

Allegro

453



454

Code: 20.045

Code: 20.044



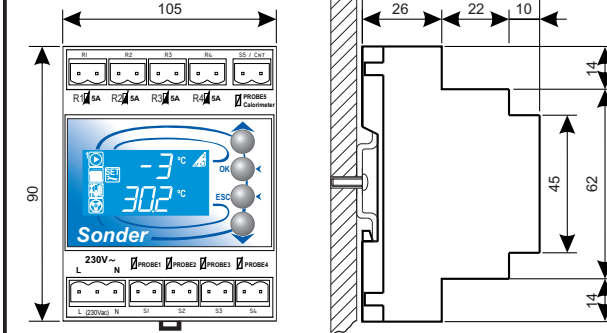
Technical Installation and Operation Manual

5992V0 SEP-09

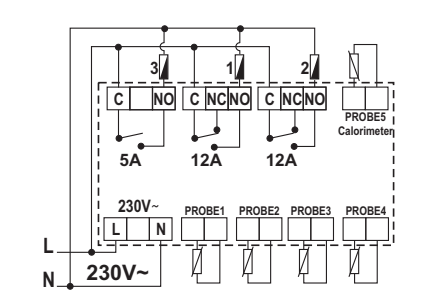
TECHNICAL SPECIFICATIONS

Power supply	230 Vac +10% -15% 50/60 Hz max. 2 VA.															
Outputs	454 - 4 relays max. 250 V~, 5 A. Voltage-free contacts. 453 - 3 relays max. 250V~, 2 (12A) + 1 (5A)															
Inputs	5 PT1000 probes / Range: -50 °C to +200 °C Verification scale:															
	<table border="1"> <tr> <td>°C</td> <td>-40</td> <td>0</td> <td>+40</td> <td>+80</td> <td>+120</td> <td>+160</td> <td>+200</td> </tr> <tr> <td>Ω</td> <td>843</td> <td>1000</td> <td>1155</td> <td>1309</td> <td>1461</td> <td>1611</td> <td>1758</td> </tr> </table>	°C	-40	0	+40	+80	+120	+160	+200	Ω	843	1000	1155	1309	1461	1611
°C	-40	0	+40	+80	+120	+160	+200									
Ω	843	1000	1155	1309	1461	1611	1758									
Wiring	H05v-k															
Operating environment	Temperature = 0 to 40°C / Humidity = 20 to 85% / Pollution = 2.															
Operation	Software class A; Action type 1.B.															
Tests	Assigned pulse voltage: 2500 V.															
	Temp. high-pressure ball valve: 100 °C (parts supporting voltage conductors). 75 °C (accessible plastic parts).															

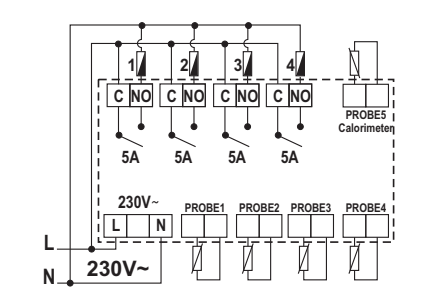
DIMENSIONS Assembly on DIN rail



CIRCUIT DIAGRAM 453



CIRCUIT DIAGRAM 454



Designed and manufactured in accordance with:
UNE-EN 60730-1 + A1:2005 + A12:2004 + A13:2005
UNE-EN 60730-2-1: 1998 + A11:2005

