Practical Information Version 1.0 EN

Concept for standard applications

PM5 - PoolManager® / Analyt

BAYROL TECHNIK

Table of content

1 Covered requirements

This document describes the electrical connections as well as the menu configuration of a PoolManager® or Analyt (PM5) for controlling a swimming pool installation with the following components:

- VSP (Variable Speed Pump)
  (in this concept the connection of a Speck Badu 90 Eco VS is described as an example. Other VSP types can be installed similarly)
- Protection against dry running of the filter pump with floating switch (forced switch off of filter pump in case of low water level in balance tank)
- Overflow protection of balance tank with floating switch (forced switch on of filter pump)
- Automatic water refill with floating switch and valve for freshwater
- Automatic backwash with a Besgo bar valve (5-way-automatic backwash-valve)
- LED lights
  Manual on/off or time-controlled
- Solar system
  - Motor-driven valve 230 V
  - Solar sensor
- Heating system (e.g. heating pump)
- Flockmatic pump

By adding or omitting functions, the application concept can be adapted to individual needs if required.

Please note:

In the following document the name PoolManager® is used to represent the entire PM5 controller family (also Analyt etc.).

2 Software-Version

This document refers to the PoolManager® software versions from v160404-M1 (6.1.0) as of 04.04.2016. In earlier versions not all functions necessary for the described applications are available.

If an older version is installed, a software update to the current software version via USB drive is mandatory.

The installed software version can be checked by pressing the hotkeys 

and then 

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The current software can be downloaded via the BAYROL web portal and copied to a standard USB drive:

http://www.bayrol-poolaccess.net

Select the option "Download Centre" in the menu of the web portal.

Further information on how to update the software can be found in the PoolManager® user manual.

3 Overall system

3.1 External switch box

For the control of filter pumps or other components with higher power consumption (>1 kW), high inrush currents or 400 V~ supply, external circuit breakers (switch contactors) may be required. For 400 V~ pumps an additional motor protection function may be required.

For switching filter pumps the use of an external circuit breaker (switch contactor) is generally highly recommend due to high inrush currents which will shorten the lifetime of the internal switching relays of the PoolManager®.

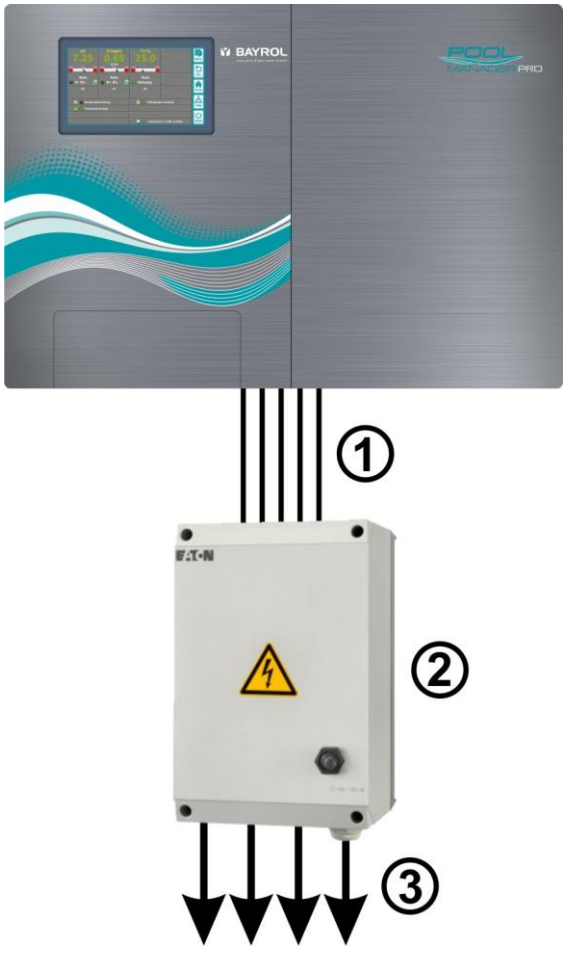
Please note:

This does not apply to filter pumps with variable speed (VSPs) which are permanently connected to the house power network and controlled via volts-free contacts.

External circuit breakers are controlled by the PoolManager® with 230 V~. The circuit breakers can be installed in an external control box as shown in the following diagram.

If many functions are used, an external switch box is also recommended in order to carry out the wiring in a simple and clear manner.

An already existing switch box or switch cabinet can be used at one's own discretion.

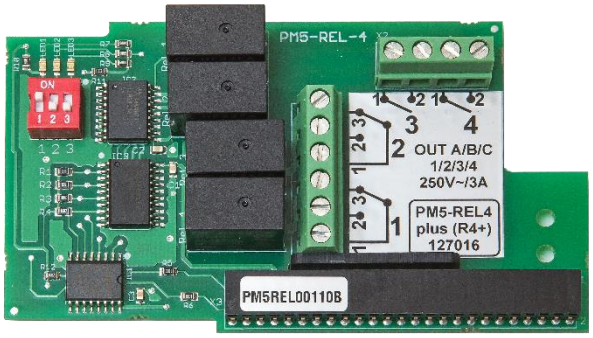


1. Volts-free control signals and/or 230V~ outputs with low power
2. External switch box with circuit breakers (contactors, power switches) and connection terminals
3. Connection of the controlled components:
   Volts-free / 230V~ / 400V~ also with high power

3.2 Relay plug-in module PM5-REL4 plus (R4+, Ref. 127 016)

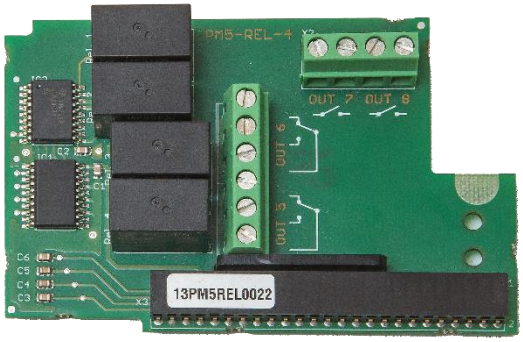
Additional relay switch outputs are required to implement all the functions described in this application concept. Therefore, an optional relay plug-in module PM5-REL4 plus (R4+, art. no. 127016) must be fitted.

If required, a maximum of 3 additional relay plug-in modules with 4 additional switch outputs each can be plugged in the controller.



PM5-REL4 plus (R4+, new version)

Up to 3 modules per controller



PM5-REL4 (elder version)

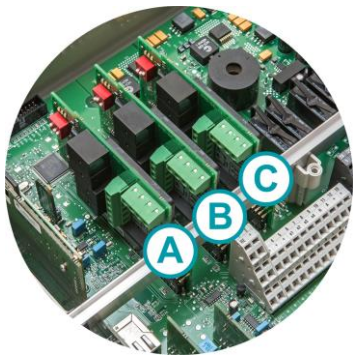
Just one module per controller, can be combined with up to two PM5-REL4 plus (R4+)

3.3 Switch outputs

Menu function "Filter pump":
Function: Variable speed filter pump Speck Badu Eco 90 VS

- Connection at relay plug-in module PM5-REL4 plus (R4+) (worthwhile since for a VSP 4 volts-free contacts are needed)

Depending on the slot used, the relay plug-in module is designated A, B or C. In this example, slot A on the far left is used. For more information, refer to the documentation for the relay plug-in module.



- Stop contact of the Eco VS:
  Connection at relay output OUT A1 [R4+]
  (left hand relay plug-in module A, relay output 1, normally closed contact [3])
- Contact for speed "Low" of the Eco VS:
  Connection at relay output OUT A2 [R4+]
  (left hand relay plug-in module A, relay output 2, normally open contact [2])
- Contact for speed "Med" of the Eco VS:
  Connection at relay output OUT A3 [R4+]
  (left hand relay plug-in module A, relay output 3
- Contact for speed "High" of the Eco VS:
  Connection at relay output OUT A4 [R4+]
  (left hand relay plug-in module A, relay output 4

Menu function switch output "Universal 1":
Function „Water refill"

- Magnetic valve for water refill
- Connection on relay output OUT1 [terminal 26]

Menu function switch output "Universal 2":
Function „Backwash"

- Besgo backwash valve
- Connection on relay output OUT2 [terminal 27]

Menu function switch output "Universal 3":
Function „LED"

- LED lights
- Connection on relay output OUT3 [terminal 30]

Menu function "Flockmatic pump":

- Connection on relay output „Dos. pH+" [terminal 22]
  (Prerequisite: This output is not in use for dosing pH Plus!)

Menu function "Heating"
(e.g. pump for heating system or magnetic valve):

- Connection on relay output (Al.) [terminal25]
  Please note: If the alarm output [terminal 25] shall be used for a switching function, this relay must be not assigned as alarm relay:
  Menu ➔ "Alarm settings":
  "Use output [25] as alarm relay = No

Menu function "Solar heating"
(Motor valve 230V~):

- Connection on relay output OUT4 [terminals 31 and 32]

3.3.1 Available relays for future extensions

All available relay outputs are used for the described functions.

If required, up to 2 additional relay plug-in modules PM5-REL4 plus (art. no. 127 016) with 4 additional switch outputs each can be installed for additional functions.

3.4 Switch inputs (volts-free / dry contact)

Float switch for protection against dry running of the filter pump (forced switch off in case of low water level in the balance tank)

- Connection on IN 2 [terminal 7]

Float switch for overflow protection of the balance tank (filter pump forced to switch on in case of high water level)

- Connection on IN 3 [terminal 8]

Float switch for water refill

- Connection on IN 4 [terminal 9]

3.4.1 Available switch inputs for future extensions

- IN 1 [terminal 6]

3.5 Temperature inputs (PT1000)

Temp.1 [terminal 3], 0-50 °C

- Temperature of pool water (use standard sensor in measurement chamber or a sensor in the pool or in the circulation line for higher measurement accuracy)
- Type of temperature sensor: PT1000

