Intro:

One or multiple water cooled Opticlimates can be connected to 1 water cooler. The water cooler is an efficient way to recirculate water or a glycol-mix in a closed loop system. The fan(s) and the circulation-pump are the only parts that consume energy. The water cooler makes it possible to run Opticlimates at outside temperatures up to 40°C.

Setting up the system starts with a good design of the system. Pump-size, piping diameter and layout are the most important items when designing the system.

Selection:

nr	*Model*	*Weight*	*L x H x D*	*Sound level*	Power	Fan(s)	Fan diameter	Internal Volume
1	OC Water cooler 4,5kW Compact Ultra Light V	7kg	650x410x320	28dB(A)	0,06kW	1	350mm	2ltr
2	OC Water cooler 9 kW Compact Ultra Light V	13kg	1200x410x320	31dB(A)	0,12kW	2	350mm	4ltr
3	OC Water cooler 12kW industrial grade V	63kg	1025x933x600	32dB(A)	0,27kW	1	500mm	6ltr
4	OC Water cooler 14kW Compact Ultra Light V	19kg	1750x410x320	33dB(A)	0,18kW	3	350mm	6ltr
5	OC Water cooler 17kW industrial grade V	76kg	1025x933x600	32dB(A)	0,27kW	1	500mm	11ltr
6	OC Water cooler 18kW Compact Ultra Light V	26kg	1200x810x320	34dB(A)	0,24kW	2	350mm	8ltr
7	OC Water cooler 32kW industrial grade V	125kg	1600x983x600	40dB(A)	0,6kW	1	630mm	19ltr
8	OC Water cooler 32kW industrial grade H	125kg	1600x1050x943	40dB(A)	0,6kW	1	630mm	19ltr
9	OC Water cooler 32W Compact Ultra Light V	52kg	1750x810x320	36dB(A)	0,36kW	6	350mm	21ltr

The capacity of the water cooler has to be the same or larger than the capacity of the Opticlimate. We suggest to use a larger water cooler in warm climates.
Example; Opticlimate 15000 has a cooling capacity of 15kW and can be used with a 17kW, 18kW or 32kW water cooler. It can not be used with a <14kW water cooler.

The pump:
The circulator pump must supply a pre-defined flow at a given pressure. The flow is determined by the energy that must be circulated (KW) and the pressure depends on the pressure-drop of the complete system (Opticlimate(s) + piping + water-cooler) We always calculate the correct pump for your setup. We suggest to place the pump indoor.

The piping:
We suggest to use PE-piping with quick connectors. Prevent knees or other fittings that reduce water-flow. Fittings for PE piping are supplied with the watercooler. Piping is also available.
The water cooler:
The stock water coolers come as Industrial heavy duty or Ultra light /compact. The stock versions are all vertical models (roof/floor or wall mount).

The fittings:
Supplied fittings are for PE piping applications. We supply automatic bleeders, air separators, ball valves, treated fittings depending on your setup. You can also use other piping but we advice against PEX or similar piping that use crimp or push connectors (these restrict the flow of the water due to small diameter inside the fittings)
The Fan/pump speed control (Smartbox):

Fan and pump control are supplied as an option. The Fan/pump control comes as a set of these parts.

-Temperature sensor(s) for water temperature
-Start sensor to determine if the compressor/water valve is on or off
-Smartbox 6/3 (direct connection to fan and pump, via 1 or 2 inverters as an extra option) or 4/0 (connects to fan and pump via inverters)
-1 or 2 inverters as an extra option.

The Fan/pump control makes the system even more efficient. The fan speed of the water cooler is regulated depending on water temperature and the pump will only run when flow is required.
In cold climates glycol mix is recommended to prevent freezing and corrosion.

Before commissioning the Smartbox, check if it's set to the correct mode.
There are 4 modes

1) *Water cooler*
2) *Water cooler + Maxi control*
3) *Humidifier*
4) *Fan/aux box*

This manual is only for the mode "water cooler"

When not in mode "water cooler", press "up" a few times to find "mode setup"
Press "Enter" and use up to find "water cooler"
Press down to enter the "water cooler" mode.

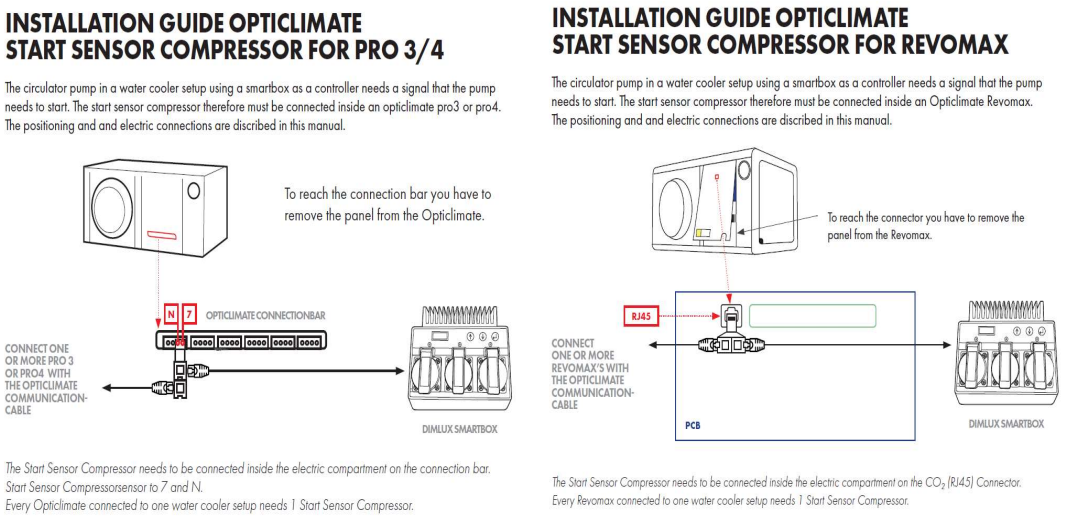
There are 4 options to control the fan and pump using a Smartbox.