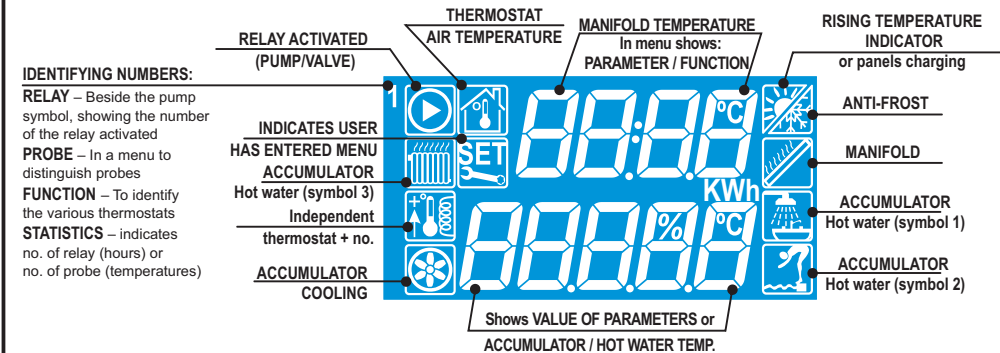


Terms of warranty

- Before installing the regulator, ensure that the environmental conditions (operating temperature, humidity, pollution and gas emissions) are suitable, as any of these factors can cause the unit to malfunction.
- When handling the regulator, whether for installation or repairs, disconnect it from the power supply.
- The Allegro is an independent control device for electrical cabinet mounting with wiring through conduit for correct installation.
- Electrical connections other than those indicated in this manual and on the connection label on the side of the device are not permitted. The connections referred to in this manual are those of the regulator; to connect the rest of the components, please consult the corresponding instructions for each unit (collectors, tanks, valves, etc.). For correct operation of the equipment, check that the technical requirements of the components are compatible and comply with current DIN regulations.
- This regulator is not a security device nor can it be used as one; it is the responsibility of the installer to provide the protection most suited to each type of installation (**officially approved**).
- The assembly, electrical connection, start-up and maintenance procedures must be carried out by qualified personnel.
- Should you encounter any defects that could cause damage or malfunctions, do not connect the device.
- The total or partial reproduction of this document by whatsoever means is prohibited without prior authorisation in writing from SONDER REGULACIÓN S.A.
- The graphics and information given in this catalogue are for guidance only and may contain technical or printing errors.
- Sonder Regulación S.A. reserves the right to modify the product, technical data and instructions for assembly and use without prior notification.
- This device has a three-years warranty. The warranty is limited to the replacement of faulty parts, which will be restored to the same condition in which they were received. No packaging, batteries, instructions or any other accessories included with the product will be replaced.
- We cannot accept any responsibility for devices damaged as a result of poor handling, disregard for the warnings provided in this manual or ignorance of the technical requirements of the installation.
- For repairs during the warranty period, customers are required to provide proof of purchase and an accurate description detailing the defect or the anomalous performance of the product as observed by the user.
- In the event of repairs not covered by the warranty, the user will be informed of their viability and cost. Assessments carried out by our technical department may give rise to an additional cost for the user.
- The following cases are excluded from the warranty:
 - Units whose serial number is worn away, erased or modified.
 - Devices which have not been connected or used in accordance with the instructions enclosed with the device.
 - Devices that have been modified without prior agreement with the manufacturer.
 - Devices damaged due to knocks, spills or gas emissions.
 - Devices with normal wear and tear or which are damaged as a result of improper use.
- **Shipment and reception costs.**
- Requests for compensation for loss of earnings, usage compensation and indirect damage, unless the company is deemed legally responsible.

On-screen information

All the information required to configure and adjust your installation quickly and easily is indicated by icons on the screen.



- In normal operation mode, the screen shows the status of the devices (pumps, relays, alarms, etc.) and the probe temperatures.
- In normal operation mode, the screen shows system operation, the active functions and the probe readings (identified by the symbol assigned) in a cyclic display (8 seconds for each screen). The display can be configured:
 - Press **OK** to hold the current screen
 - Press **▲** to return to the cyclic display
 - Press **ESC** to fast forward through screens
- If pumps are running or if there are any temperature alerts, this is indicated by the relevant symbol flashing.
- A sun symbol appearing at the top of the panel indicates that:
 - temperature is rising, panel temperature is higher than average temperature.
 - the panels are currently transferring heat to the accumulator.

Operation

The Allegro is a thermal solar energy regulator with inputs for five PT1000 probes (t1...t5). Only three 1,5 metre probes are included, each with a range of -50 °C to +200 °C. The input for probe S5 can also be configured as a pulse input for calorie counting (*LCntE*).

The 454 model has 4 5A 250V~ relay outputs and the 453 has 3 relay outputs (two 12A 250V~ and one 5A 250V~). The relays are voltage-free contacts, which means that they only act as switches and the devices connected to the relay need to be powered.