Temp.3 [terminal 5], 0-75 °C

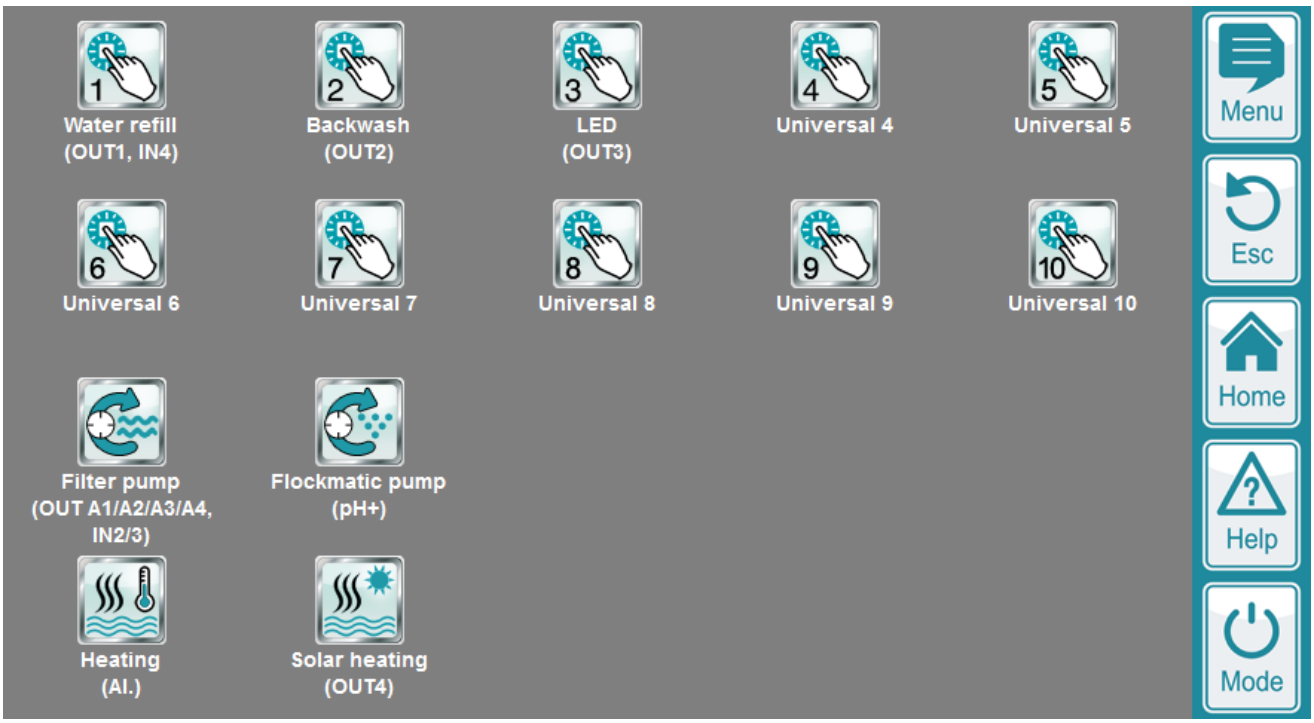
- Solar temperature
- Type of temperature sensor: PT1000

3.5.1 Available temperature inputs for future extensions

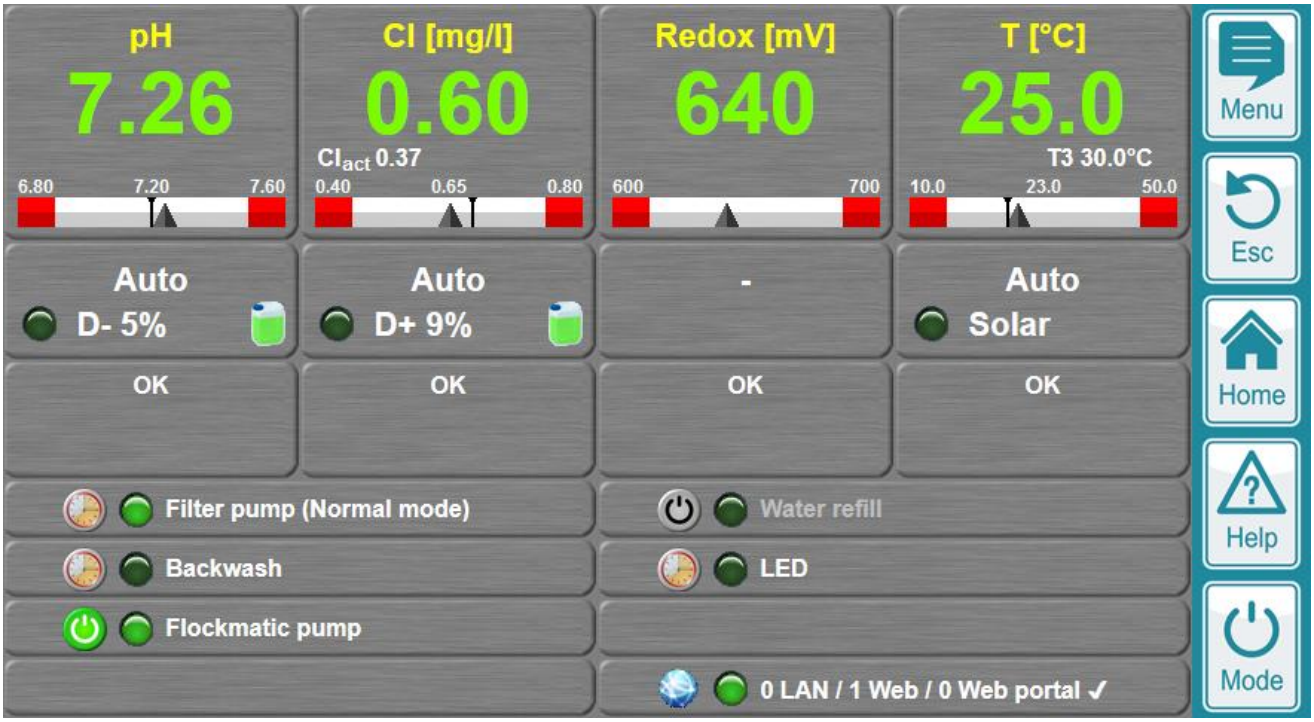
Temperature input temp.2 [terminal 4], 0-50 °C remains for now unused and is therefore available for future extensions.

3.6 Overview Icon menu and Home menu

The Icon menu „Add-on functions“ gives an overview of the assigned inputs and outputs:



In the Home menu the functions are presented as shown:



4 Filter pump Speck Badu Eco 90 VS

4.1 Electrical connection on PoolManager®

Note: The specified colours of the Eco 90 VS connection cable may differ depending on the pump model used.

Further down on page 20 you will find an illustration for connecting the Eco 90 VS pump to the relay plug-in module PM5-REL-4 plus in the PoolManager®.

Common / GND:

Connect the black cable (GND) of the Eco 90 VS to the middle contacts of OUT A1 and OUT A2 and to one side each of OUT A3 and OUT A4 (distribution of one Eco 90 VS connection (Common / GND) to four PoolManager® terminals).

The connections OUT A1, OUT A2, OUT A3 and OUT A4 are all located on the relay plug-in module PM5-REL4 plus.

Best way to distribute the GND connection to the four terminals of the PoolManager® is to use a suitably manufactured cable with wire end ferrules.

Stop-Contact:
Red cable of the Eco 90 VS to be connected to
OUT A1-RK (normally closed contact) [PM5-REL-4 plus]

Eco mode (Speck n1 = 2000/min):
Brown cable of the Eco 90 VS to be connected to
OUT A2-AK (normally open contact / working contact) [PM5-REL-4 plus]

Normal mode (Speck n2 = 2400/min):
Green cable of the Eco 90 VS to be connected to
OUT A3 [PM5-REL-4 plus]

Increased mode (Speck n3 = 2830/min):
Yellow cable of the Eco 90 VS to be connected to
OUT A4 [PM5-REL-4 plus]

Alternatively, other outputs of the PoolManager® can also be used. However, it is important that the stop contact of the Badu Eco 90 VS is connected to the normally closed contact of a switching output. The three changeover contacts OUT 4 / OUT A1 / OUT A2 can be used for this, which in addition to the usual normally open contact (working contact) also offer a normally closed contact.

4.2 Configuration in the menu

Initially, the switch outputs used (OUT A1 / A2 / A3 / A4) need to be assigned to the menu functions of the filter pump control:

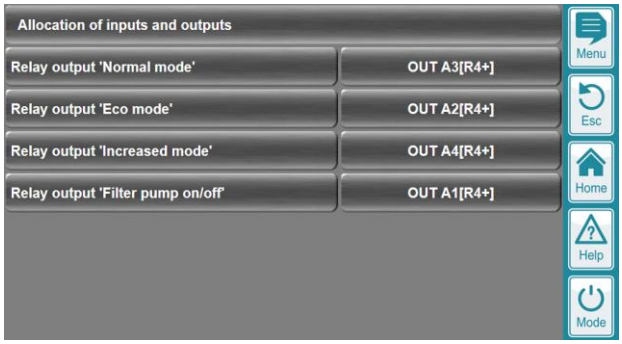
Menu ➔ Add-on functions ➔ Filter pump ➔ Basic Configuration ➔ Allocation of inputs and outputs

Relay output ‚Filter pump on/off' = OUT A1[R4+]
(function ‚Filter pump on/off' is used to control the stop contact)

Relay output ‚Eco mode' = OUT A2[R4+]
(Speed 1)

Relay output ‚Normal mode' = OUT A3[R4+]
(Speed 2)

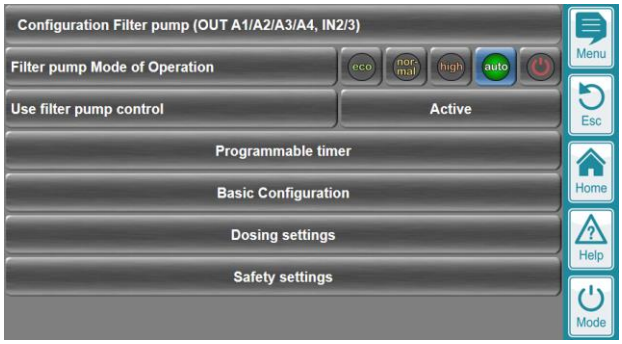
Relay output ‚Increased mode' = OUT A4[R4+]
(Speed 3)



After assigning the switch outputs the filter pump can be activated:

- Menu ➔ Add-on functions ➔ Filter pump:
  - Use filter pump control = Active

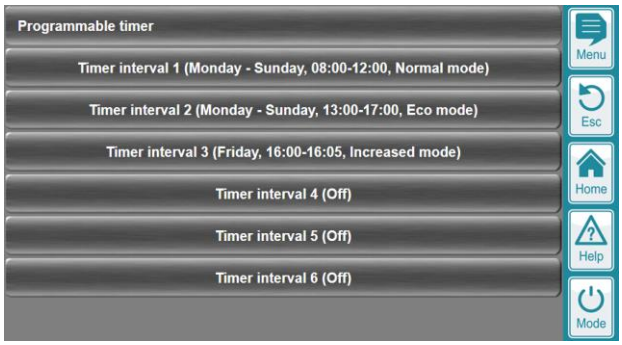
After activating the filter pump control five quick-select buttons appear in the menu that allow to activate the different filter pump modes:



The filter pump should first be manually set to the different operating modes with the buttons - eco / normal / high - in order to check whether the control is carried out as desired.

To automate the pump control afterwards, program the "Programmable timer" as desired and then select the Mode of operation "Auto" by pressing the corresponding quick-select button.

- Menu ➔ Add-on functions ➔ Filter pump ➔ Programmable timer:
  - Programming of the desired filter periods
  - Please note: In all periods where no mode of operation is programmed, PoolManager® will switch the filter pump off.



