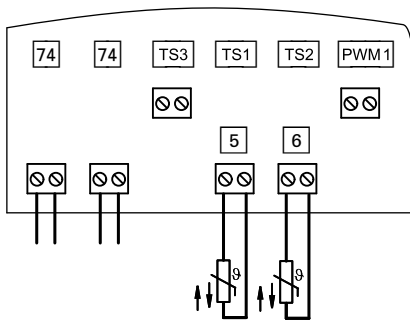


Fig. 9

1. Disconnect the plug of the relevant temperature sensor from the extension. Check the sensor resistance.
2. Compare the sensor resistance with the curve (see the following diagram).
3. In the event of severe deviation, replace the sensor.

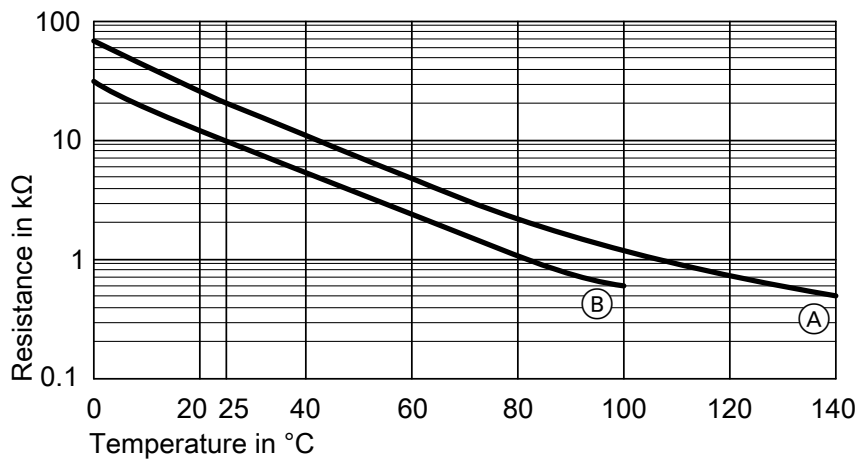


Fig. 10

- Ⓐ Collector temperature sensor [6] (sensor type: NTC 20 kΩ)
- Ⓑ Cylinder temperature sensor [5] (sensor type: NTC 10 kΩ)

Function description of solar DHW heating

Note

Set or alter the functions described below in the parameters in the "Solar" group.

Parameter		Description
Number	Designation	
The solar circuit pump is switched on according to the following criteria, resulting in the DHW being heated:		
1126.0	"Collector minimum temperature"	The solar circuit pump is started when the minimum collector temperature set in parameter 1126.0 is exceeded.
1492.0	"Start temperature differential, solar circuit pump"	The temperature differential between the cylinder temperature and the collector temperature is greater than the start temperature differential set in parameter 1492.0.
The solar circuit pump is switched off if one of the following criteria is met:		
1125.0	"Maximum cylinder temperature for solar DHW heating"	The maximum cylinder temperature (set DHW temperature) set in parameter 1125.0 is exceeded.
1126.1	"Maximum collector temperature"	If the maximum collector temperature set in parameter 1126.1 is exceeded, the solar circuit pump is switched off to protect the system components (emergency collector shut-down). The solar circuit pump will restart when the collector temperature falls to 20 K below the set value.
1492.1	"Stop temperature differential, solar circuit pump"	The temperature differential between the cylinder temperature and the collector temperature is smaller than the stop temperature differential set in parameter 1492.1.
—	—	The temperature set at the temperature limiter (if installed) is exceeded.
Further parameters:		
1118.0	"Minimum speed of the solar circuit pump"	Minimum speed of the solar circuit pump adjustable in %. Delivered condition: 23 %
1118.1	"Maximum speed of the solar circuit pump"	Maximum speed of the solar circuit pump adjustable in %. Delivered condition: 84 %

Suppression of DHW cylinder reheating by the boiler

Reheating of the DHW cylinder by the boiler is suppressed when the set DHW temperature for reheating is reduced by the boiler.

During reheating suppression, the DHW cylinder is only heated by the boiler if the cylinder temperature falls below the set DHW temperature for reheating.

The duration of reheating suppression is based on the runtime of the solar circuit pump and takes place in 2 stages.

Start of reheating suppression	Duration of reheating suppression	Set DHW temperature for reheating by the boiler
Stage 1		
Solar circuit pump on	Solar circuit pump runtime x 6 Example: Solar circuit pump runtime: 0.5 h 0.5 h x 6 = 3 h reheating suppression Pump runtimes that occur during the runtime of reheating suppression are calculated according to the formula and the result is added to the remaining runtime of the previous reheating suppression.	Average of the set DHW temperature and the value set in parameter 1394.0 Example: Set DHW temperature: 50 °C Value set in parameter 1394.0: 40 °C Calculated set DHW temperature for reheating by the boiler: 45 °C

Function description

Function description of solar DHW heating (cont.)

Start of reheating suppression	Duration of reheating suppression	Set DHW temperature for reheating by the boiler
Stage 2		
Solar circuit pump on > 120 min	Runtime of the solar circuit pump + 24 h	<ul style="list-style-type: none">▪ Solar circuit pump running: Value set in parameter 1394.0▪ Solar circuit pump off: As for stage 1

Reduction of stagnation time

If there is an excess of solar energy, the speed of the solar circuit pump is reduced before the maximum cylinder temperature is reached (parameter 1125.0). This causes an increase in the differential between collector temperature and cylinder temperature. The heat transfer to the DHW cylinder is reduced, which delays stagnation.