The probes are shared by systems and functions but the relays configured for one function are excluded from the system (except with OR and AND).

The Allegro 454's factory settings configure the system as a differential (**t1 - t2 activate relay 1 / t1 - t3 activate relay 2 / t1 - t4 activate relay 3 and t1 - t5 activate relay 4**). The Allegro 453 has one relay less and t5 is not assigned to a relay. As soon as a relay is assigned to a function it ceases to function as a differential for the system. *To obtain the best results from your Allegro unit read this section carefully. It gives details of the correct procedures and methods to use and the information given on the screen.*

- When all components have been installed and connected, the Allegro can be powered up.

- Before configuring the parameter and function settings, the probes and relays should be tested to check that the installation works correctly.

- All the settings are preset to factory default values. If these settings are not appropriate for your needs, use the menu to change the settings.

- If you wish to activate a function, first make sure that the resources needed by the function are not being used by the system.

- The following functions can be activated via the menu: anti-frost, tubular sensors, independent thermostat 1, independent thermostat 2, independent thermostat 3, ambient thermostat 1, ambient thermostat 2, heater unit, double pump, increased return, OR, AND and calorie counter. Please bear in mind that relays occupied by functions will be excluded from the system.

- Once all the connections have been made and the device is connected to the power supply, the device shows the screen operating in normal mode with the factory settings.

- Press **▲▼** together for 5 seconds to show the main menu on the screen. Use the **▲▼** keys to choose a sub-menu.

- Press **OK** to enter the chosen sub-menu, such as Functions.

- Use the **▲▼** keys to browse through the sub-menu and locate the function you wish to configure; the screen will show the status of the function.

- Press **OK** in the desired function to configure the values (the value to be changed flashes). Press **▲▼** to change the value and then press **OK** to save and move on to the next value. When all the values have been set, press **OK** to save the changes and return to the sub-menu.

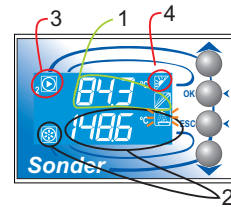
- Press **ESC** to return to the functions sub-menu without saving the changes.

- Press **ESC** again to return to the main menu.

- Press **ESC** again to return to normal regulation operation. If no keys are touched for 15 minutes the screen light will switch off. Press any key to return to normal mode.

This method is applicable to all configuration menus and sub-menus.

Screen: Normal Operation Mode

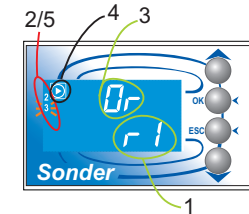


1-Manifold temperature

2-Accumulator temperature. The symbol assigned to this accumulator is flashing because the temperature alert has been activated and the cooling system has been brought into operation (heater unit symbol).

3-Relay 2 activated (assigned to differential between S1-S3)

4- The temperature tends to rise.



1-Slave relay

2- Mask relays

3- Function displayed

4- Slave relay ON

5- Mask relay flashing = ON

From this screen you can access:

Menu



Press **▲▼** together for 5 seconds.

Parameter values can be set and functions configured.

SET icon on screen

Statistics



Press **OK** for 6 seconds to view:

- Record of maximum, minimum and average temperatures.
- Hours, whole and part, of relay operation.
- Flow and total/partial energy supplied to system..

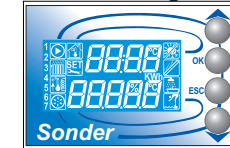
Probe, relay and meter test / manual mode



Press **ESC** for 6 seconds to:

- View the current temperature of each of the probes, their assignment and operation.
- Connect/disconnect relays manually.
- Check whether flow is present and whether the Allegro is receiving pulses from the meter.