4.3 Safety settings

To make the operation of the filter pump more convenient, some security mechanisms can be deactivated in the "Safety settings" menu:

Here you can enable the display of the quick-select buttons for the filter pump in the Mode menu as well as in the context menu.

The operating mode of the filter pump can then be easily changed at any time in the Mode menu or in the context menu. The Mode menu can be called up with the Mode hotkey. The context menu is called up by tapping on the 'Filter pump' field in the PoolManager® Home view.

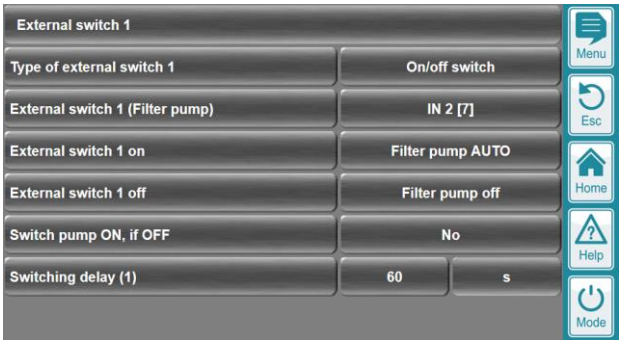
The code queries for the mode menu or the context menu can be deactivated as follows:

- Menu ➔ User management ➔ Mode menu configuration
  - User level for Mode menu = Guest (Level 0)

- Menu ➔ User management ➔ Context menu configuration
  - User level for context menus = Guest (Level 0)

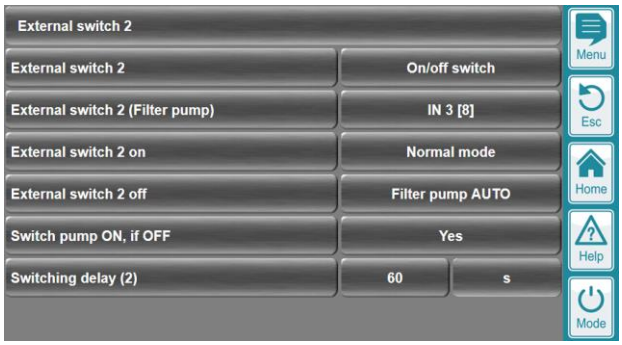
If you want to remove all safety restrictions, you can use the corresponding button at the bottom of the menu.

4.4 Protection against dry running (forced shut-off of filter pump) by float switch at IN 2 [terminal 7]



- Connect external switch signal (volts-free contact!) respectively float switch for forced switch off of the filter pump on input **IN 2 [terminal 7]**
- With low water level: Volts-free contact open (off) => Forced switch-off (reverse configuration is also possible)
- Menu filter pump ➔ Basic configuration ➔ External switches
- Menu „External switch 1“
  (External switch 1 has highest priority, External switch 6 has lowest priority => highest priority for forced switch off)
- External switch 1 (Filter pump) = **IN 2 [7]**
  (the input to which the external control signal for forced switch off is connected must be selected here)
- Type of external switch 1 = On/off switch
- External switch 1 on = Filter pump AUTO
  (If the volts-free contact is closed ("on"), the timer or manual control takes over the control and there is no forced switch-off).
  External switch 1 off = Filter pump off
  (If the volts-free contact is open ("off"), the filter pump is switched off, i.e. a forced switch-off occurs).
- Switch delay (1) = XXX s
  A switching delay for the float switch can be set here. The filter pump is only switched off or switched on again when the float switch remains open or closed for at least XXX s. This prevents the filter pump from being constantly switched off and on again due to waves.

4.5 Overflow protection (forced switch on of the filter pump) by float switch on IN 3 [terminal 8]



- Connect the external control signal (volts-free contact!) or float switch for the forced activation of the filter pump to input IN3 [terminal 8]
- At high water level: volts-free contact closed (on), forced switch-on (reverse configuration is also possible)
- Menu filter pump ➔ Basic configuration ➔ External switches
- Menu „External switch 2“
  (External switch 1 has highest priority, External switch 6 has lowest priority)
- External switch 2 (filter pump) = **IN 3 [8]**
  (the input to which the external control signal for forced activation is connected must be selected here.)
- Type of the external switch 2 = On/off switch
- External switch 2 on = Normal mode (or Increased mode)
  (If the volts-free contact is closed ("on"), the filter pump is switched on, i.e. a forced switch-on occurs).
- External switch 2 off = Filter pump AUTO
  (If the volts-free contact is open ("off"), the timer or manual control takes over the control and there is no forced switch-on).
- Switch pump ON, if OFF = Yes
  The pump will also be switched on, if it is currently off due to the timer programming. If this is set to „No“, the pump will not be switched on, if it is currently off. Instead, only the speed may be changed, in case the pump is already running.
- Switch delay (2) = XXX s
  A switching delay for the float switch can be set here. The filter pump is only switched off or switched on again when the float switch remains open or closed for at least XXX s. This prevents the filter pump from being constantly switched off and on again due to waves.

4.6 Level control

Automatic water refill with float switch and magnetic valve on relay output OUT1 [terminal 26]

4.7 Installation

- Selection of a switching output for connection of the solenoid valve. The valve is controlled with 230 V~. The connection is made **e.g. to OUT1 [terminal 26]** as follows
- Connection variant 1, please see below in document
- Wire bridge from [26 L_F] (bottom) to [26 a] (middle) to connect 230 V~ to the relay contact.
- Connect the phase L of the solenoid valve (usually a brown cable) to terminal [26b] (top).
- Connect the neutral conductor N of the solenoid valve (usually a blue cable) to the blue terminal [28] (N_F). The 3 terminals [28] are all equivalent.
- Connect the PE protective conductor of the solenoid valve (usually a yellow-green cable) to the green terminal [29] (PE). The 3 terminals [29] are all equivalent.

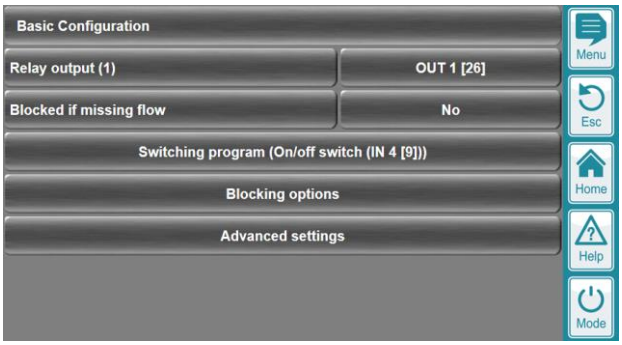
The connection to other switching outputs can be made according to the same principle.

- Connection of the float switch in the skimmer or in the balance tank to one of the PoolManager® inputs, e.g. IN 4, terminal [9].

4.8 Configuration in the menu

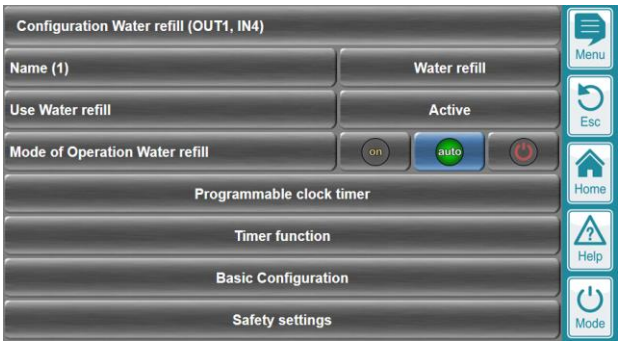
The automatic water refill is controlled via one of the switching outputs in the "Add-on functions" menu , e.g. switching output “Universal 1” at the top left of the "Add-on functions" menu (switching output “Universal 1” in the menu can be linked to relay output OUT 1, terminal [26] or any other relay output). The following settings are then made for switching output “Universal 1”:

- Assignment of the relay switching output used for the solenoid valve for water refill:
  - Menu ➔ Add-on functions ➔ Universal 1 ➔ Basic configuration
  - Relay output (1) = **OUT 1 [26]**



- Set the designation of the switch output:
  - Menu ➔ Add-on functions ➔ Universal 1
  - Name (1) = Water refill
- Activation of switch output “Universal 1”:
  - Menu ➔ Add-on functions ➔ Water refill (Universal 1)
  - Use Water refill = Active
- Set the Mode of Operation:

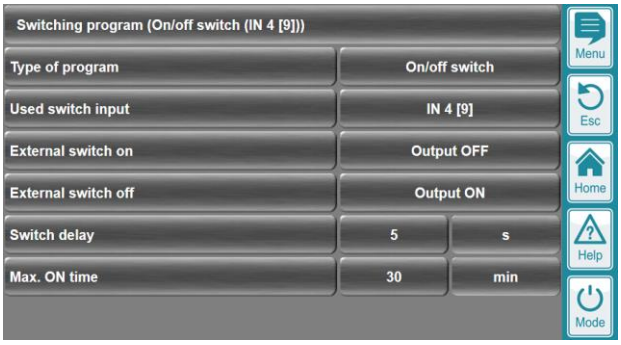
  The mode of operation can now be set to "Auto" using the quick-select buttons that appear after activation (“Auto” enables automatic activation by the float switch)



4.8.1 Activation by volts-free input

Now we have to make sure that the water refill is automatically switched on by the float switch which is connected e.g. to IN 4 [9]. We use a float switch with a contact that opens when there is a lack of water. However, it is also possible to use float switches with a contact that closes when there is a lack of water.

The control of a switch output by an external switch (in this case by the float switch) can be configured in the menu
"Basic configuration ➔ Switching program".
(up to software version 7.4.2:
"Basic configuration ➔ external switch or button“).



- Type of program = On-/off switch
- Allocation of used input IN 4 [9] for the external switch:
  - Water refill (Universal 1) ➔ Basic configuration ➔ Switching program
  - Used switch input = IN 4 [9]
- The float switch opens when there is lack of water, i.e. when the water level is sufficient, it is closed (switched on).
- In this case - sufficient water in the pool - the solenoid valve must switch off. This is configured as follows

  External switch on ⇒ Output OFF

  "External switch on" here means "enough water in the pool". "Output OFF" means that in this case the solenoid valve is switched off (closed).

- If there is lack of water, the float switch opens, i.e. it switches off. In this case, the water refill must be switched on.:

  External switch off ⇒ Output ON
- Now the float switch at IN 4 [9] controls the solenoid valve for the water refill at OUT 1 [26]. When the float switch opens, the PoolManager® switches the solenoid valve on, and vice versa.

4.8.2 Switch delay

If there are waves in the pool it may happen that the float switch constantly opens and closes. This would also result in a continuous opening and closing of the valve for the water refill. This would reduce the life time of the valve as well as it would cause noise nuisance due to constant switching.