The temperature differential for reducing the stagnation time can be adjusted in parameter 1505. This function can only be implemented in systems with a variable speed solar circuit pump.

Collector frost protection

Viessmann collectors are filled with Viessmann heat transfer medium. Consequently, this function does not need to be enabled. Only enable it if water is used as the heat transfer medium.

To prevent damage to the collectors, the solar circuit pump is switched on if the collector temperature falls below +5 °C. The pump is switched off when +7 °C is reached. Note parameter 1127.0.

Interval function solar circuit pump

Set parameter 1719.0. Activate the interval function in systems where the collector temperature sensor is not in an ideal location, to prevent a time delay in capturing the collector temperature.

For correct capture of the collector temperature, the interval function cyclically switches on the solar circuit pump for brief periods.

Relay kick

To prevent the pumps and valves from seizing up, they are started for about 10 s every 24 h.

Specification

Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	2 A
Power consumption – electronics	2 W
Power consumption	9 mA
Permissible ambient temperature	
▪ Operation	0 to +40 °C
▪ Storage and transport	-20 to +65 °C
Rated relay output breaking capacity	
▪ P1 (solar circuit pump)	1 A 230 V~
▪ P3 (transfer pump)	1 A 230 V~

Connection and wiring diagram

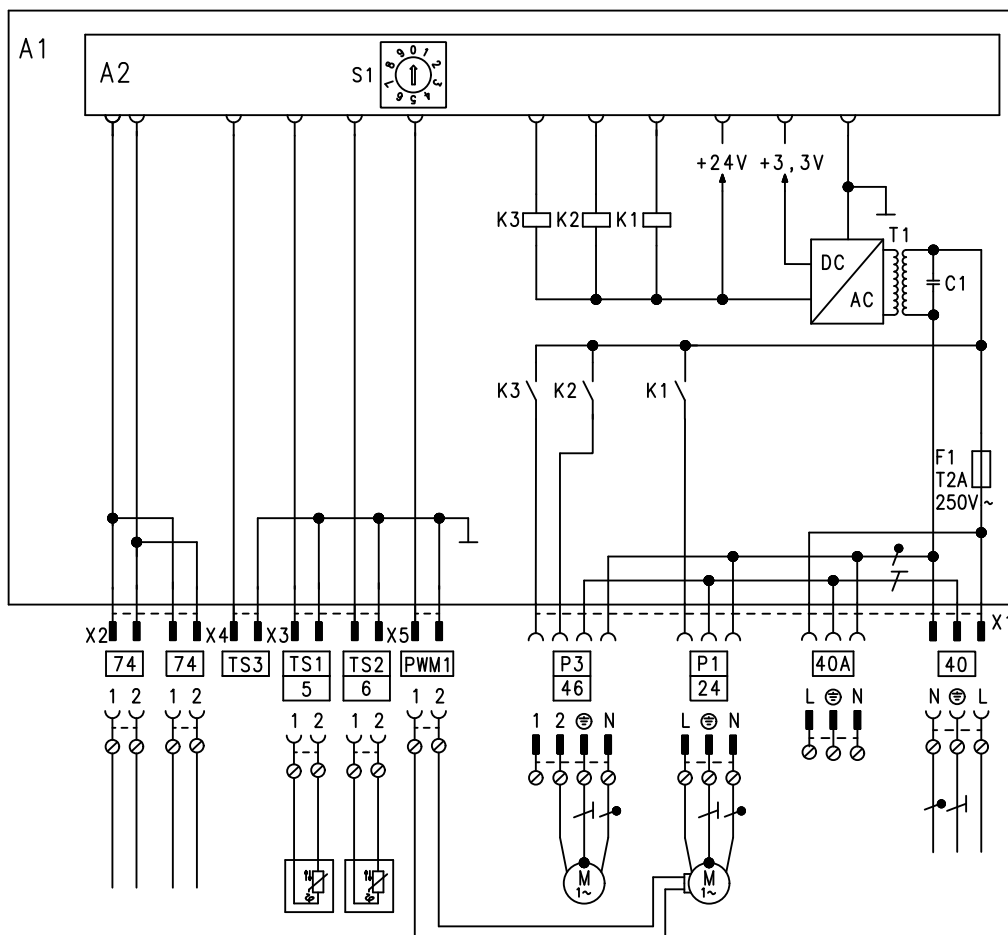


Fig. 11

Plug 230 V~

- P1 [24] Solar circuit pump (only with PWM control)
- P3 [46] Transfer pump
- [40] Power supply
- [40A] Power supply for accessories

Extra low voltage connections

- PWM1 Speed control, solar circuit pump
- TS1 [5] Cylinder temperature sensor NTC 10 kΩ
- TS2 [6] Collector temperature sensor NTC 20 kΩ
- TS3 No function
- [74] PlusBus

Declaration of Conformity

Declaration of conformity

Declaration of Conformity

We, Viessmann Werke GmbH & Co. KG, D-35107 Allendorf, declare as sole responsible body that the named product complies with the European directives and supplementary national requirements in terms of its design and operational characteristics.

Using the serial number, the full Declaration of Conformity can be found on the following website:

www.viessmann.co.uk/eu-conformity

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