To reset settings

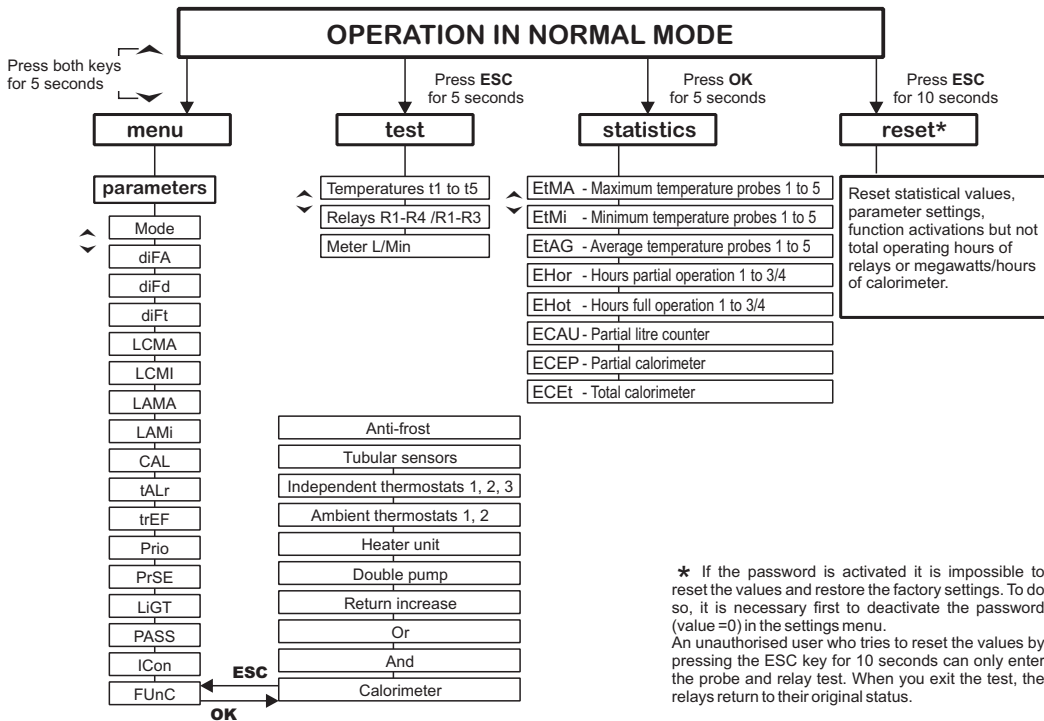


Press **ESC** for 15 seconds. All the values are reset except the total operating time of the relays and the total MWh of the meter; these values belong to the statistics menu.

To enter this mode the password must be OFF.

If you are in configuration mode in a menu and do not touch any keys for 15 minutes, the device will return to normal operation without saving the changes.

Configuration diagram



Probe, relay and meter test

Press **ESC** for 6 seconds to enter test mode from normal operation mode. This menu enables you to:

- View the current temperature of each of the probes, its assignment and operation. If the reading is not correct, check that the probe is properly connected and its cables are not cut.
- Press **OK** to go to the next probe. If S5 is configured as a calorimeter, the probe reading will indicate an error and only give the correct value when you reach the calorimeter.



- Enter **forced manual mode**: Connect and disconnect the relays manually to check that the installation is working correctly.



- Press **OK** to activate/deactivate relay **R1**.
- Press **▲▼** to move on to the next relay.

- Finally, you will find the flow meter (L/min), showing whether there is a flow in the circuit and whether the Allegro is receiving pulses from the meter.

- When you exit **TEST** mode all the relays will update their status to system regulation status.



Password On: If no keys are touched for 15 minutes, the system returns to normal operation and the relays return to the status required by the system at that time.

Password OFF: The system does not exit the test menu until the **ESC** key is pressed (**forced manual mode**).

It is very important to press ESC to exit manual mode when you finish, since the Allegro's system regulation is deactivated in this mode and operations are limited to the orders given manually.

RECOMMENDATIONS

PROBES

- Use only original probes (1.5m PT1000). Should they need to be extended, they must be welded together to avoid losing the reading value and the joint must be shrink wrapped to insulate against humidity.
- The probes on the panels must be installed at the output leading to the installation.
- The accumulator probes must be installed inside the accumulators.
- Probe leads must never run in the same duct as power cables.