In order to prevent that there is the setting "Switch delay". Setting such delay causes that the relay only is switched when the external switch is in a constant state for the given number of seconds, either "on" (closed) or "off" (open).

Constantly changing states have no more effect. Usually a setting of a few seconds is sufficient e.g. Switch delay = 10s.

If the float switch switches, the solenoid valve for the water refill reacts only with a delay of 10s.

If, for example, the float switch changes its state every 5s, the solenoid valve does not react and remains in its current position (open or closed).

4.8.3 Time limit of the water refill

For safety reasons, it is possible to limit the time of the automatic water refill, e.g. in the case of a hanging float switch.

For this purpose, the parameter "Max. ON time " can be set accordingly, e.g. to 60 minutes.

If the float switch remains active until the set "Max. ON time" is exceeded, the PoolManager® automatically stops the water refill and reports an alarm "Max. ON time Water refill" (also by e-mail, if activated). In this case, the water refill is only continued after manual confirmation of the alarm.

If no time limit for the water refill is desired, simply set the "Max. ON time " parameter to 0 minutes.

4.9 Appropriate float switches

In principle, any float switch with a simple volts-free switching contact is usable. The description above refers to a normally open contact, i.e. the contact closes when the float is up (when it floats).

A normally closed contact can also be used if the menu configuration is adapted accordingly.

The BAYROL Technik float switch used in the suction lances has been tested in practice already. Other float switches may be used at one´s own discretion.

5 Besgo bar valve for automatic backwash at relay output OUT2 [terminal 27]

The automatic backwash can be implemented via one of the universal switching outputs, e.g. switching output “Universal 2”. (2nd icon at the top left of the "Add-on functions" menu.

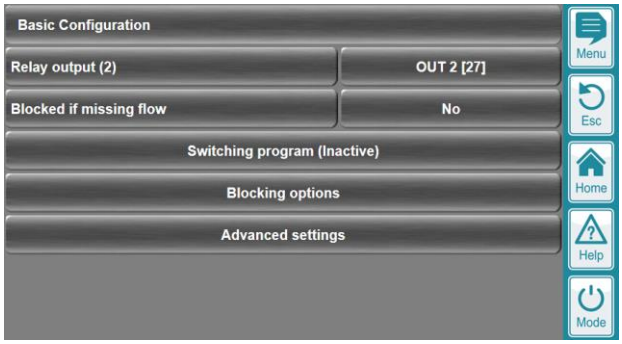
5.1 Electrical Connection at the PoolManager®

- Selection of a switching output for the connection of the besgo bar valve. The valve is controlled with 230 V~. The connection is made e.g. at **OUT 2 [terminal 27]** as follows:
- Connection variant 1, see below in document
- Bridge from [27 L_F] (lower) to [27 a] (middle) to connect 230 V~ to the relay contact.
- Connect the phase L of the besgo valve (usually a brown cable) to the terminal [27b] (top)
- Connect the neutral conductor N of the besgo valve (usually a blue cable) to the blue terminal [28] (N_F).
  The 3 terminals [28] are all equivalent.
- Connect the PE conductor of the besgo valve (usually a yellow-green cable) to the green terminal [29] (PE).
  The 3 terminals [29] are all equivalent.

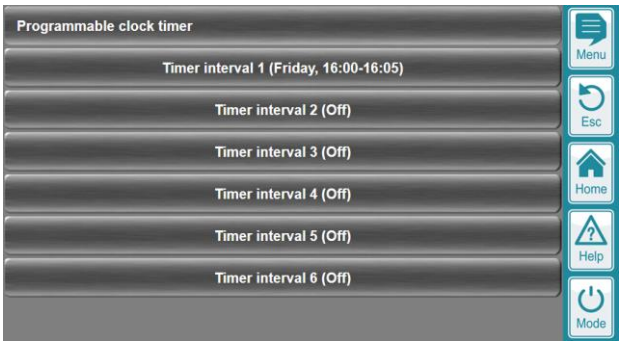
The connection to other switching outputs can be made according to the same principle.

5.2 Menu-Configuration at the PoolManager®

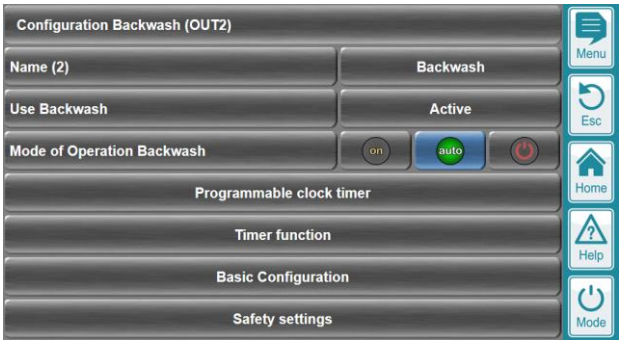
- Menu ➔ Add-on functions ➔ Universal 2:
  - Name (2) = Backwash (or any other designation)
- Menu ➔ Add-on functions ➔ Backwash (Universal 2) ➔ Basic-Configuration:
  - Relay output (2) = OUT 2 [27]



- Menu ➔ Add-on functions ➔ Backwash (Universal 2) ➔ Basic-Configuration:
  - Blocked if missing flow = No
- Menu ➔ Add-on functions ➔ Backwash (Universal 2) ➔ Programmable clock timer:
  - Programming of the desired times for the backwash, e.g. Friday, 16:00 - 16:05.



- Menu ➔ Add-on functions ➔ Backwash (Universal 2):
  - Use Backwash = Active
- Menu ➔ Add-on functions ➔ Backwash (Universal 2):
  - Quick-select buttons: Mode of operation Backwash = auto (hands over the control to the programmed timer)



Only for variable speed pumps (VSP):

To set the filter pump to the highest level during backwashing, a dependency on the used backwash output can be programmed in the filter pump menu:

- Menu ➔ Add-on functions ➔ Filter pump ➔ Basic Configuration ➔ External switches ➔ External switch 3:
  - Type of external switch 3 = Other Output
  - Other Output = OUT 2 [27] (output of Backwash)
  - External switch 3 on ⇒ Increased mode (increased power of the filter pump during backwash)
  - External switch 3 off ⇒ Filter pump AUTO (when there is no backwash filter pump runs in regular automatic mode)
  - Switch pump ON, if OFF = Yes (if pump is switched off it will be activated by a pending backwash)

6 LED at relay output OUT3 [terminal 30]

The LED lights can be controlled via one of the universal switching outputs, e.g. “Universal 3” (3rd icon at the top of the "Add-on functions" menu).

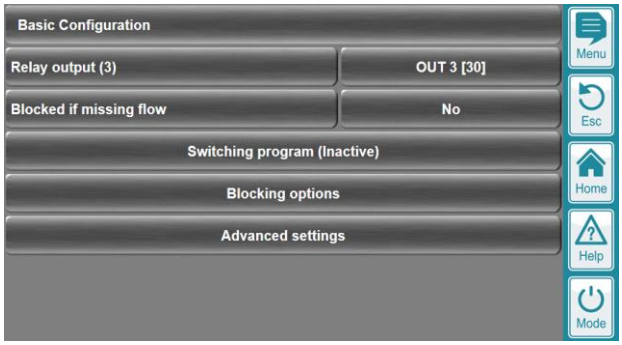
6.1 Electrical Connection on the PoolManager®

- Selection of a switching output for the connection of the function to be switched. The connection is made e.g. at **OUT 3 [terminal 30]** as follows:
- Connection variant 1 or 3 for 230 V~, connection variant 2 (volts-free) or connection variant 4 (external circuit-breaker / contactor), please see below in document
- Connection for 230 V~ (connection variant 1):
- Wire bridge from [30 L_F] (lower) to [30 a] (middle) to connect 230 V~ to relay contact.
- Connect the phase L of the function to be switched (usually a brown cable) to the terminal [30b] (top)
- Connect the neutral conductor N of the function to be switched (usually a blue cable) to the blue terminal [33] (N_F). The 3 terminals [33] are all equivalent.
- Connect the PE protective conductor of the function to be switched (usually a yellow-green cable) to the green terminal [34] (PE). The 3 terminals [34] are all equivalent.
- **If the power exceeds 250 W, it may be necessary to use a different type of connection (connection variant 3 or 4). The different connection variants are shown below.**
- **If it is not a 230 V~ system, the electrical connection must be adapted accordingly (connection variant 2 (volts-free)).**

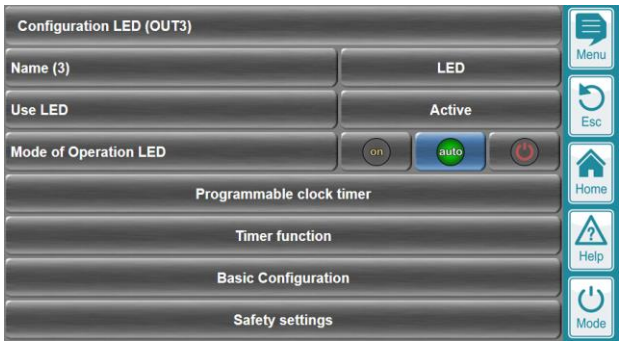
The connection to other switch outputs can be made according to the same principle.

6.2 Menu configuration at the PoolManager®

- Menu ➔ Add-on functions ➔ Universal 3:
  - Name (3) = LED
- Menu ➔ Add-on functions ➔ LED (Universal 3) ➔ Basic configuration:
  - Relay output (3) = OUT 3 [30]

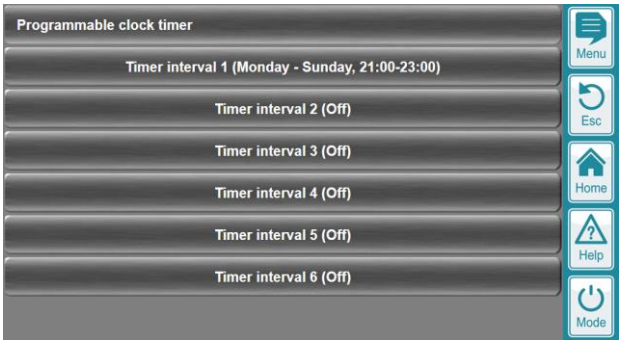


- Menu ➔ Add-on functions ➔ LED (Universal 3):
  - Use LED = Active



If the function should be switched on or off automatically at certain times, this can be set accordingly in the "Programmable clock timer" menu. It is also possible to program interval operation, e.g. to switch on every half hour for 5 minutes

- Menu ➔ Add-on functions ➔ LED (Universal 3) ➔ Programmable clock timer
  - Programming of the desired operation times



The mode of operation must be set to „auto“ in order to activate the timer (button „auto“ in the middle for the mode of operation).