RELAYS

- The relays that activate devices in the system have voltage free contacts and work only as switches; they must therefore have appropriate independent power supplies, depending on each device.
- Ensure that electrical connections from the devices to the contacts of the relays have been made correctly before connecting the **Allegro** terminal to the power supply.

Settings

The factory settings are those considered to be the most widely used. If they are suitable for your system, the Allegro is ready to control and regulate your installation. If you require other settings due to the needs of your installation, read this section carefully.

To access the menu press **▲** for 5 seconds (with the screen illuminated). Use the menu to adjust the settings that will determine the operation of the installation.



SETTING		RANGE	ADJUSTED
Node	Mode A (Summer) / b (Winter): You can choose between two different settings for tank priorities and alarms without having to change them one by one. In the factory setting both modes have the same preset values.	Winter / Summer	Winter
d FA	Activation differential: This sets the temperature difference required between the accumulator and the solar manifold for the pump to come into operation.	2.0 to 20.0 °C	6.0 °C
d Fd	Deactivation differential: This sets the temperature difference required between the accumulator and the solar manifold for the pump to cease operation.	1.0 to 15.0 °C	2.0 °C
d Ft	Temperature differential: This allows you to configure the temperature differential for the setpoints of all the functions (except ambient thermostat, which has its differential set to 0.3 °C).	0.3 to 9.0 °C	2.0 °C
LCNA	Maximum setpoint: This limits the maximum value for the support function setpoint temperature.	5 to 80 °C	10 °C
LCN	Minimum setpoint: This limits the minimum value for the support function setpoint temperature.	5 to 130 °C	2.0 °C
LANA	Maximum ambient limit: This limits the maximum value for the ambient thermostat setpoint temperature.	6 to 17 °C	6 °C
LAN	Minimum ambient limit: This limits the minimum value for the ambient thermostat setpoint temperature.	18 to 30 °C	30 °C
CAL	Probe calibration (t1 – t5): This is used to adjust the readings for each probe. Use a precision master thermometer to take the reading and then adjust the probe to this temperature.	-10.0 to +10.0 °C	0.0 °C
tALr	Tank temperature alarm (1-4): This parameter defines a temperature alarm for each accumulator in order to activate a heater unit or cooling system, charge another accumulator or stop circulation. The adjustment has a double effect with the mode A / B parameter.	5 to 130 °C	85 °C
t-rEF	Accumulator cooling (1-4): This reduces the temperature of the accumulator by feedback from the manifold, when it detects that the manifold temperature is lower than the accumulator temperature.	5 to 130 °C	130 °C
Pr10	Tank priority (1-4): This determines the order in which accumulators are charged if there is more than one (see example). The adjustment has a double effect with the mode A / B parameter.	5 to 85 °C	5 °C
PrSE	Sequential priority: This defines the charging priorities according to the accumulator number, if the installation has more than one (see example).	On/OFF	OFF
L.Obt	Display light: This defines the type of display lighting: timer (switches off after 15 minutes without keyboard activity) or always on.	On/OFF	OFF
PASS	Password: This denies access to configuration; the user can only view statistics, display lighting and change the summer/winter, probe and relay tests.	OFF(0)/On(1...9999)	OFF
iCon	Accumulator icons: This allows a different icon to be assigned to each accumulator. The screen shows the temperature, the icon assigned and the number of the activated relay.		
FUNC	Functions: The following functions can be activated via the menu: anti-frost, tubular sensors, independent thermostat, ambient thermostat, heater unit, double pump, increased return, OR, AND and energy meter.	All deactivated (see section on functions)	

Priority operation

When a system uses several accumulators (tanks, heating, swimming pools, etc.) priorities can be set for charging them (accumulator priority setting on page 28). Their minimum temperature is set and these temperatures determine priority and non-priority status when charging. The tanks with lower temperatures are given priority until they reach the temperature when they become non-priority.

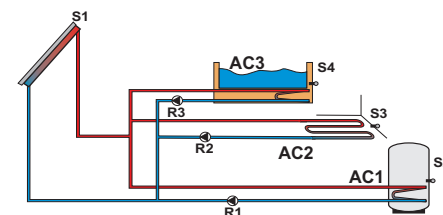
When the sequential priority parameter is activated, it assigns the charge order in accordance with numerical order and temperature. **The numerical order assigned to the accumulators is the numerical order of the relays.**

Sequential priority OFF

When an accumulator is below its priority temperature, it is charged exclusively until it reaches that temperature. If another accumulator falls below its priority temperature while the former is charging, both become priority and are charged at the same time until one of them reaches its minimum temperature.

Sequential priority ON

When accumulator number 1 is below its priority temperature, it is charged exclusively until it reaches its priority temperature. If number 2 falls below its priority temperature while number 1 is charging, it will not be charged until accumulator 1 reaches its minimum temperature (priority temperature).



Example of operation

In winter

Accumulator priority °C			Tank alarm °C		
AC 1	AC 2	AC 3	AL 1	AL 2	AL 3
65	40	5	70	45	35
Hot water	S. R.	Swimming pool			

Sequential priority OFF

If the temperatures of AC1 and AC2 are below 65 and 40 respectively, the installation heats them both at once. When AC2 reaches 40, only AC1 is heated until it reaches 65. Once it reaches this temperature there are no other accumulators in priority mode and it heats all three accumulators until they reach 70, 45 and 35, respectively.

If one of them falls below its priority temperature, the priority system is reactivated and only the one with a temperature below its priority value is heated.

In the case of excess heat: When AC1 has reached 70 and AC has reached 45, the swimming pool is heated to dissipate the excess heat instead of accumulating it in the manifolds, thus preventing the installation from overheating.

Sequential priority ON

If the temperatures of AC1 and AC2 are below 65 and 40, the installation **only** heats AC1 (numerical order) until it reaches 65 °C. Once it has reached this temperature it is no longer priority and the system then exclusively heats accumulator 2 until it reaches 40. As there are no other priority accumulators, the two accumulators are heated at the same time until their temperature alarms are triggered.

In summer

Accumulator priority °C			Tank alarm °C		
AC 1	AC 2	AC 3	AL 1	AL 2	AL 3
65	5	5	70	5	35
Hot water	S. R.	Swimming pool			

Since the underfloor heating does not need to be activated during the summer, its priority can be set to 5 °C and its alarm to 5 °C to deactivate it, and AC3 can be set to 5 °C with its alarm at 35 °C so it is not priority. The system then heats AC1 until it reaches 65 °C and, once it reaches this temperature, it heats AC1 and AC3 at the same time until they reach their alarm temperature, at which point the system stops charging the accumulators.

Accumulator priority °C			Tank alarm °C		
AC 1	AC 2	AC 3	AL 1	AL 2	AL 3
65	5	28	70	5	35
Hot water	S. R.	Swimming pool			

Since the underfloor heating does not need to be activated during the summer, its priority can be set to 5 °C and its alarm to 5 °C to deactivate it, and AC3 can be set to 28 °C and its alarm to 35 °C. The system then heats AC1 until it reaches 65 °C, and, once it reaches this temperature, it heats AC3 until it reaches 28 °C, then it charges AC1 and AC3 at the same time. If AC1 falls below 65 °C while AC3 is charging, the system stops charging AC3 so it can charge AC1 until it reaches 65 °C.

* The values of the tank alarm and accumulator priority settings are interrelated in such a way that the alarm cannot be set below the value of the tank priority and the tank priority value cannot be set above that of the alarm, since this can block the setting adjustment range.

FOR EXAMPLE: If AC1 has its alarm set to 70 °C, you cannot set the priority above this value. If the priority is set to 60 °C and you try to reduce the alarm to 50 °C, the same thing happens and the range of the alarm is blocked.

Statistics

In this menu you will find all the data that the Allegro has compiled since it has been in operation. You can use it to optimise your installation as it provides information about operation times, maximum and minimum temperatures, in addition to data from the water meters and calorimeters. All these data allow you to assess the performance of the installation according to the weather conditions and your configuration.

To access the statistics menu press **OK** for 5 seconds (with the screen illuminated) and you will see the first figures. No readings are registered for probes that are not connected and will produce an error. When t5 is configured as a calorimeter, the temperature appears as nAn (not a number), because it is in pulse mode.