- Menu ➔ Add-on functions ➔ LED (Universal 3):
  - Quick-select buttons: Mode of operation = Auto
    (hands over the control to the programmed timer)

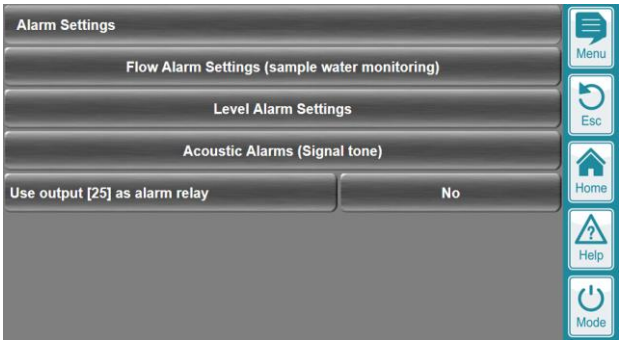
7 Heating system (e.g. pump of heating system or motor-driven valve) at output Alarm [terminal 25]

7.1 Electrical Connection on the PoolManager®

Important note:

To use the alarm output [terminal 25], the alarm relay must be released in the "Alarm settings" menu:

- Use output [25] as alarm relay = No



7.1.1 Control of the heating system

- Selection of a switch output for controlling the heating. The PoolManager® switches this output on when there is a heating demand. Depending on the heating system, it can be controlled either by connecting 230 V~ or by a volts-free control signal. The connection is made **e.g. at the relay output Alarm [terminal 25]**
- Depending on the heating system, either connection variant 1 (230 V~) or connection variant 2 (volts-free) is used (see below in the document). Only if the 230 V~ heating control requires a higher output in the kW range, it may be necessary to use connection variants 3 or 4.
- For a 230 V~ heating pump with a maximum output of a few hundred watts, connection variant 1 can usually be used.
- Some heating pumps can briefly cause very high currents at the moment of switching on. This can considerably shorten the service life of the switching relays in the PoolManager® or, in worst case, also lead to hanging (adhesive) relays which then no longer switch off.
- If necessary, clarify with the manufacturer of the heating pump whether these can be switched easily via simple relays.
- If necessary, an external circuit breaker (contactor) can be used according to connection variant 4 (see below) in order to safely avoid any potential issues.
- If necessary, it is also possible to connect an NTC resistor or a simple ohmic resistor of approx. 50 Ohm in series connection to the heating pump in order to limit the inrush current to a non-critical level.

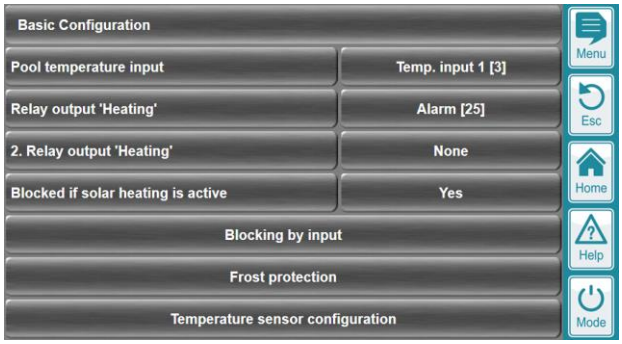
7.2 Menu configuration at the PoolManager®

- Menu ➔ Add-on functions ➔ Heating ➔ Basic configuration:
  - Relay output ‚Heating‘ = **Alarm [25]**
    (selection of output that controls the heating system)

Please note

Sometimes an additional volts-free switching contact is required for a signal to the heating system when heating is required.

In this case, another relay switching output of the PoolManager® can be assigned as "2. Relay output 'Heating' ". This can be configured as a volts-free contact according to connection variant 2.



- Menu ➔ Add-on functions ➔ Heating:
  - Selection of desired Pool Temperature Setpoint
- Menu ➔ Add-on functions ➔ Heating:
  - Heating mode of operation = Auto
    (for automatic control of the temperature)

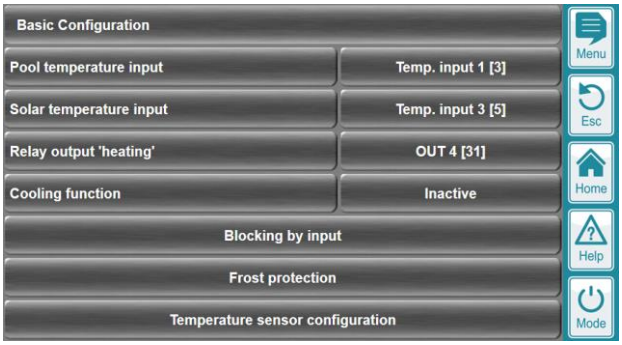
8 Solar (e.g. motor-driven valve 230 V~) at relay output OUT4 [terminals 31 / 32]

8.1 Electrical Connection on the PoolManager®

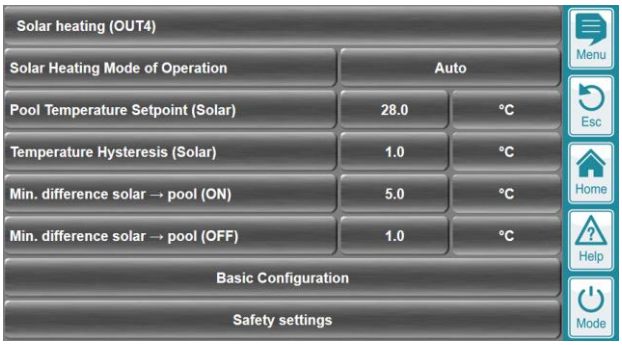
- Selection of a switch output for controlling the solar valve. The PoolManager® switches this output on when there is a need for solar heating. Motor-driven valves with 2 connections for OPEN / CLOSE can be connected to the changeover contact **OUT4 [terminals 31 / 32]**.
- The "Solar operation ON" position of the motor-driven valve is connected to the terminal block [31]
  (normally open contact (NO)).
- The "Solar operation OFF" position of the motor valve is connected to the terminal block [32]
  (normally closed contact (NC)).
- The connection variant 1 (230 V~) is used in each case (see below in the document).

8.2 Menu configuration at the PoolManager®

- Menu ➔ Add-on functions ➔ Solar heating
- Menu ➔ Add-on functions ➔ Solar heating ➔ Basic configuration:
  - Relay output „Heating“ = **OUT4 [31]**
    (selection of output that controls the solar valve)
- Additionally, the used temperature inputs are assigned here:
  - Pool temperature input = T1 (Temp. input 1 [3])
  - Solar temperature input = T3 (Temp. input 3 [5])



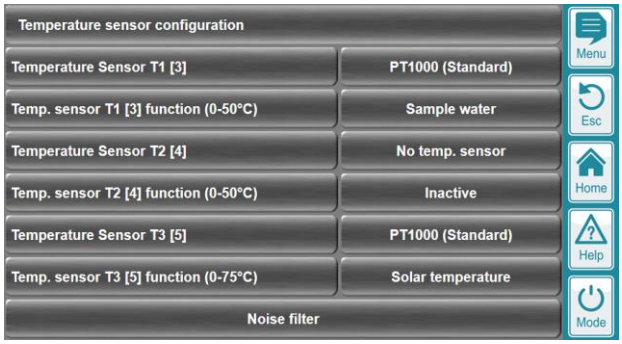
- Menu ➔ Add-on functions ➔ Solar heating:
  - Selection of desired Pool Temperature Setpoint (Solar)
- Menu ➔ Add-on functions ➔ Solar heating:
  - Solar Heating Mode of Operation = Auto
    (for automatic control of the temperature)



9 Temperature measurement

- If the heating or solar system is controlled by the PoolManager®, the water temperature can be measured with the existing temperature sensor in the measuring chamber.
- If this measurement is not accurate enough, e.g. due to influences of the ambient air temperature, a PT1000 temperature sensor can be used instead, which is installed directly in the circulation circuit or in the pool. Such standard sensors are available in electronic stores or can be ordered in the internet.
- The simplest way in this case is to disconnect the standard temperature sensor from the measuring chamber of the PoolManager® of Temp.1 [3] and connect the new PT1000 temperature sensor to this input. Then nothing needs to be reconfigured in the menu.
- Additional PT1000 temperature sensors can be connected to the temperature inputs Temp.2 [4] and Temp.3 [5].
- The **solar temperature sensor** can be connected to the **Temp.3 [terminal 5]** input, which has an extended measuring range of up to 75 °C.

The additional connected sensors are activated and configured in the following menu:
Menu ➔ Configuration Temperature ➔
➔ Temperature sensor configuration



10 Flockmatic

10.1 Electrical Connection on the PoolManager®

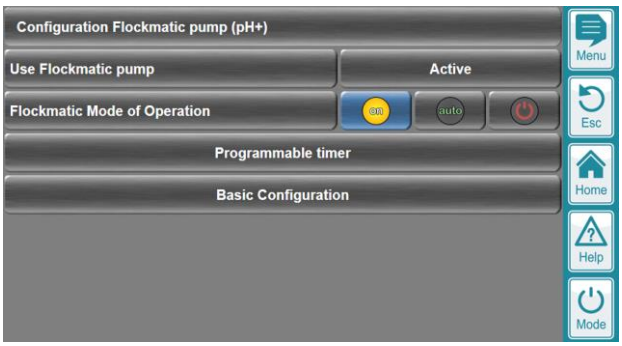
- Selection of a switch output for connecting the Flockmatic® pump. The Flockmatic® pump is controlled with 230 V~. The connection is made, **e.g. to pH+ [terminal 22]** as follows (connection variant 1, see below in the document):
- Wire bridge from [22 L_D] (bottom) to [22 a] (middle) to connect 230V~ to the relay contact.
- Connect the phase L of the Flockmatic® (usually a brown cable) to the terminal [22b] (top) in the PoolManager®
- Connect the neutral conductor N of the Flockmatic® (usually a blue cable) to the blue terminal [23] (N_D)) in the PoolManager®. The 3 terminals [23] are all equivalent.
- Connect the PE conductor of the Flockmatic® (usually a yellow-green cable) to the green terminal [24] (PE) in the PoolManager®. The 3 terminals [24] are all equivalent.

The connection to other switch outputs can be made according to the same principle.

10.2 Menu configuration at the PoolManager®

- Menu ➔ Add-on functions ➔ Flockmatic pump ➔ Basic configuration
  - Flockmatic relay output = pH+ [22]
- The other settings can usually remain unchanged if the Flockmatic® pump should run continuously while the circulation is running.