- Press **OK** to reset the values to zero.
- Press **▲** to move on to the next value.
- Press **ESC** to go back.

EtNA	Maximum temperatures (t1 to t5) Indicates the maximum temperature read for each probe identified by its number on the screen.
EtN	Minimum temperatures (t1 to t5) Indicates the minimum temperature read for each probe identified by its number on the screen.
EtAG	Average temperatures (t1 to t5) Indicates the average temperature read for each probe identified by its number on the screen.
EHO-	Partial operating hours (R1 to R3/R4) This indicates how long each relay has been in operation since the last reset. They are identified by their number on the screen.

EHOt	Total operating hours (R1 to R3/R4) This indicates how long each relay has been in operation since it was installed. This value cannot be reset to zero.
ECAU	Flow This sub-menu shows the amount of heat-transfer liquid that has passed through the meter (in litres).
ECEP	Partial energy meter The KWh meter shows how much energy the panels have supplied to the installation.
ECEt	TOTAL energy meter The MWh meter shows how much energy the panels have supplied to the installation since start up. This value cannot be reset to zero.

Functions

The functions use the probes shared by the systems and the relays left free by the systems and other functions.

If you try to configure more functions than can be supported by the unit, a FULL message will appear on the screen and it will exit the function.

To access the functions menu, press  for 5 seconds (with the screen lit), use the arrows to select **functions** and then press **OK**.



Anti-frost

This function is designed for installations that use water as a heat-transfer liquid. Since it does not contain any anti-freeze, the heat of the installation is used to prevent the circuit from freezing.

- The function can be enabled/disabled by setting the temperature at which the pump is activated (-20 to 20 °C).

Resources

- 2 automatically configured shared probes



Tubular sensors

This updates the reading of the probes installed outside the manifolds by recirculation for 30 seconds when it detects that the temperature has increased by 2K with regard to the last reading in memory.

- In function settings, where you can activate/deactivate the function.

Resources

- It does not use resources and only modifies the probe reading



Independent thermostat This function allows you to regulate the temperature of a probe (heating, underfloor heating, etc.) regardless of the operation of the system. There are 3 Independent Thermostat functions, identified by number.

- In function settings you can activate/deactivate the function, set the temperature to be regulated (10 to 90 °C), as well as the reading probe and the relay activated.

Resources

- 1 shared probe
- 1 fixed, configurable relay



Ambient thermostat

This function allows you to install one or two remote adjustment probes (MODERATO SR) in your installation. This allows you to regulate the temperature of the room without having to change the temperature setpoint using the Allegro.

- In function settings you can activate/deactivate the function, set the setpoint probe *SLon* (to select the temperature at which the room must be kept), the regulation probe *Sand* (to take the temperature of the room) and the relay to be activated *rELE*.

Once you have configured and installed the remote probe you have to calibrate the reading on the button of the remote terminal with the value shown by the Allegro. To do this:

- Set the button of the remote probe to 20 °C.
- Go to **menu, parameters and calibrate probes**.
- Change the value of the setpoint probe to 20 °C.

Example setpoint probe *t4*: On screen, the reading from this probe is 19.5 °C, go to probe calibration and change the value of *S4* from 0.0 to 0.5.

Resources

- 2 shared probes
- 1 fixed, configurable relay



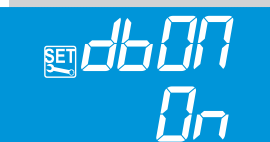
Cooling by heater unit

This function allows you to reduce the temperature of a device by recirculation or using a cooling device. The configured relay is activated when it detects that the temperature of the device is higher than the temperature of the circuit.

- In function settings you can activate/deactivate the function, determine the setpoint temperature (*ConS* 40 to 140 °C), the reading probe and the recirculation or heater unit activation relay

Resources

- 1 shared probe
- 1 exclusive, configurable relay



Double pump alternation

This function allows you to have two pumps in your installation, working alternately.

- In function settings, you can activate/deactivate the function and set the total time that each pump will operate before changing (*ALtH* 4 to 120 hours), the source relay of the pump to be copied (*rDrC*) and the relay which will alternate with the original.