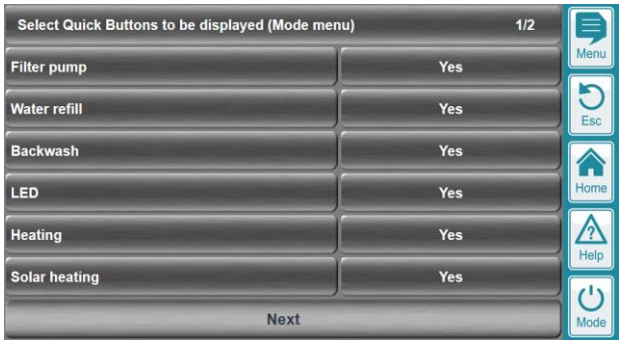
- Menu ➔ Add-on functions ➔ Flockmatic pump
  - Quick-select buttons: Flockmatic Mode of operation = on (The Flockmatic® is permanently switched on, but is automatically blocked if there is no flow)
- Alternatively, the desired switch-on times of the Flockmatic® can be set via the Programmable timer.

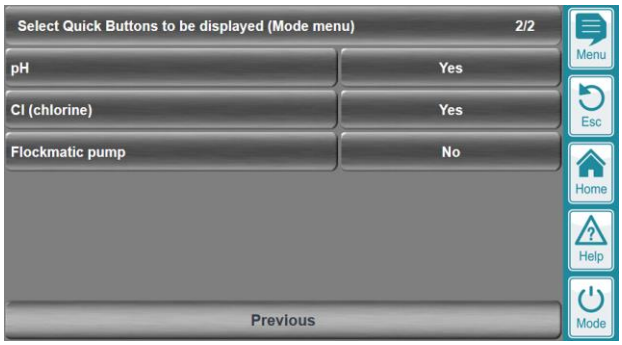


11 Mode menu

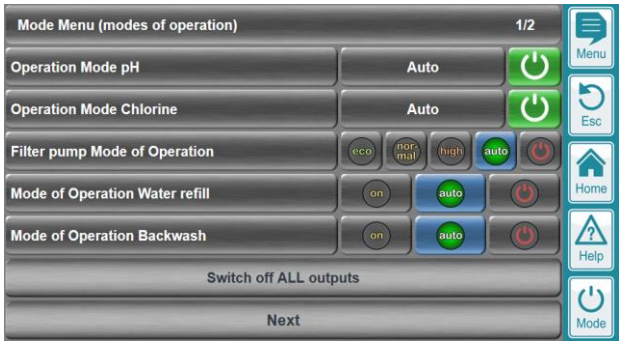
To enable switching of the various functions via the Mode menu (hotkey "Mode"), the Mode menu should be configured as follows:

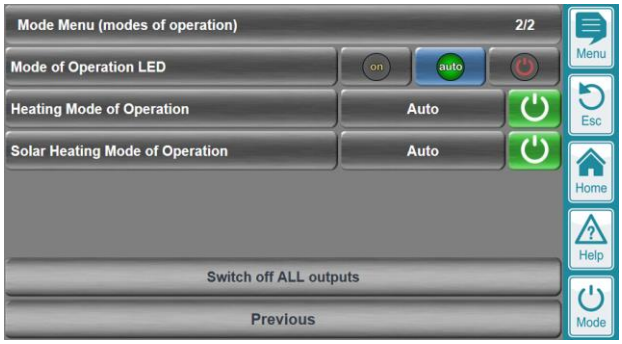
- Menu ➔ User management ➔ Mode menu configuration:



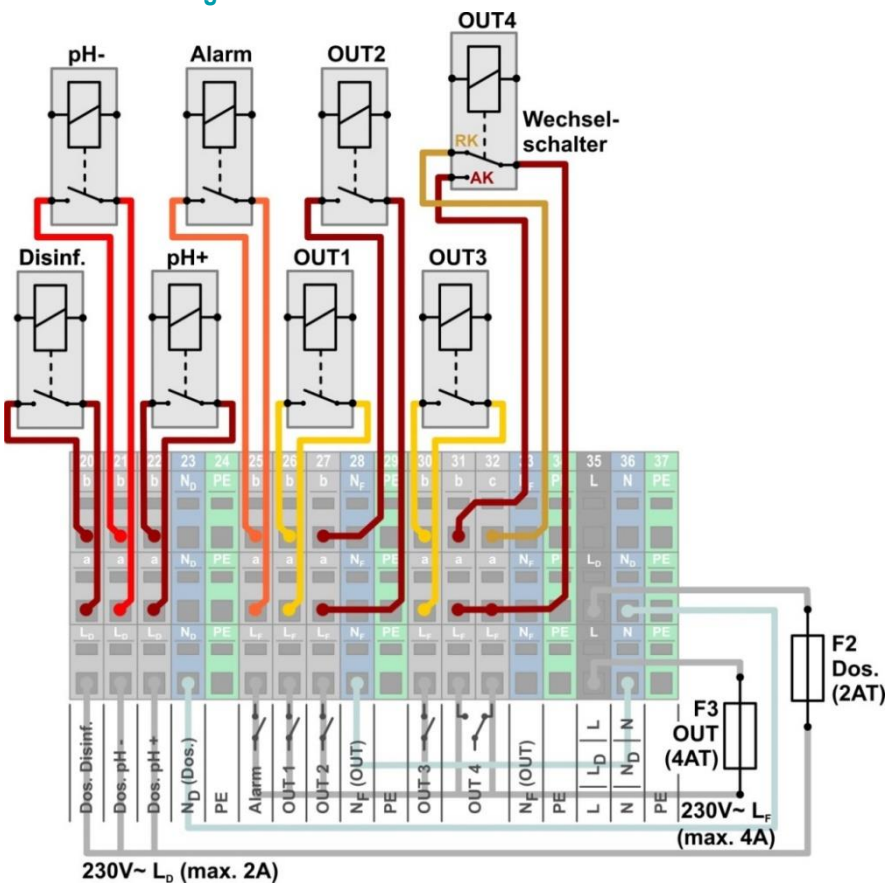


The Mode menu appears as follows:





12 Connections in the PoolManager® controller



Term	Short term	Terminal	Function
Dosing disinfection	Disinf.	[20]	Dosing pump or other devices for disinfection
Dosing pH-Minus	pH-	[21]	Dosing pump pH-Minus
Dosing pH-Plus	pH+	[22]	Flockmatic pump 230 V~ Connection variant 1 (see below)
Alarm-Relay(1)	Alarm	[25]	Control of heating Connection variant 1, 3 or 4 for 230 V~ (see below) or connection variant 2 (volts-free)
OUT1	OUT1	[26]	Valve for fresh water Connection variant 1 (see below)
OUT2	OUT2	[27]	Besgo bar valve for backwash Connection variant 1 (see below)
OUT3	OUT3	[30]	LED lights Connection variant 1, 3 or 4 for 230 V~ (see below) or connection variant 2 (volts-free)
OUT4 – normally open contact (closes when OUT4 switches ON)	OUT4-AK	[31]	Solar 230 V~ or also Solar motor-driven valve 230 V~ Position „Solar operation ON“ Connection variant 1 (see below)
OUT4 – normally closed contact (opens when OUT4 switches ON)	OUT4-RK	[32]	Free or also Solar motor-driven valve 230 V~ Position „Solar operation OFF“ Connection variant 1 (see below)

(1) Needs to be enabled for switching functions in menu “Alarm Settings”

13 Use of the universal switch inputs

The PoolManager® offers four universal switching inputs to which external volts-free switches or switching contacts can be connected:

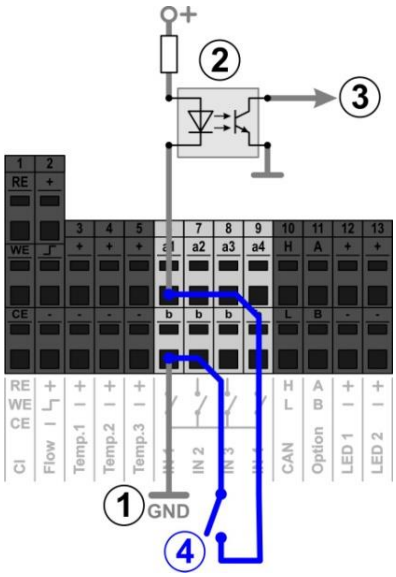
IMPORTANT NOTE!

Volts-free!

The externally connected switch or switching contact must be volts-free (voltage-free). Otherwise residual currents may occur and electronic components may be destroyed.

Universal switch input	Description	Use
IN 1 [6]	Switch input IN 1 [terminal 6]	**unused**
IN 2 [7]	Switch input IN 2 [terminal 7]	**Float switch for dry run protection**
IN 3 [8]	Switch input IN 3 [terminal 8]	**Float switch for overflow protection**
IN 4 [9]	Switch input IN 4 [terminal 9]	**Float switch for fresh water refill**

- The following figure shows the internal wiring of input IN 1.
  The other inputs IN 2...IN 4 have the same structure.



1 Internal ground connection of terminal b
(the terminals b of all four switching inputs are internally connected to ground)

2 Optocoupler for galvanic isolation (internal)

3 Signal for further internal processing

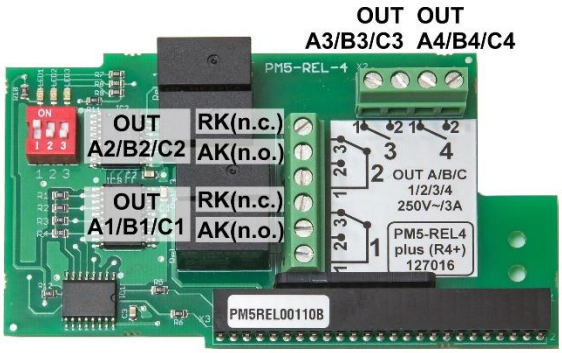
4 Externally connected volts-free switch

14 Use of the temperature inputs

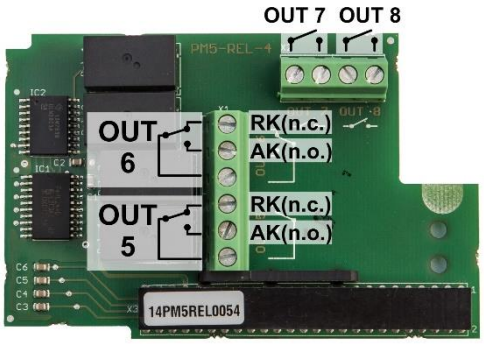
The PoolManager® offers three temperature inputs for the connection of temperature sensors type PT1000:

Temperature input	Description	Use
Temp.1 [3]	Temperature input 1 PT1000, 0-50 °C	**Pool temperature** Here the existing temperature sensor in the measuring chamber of the PoolManager® is connected as standard. For a higher measuring accuracy, a PT1000 sensor can be placed directly in the pool or in the circulation circuit if required.
Temp.2 [4]	Temperature input 2 PT1000, 0-50 °C	**Unused**
Temp.3 [5]	Temperature input 3 PT1000, 0-75 °C	**Solar temperature** Solar temperature sensor type PT1000 (not included in the PoolManager® scope of delivery)

15 Additional relay outputs on the plug-in module PM5-REL-4 plus (R4+) Ref. 127016 (optional)



PM5-REL4 plus (R4+, new version)
Up to 3 Modules per controller
RK (n.c.) = normally closed contact
AK (n.o.) = normally open contact



PM5-REL4 (elder version)
Just one module per controller,
can be combined with up to
2 PM5-REL4 plus (R4+) modules

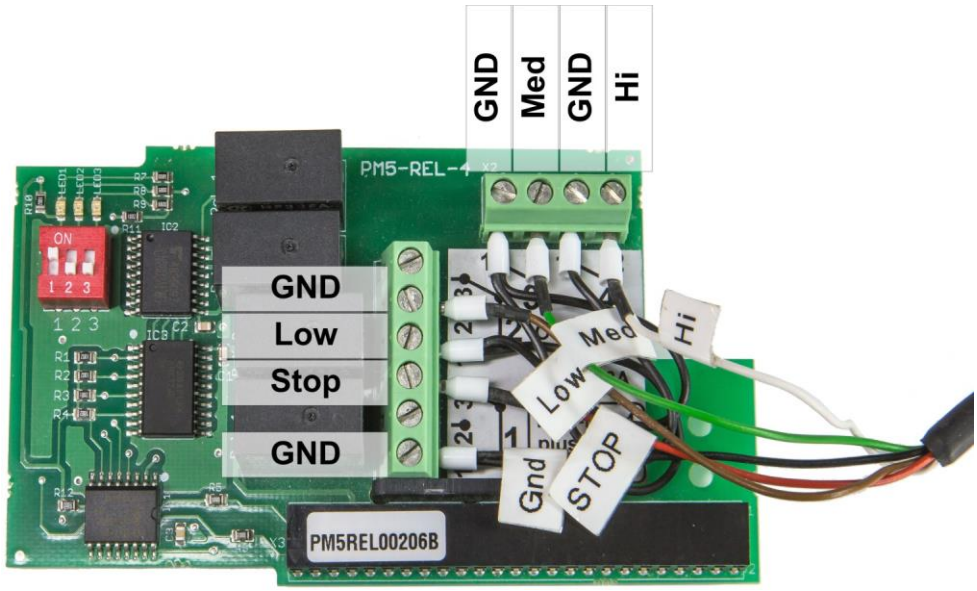
First relay plug-in module (module A, left slot)

Term	Short term	Function
OUT A1 (OUT5) – normally open contact [2] (closes when OUT A1 switches ON)	OUT A1-AK (n.o.) OUT5-AK (n.o.)	Unused
OUT A1 (OUT5) – normally closed contact [3] (opens when OUT A1 switches ON)	OUT A1-RK (n.c.) OUT6-RK (n.c.)	Badu Eco – stop contact Badu Eco – Common / GND (at middle contact [terminal 1])
OUT A2 (OUT6) – normally open contact [2] (closes when OUT A2 switches ON)	OUT A2-AK (n.o.) OUT5-AK (n.o.)	Badu Eco – Low contact / Badu Eco – Common / GND (at middle contact [terminal 1])
OUT A2 (OUT6) – normally closed contact [3] (opens when OUT A2 switches ON)	OUT A2-RK (n.c.) OUT6-RK (n.c.)	Unused
OUTA3 (OUT7)	OUT A3 OUT7	Badu Eco – medium contact / Badu Eco – Common / GND
OUTA4 (OUT8)	OUT A4 OUT8	Badu Eco – high contact / Badu Eco – Common / GND

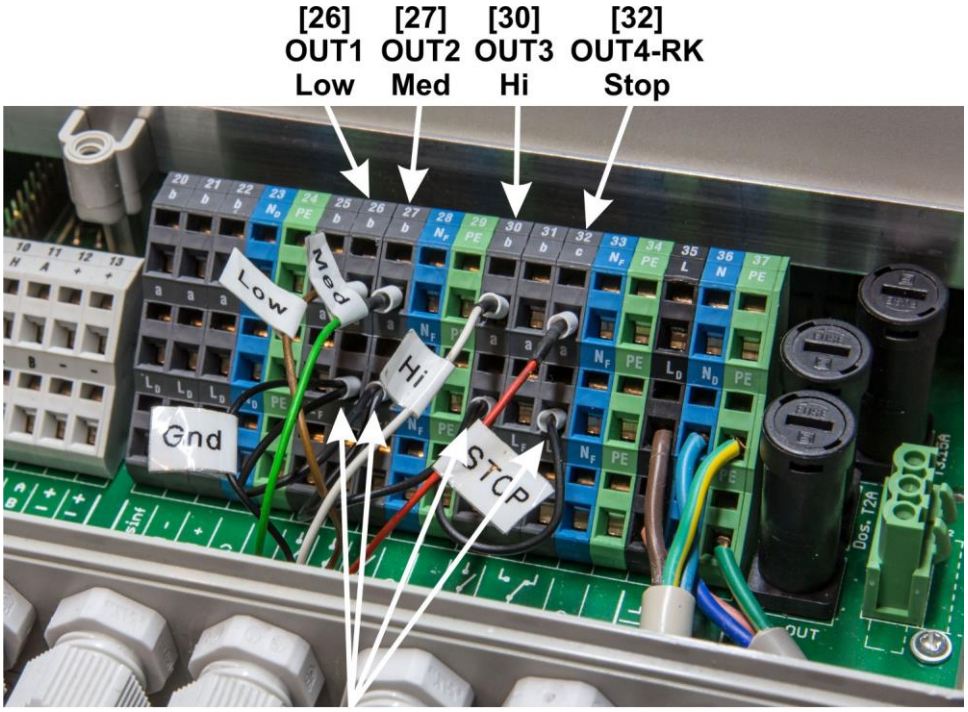
All switching outputs are volts-free and can switch the following max. voltages and currents:

3 A / 230 V~ or 3 A / 30 V DC

16 Connection of a Speck Badu Eco pump at a PM5-REL4 plus plug-in module

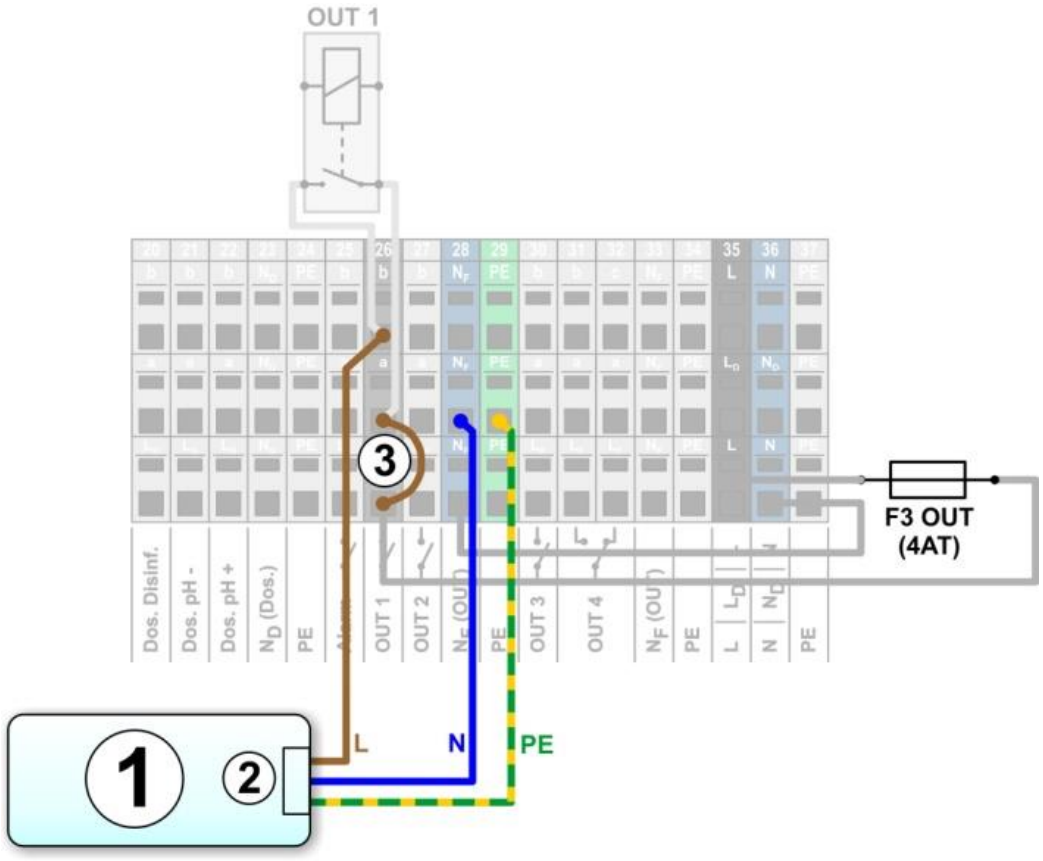


17 Connection of a Speck Badu Eco pump at the switch outputs OUT1-OUT4



GND / common distributed to all middle terminals [a]

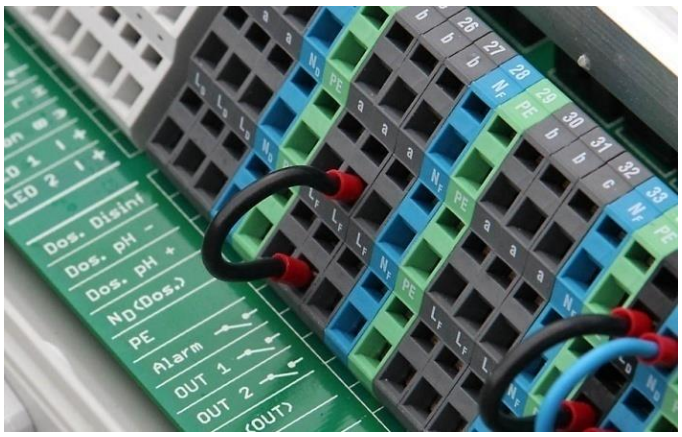
18 Connection variant 1: Switching the internal 230 V~ supply of the PoolManager®