Resources

- 1 shared relay (double)
- 1 exclusive, configurable relay



Increasing the circuit return temperature

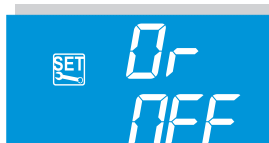
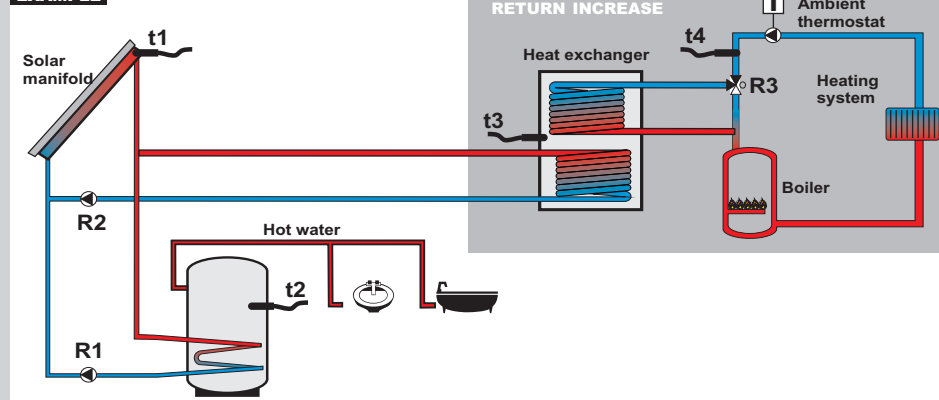
The increase return function allows you to control a valve to divert the course of the hot-water circuit and increase the temperature of the heating return circuit. This allows you to use solar heat from the accumulator for heating. It uses solar energy to preheat the water from the heating installation before adding the rest of the hot water from a backup source, either a boiler or a heating element.

- In function settings you can activate/deactivate the function and set the temperature differential (0.3 to 9 °C) between the accumulator of the solar circuit and the return from the heating circuit which will activate it. It will select the probe for the heat exchanger (*SnE*), the return probe (*SEt*), and the relay that activates the circuit return valve

Resources



- 2 automatically configured shared probes

EXAMPLE



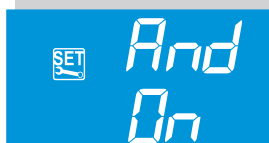
OR

This function determines the status of a relay based on the status of **any** of the selected relays. For example: if you choose R1 as the slave relay and R2 and R4 as the main relays, R1 will be activated when R2 **OR** R4 is activated. When they are all off, the slave relay switches off. The command is executed after the AND command.

- In function settings you can activate/deactivate the function, choose the slave relay and the main relays (*rASC*) that will determine the status of the slave relay.  select the relay number,  change the status and press **OK** to confirm and exit.



Resources

- This does not use resources, it only modifies the actions of relays which have been configured



AND

This function determines the status of a relay based on the status of **all** the selected relays. For example: if you choose R1 as the slave relay and R2 and R3 as the main relays, R1 will be activated when R2 **AND** R3 are activated. When either of the main relays is off, the slave relay switches off.

- In function settings you can activate/deactivate the function, and choose the slave relay and the main relays (*rASC*) that will determine the status of the slave relay.  select the relay number,  change the status and press **OK** to confirm and exit.

Resources

- This does not use resources, it only modifies the actions of relays which have been configured



Energymeter

This function measures the amount of energy supplied to your installation by the solar collector by reading two probes (one at the input and the other at the output of the part of the installation you want to monitor) and the pulse input (which measures the flow rate of the installation).

- In function settings you can activate/deactivate the function, adjust the configuration of the pulse input (*PLP1* to 200 litres per pulse), the composition of the heat-transfer liquid (*GL* 0 to 100% glycol), the input probe (*SEnE*) and the meter probe (*SSRL*) to calculate the amount of heat transferred. When this function is activated, the following messages can be seen on the screen:

<i>POLE</i> 634	Power currently supplied to the installation (W)	<i>LFI</i> 510	Current flow rate in the installation (litre/minute)
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Resources

- 1 probe. It will always be 15 as it is set for pulse input and not temperature