1 External system to be controlled

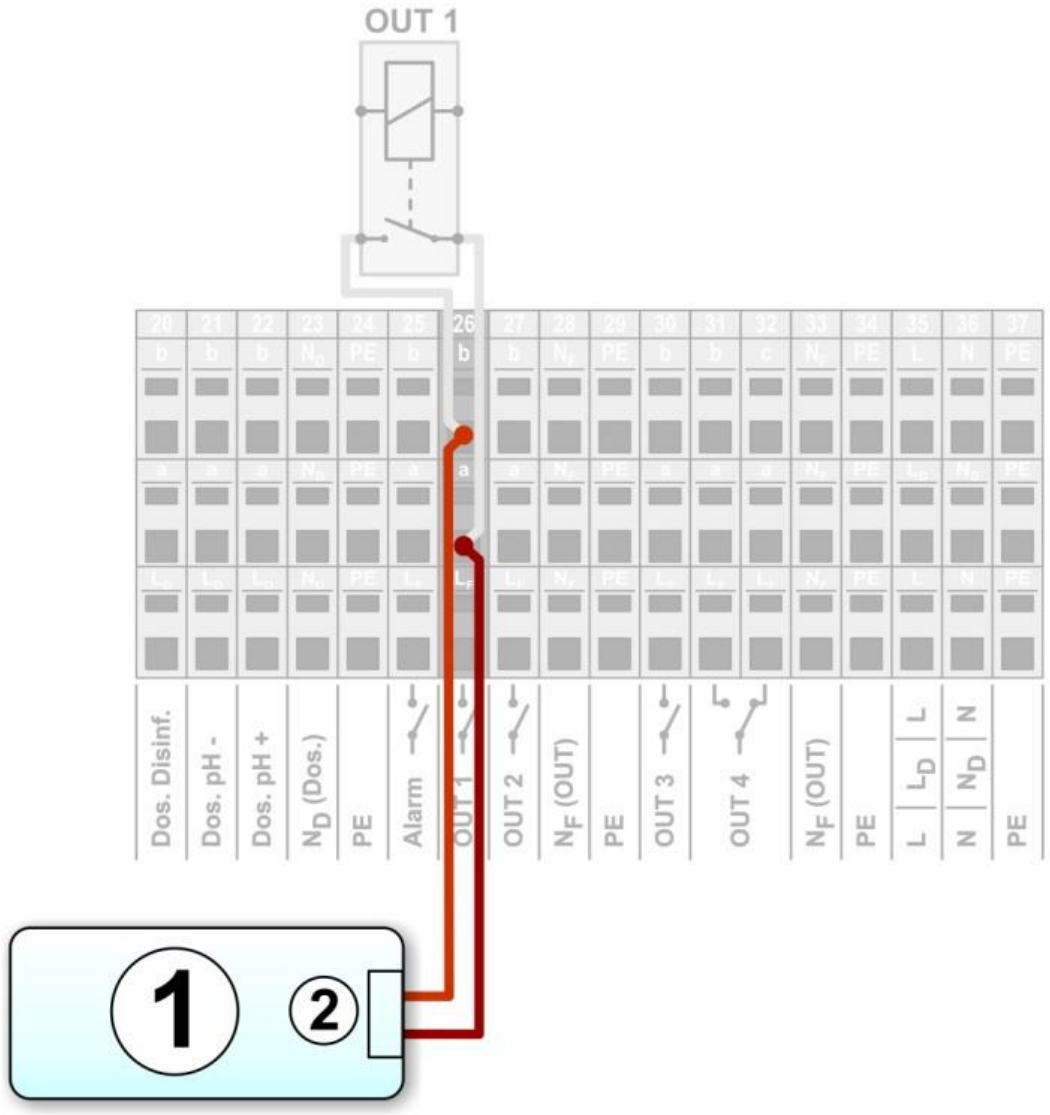
2 Power supply 230 V~ of the external system

3 Wire bridge in the terminal compartment of the PoolManager® from the phase L_F (or L_D) to the relay middle contact [a]



Max. 4 A in TOTAL for all switched outputs of the PoolManager®

19 Connection variant 2: Switching of a volts-free control signal

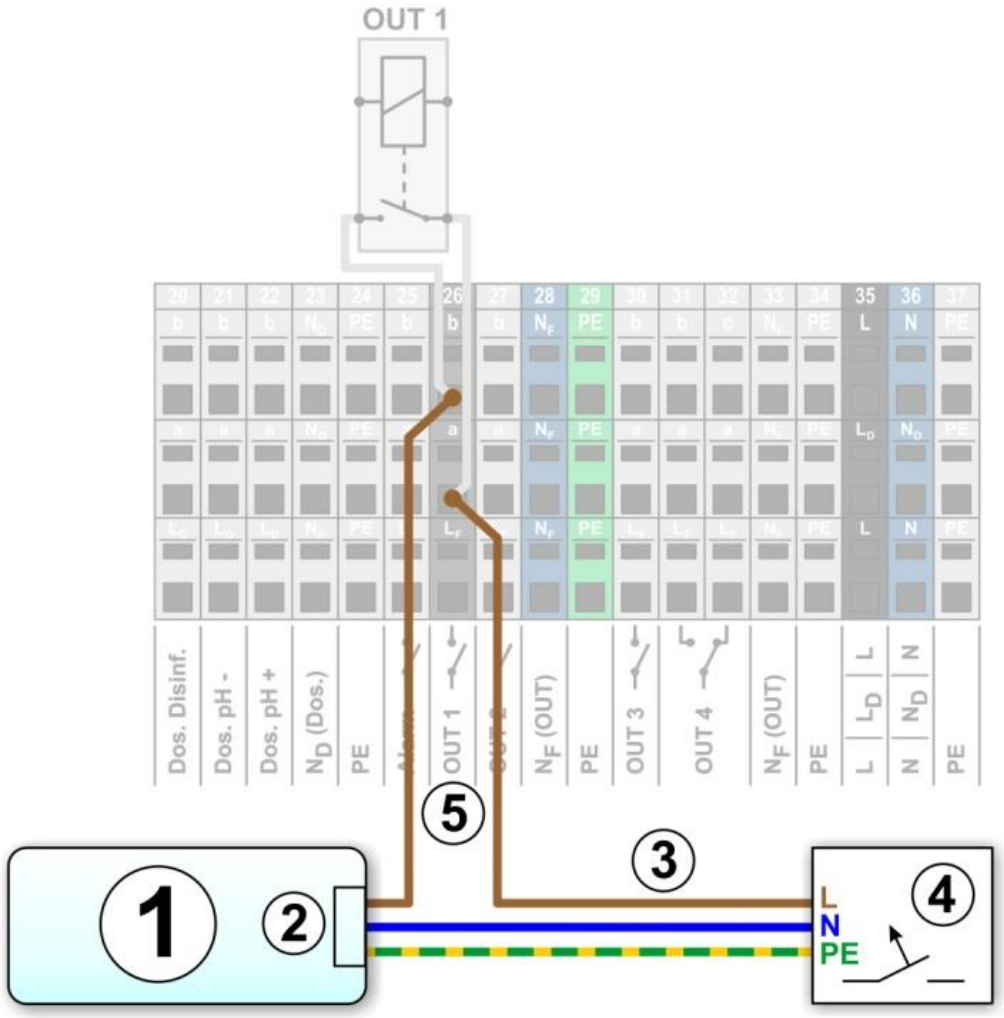


1 External system to be controlled

2 Volts-free control input of the external system

Max. 5 A PER output

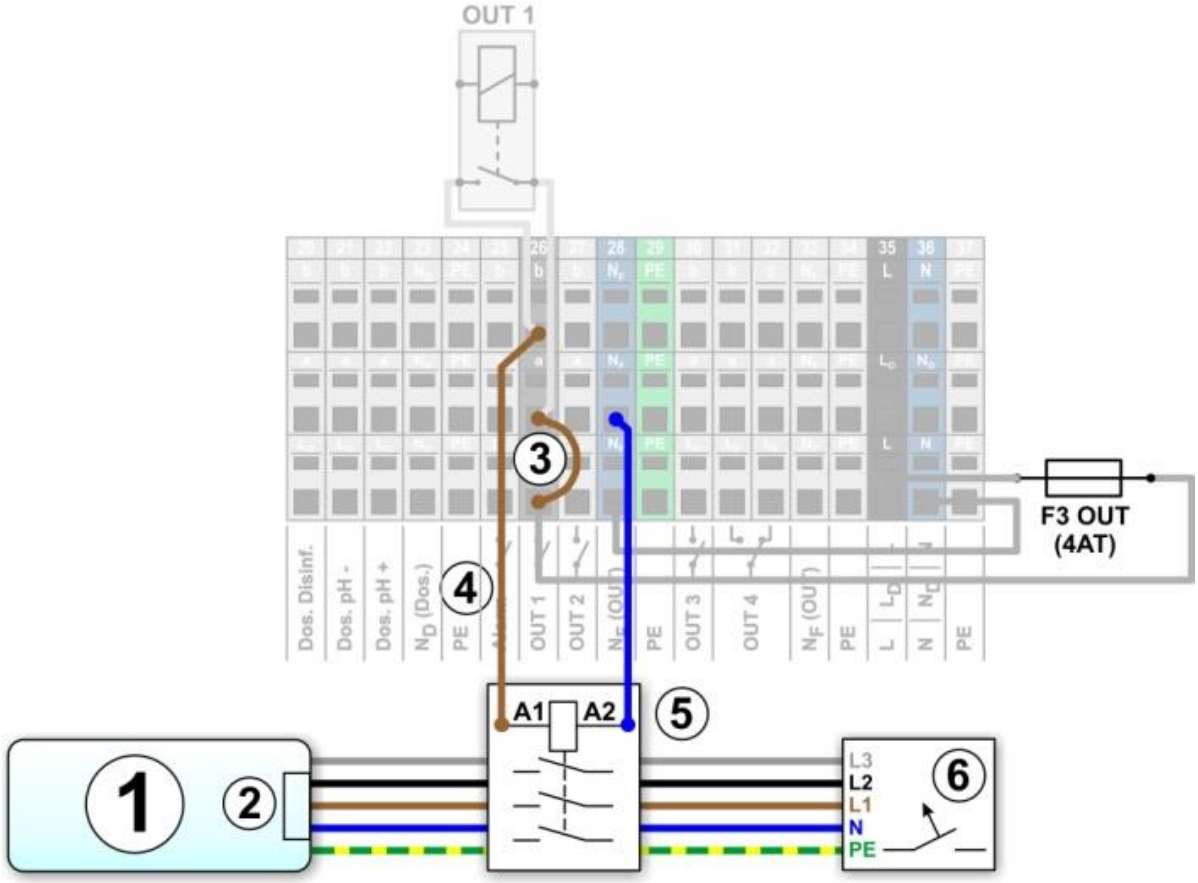
20 Connection variant 3: Switching an external 230 V~ supply



1 External system to be controlled
2 Power supply 230 V~ of the external system
3 External (on-site) 230 V~ power supply
4 External (on-site) electrical fuse protection in accordance with regional regulations
5 Switched phase L of the external (on-site) 230 V~ supply

Max. 5 A PER output

21 Connection variant 4: Switching of an external circuit breaker (230 V~ or 400 V~ contactor)



1 External system to be controlled
2 Power supply 230 V~ or 400 V~ of the external system
3 Wire bridge in the terminal compartment of the PoolManager® from the phase L_F (or L_D) to the relay middle contact [a]
4 Switched phase L_F (or L_D) for controlling the contactor coil
5 External circuit breaker (230 V~ or 400 V~ contactor)
6 External (on-site) electrical fuse protection in accordance with regional regulations

Maximum switching capacity is determined by the external circuit-breaker!