1) *Smartbox 6/3 drives pump and fan direct.*
2) *Smartbox 6/3 drives fan direct and drives pump using an inverter.*
3) *Smartbox 6/3 drives pump direct and drives fan using an inverter.*
4) *Smartbox 6/3 , 4/0 or 8/0 drives both fan and pump using an inverter.*

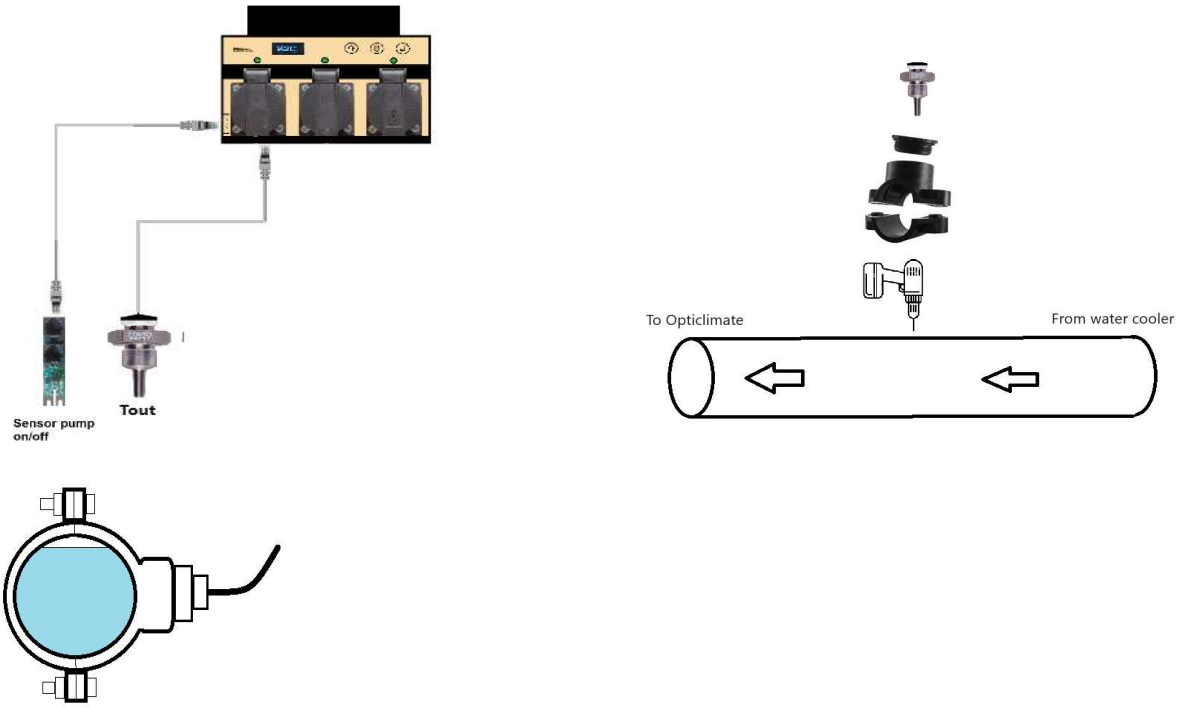
Connection Setup ***option 1,*** *Smartbox 6/3 drives pump and fan direct.*

Connect the start sensor inside the Opticlimate. The start sensor determines when the

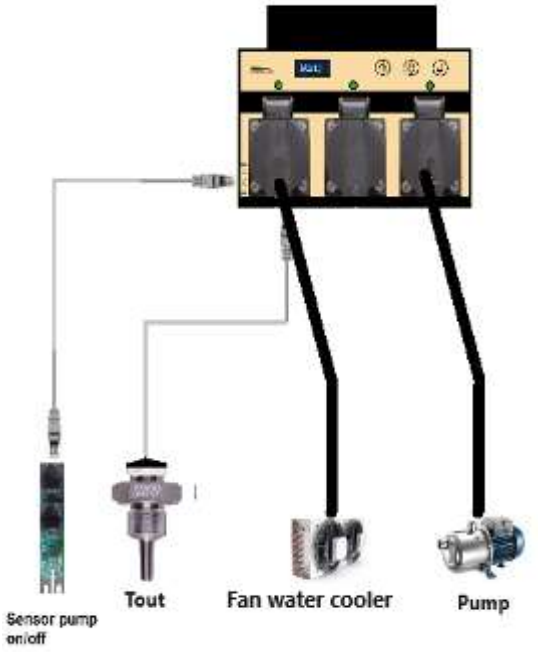
pump must start or stop. The start sensor can be connected to the 6/3 Smartbox.



Connect the water temperature sensor to P2 on the Smartbox. The other side must be connected on the water pipe going from the water cooler to the Opticlimate. The temperature of the sensor can be seen on the Smartbox as Tout.



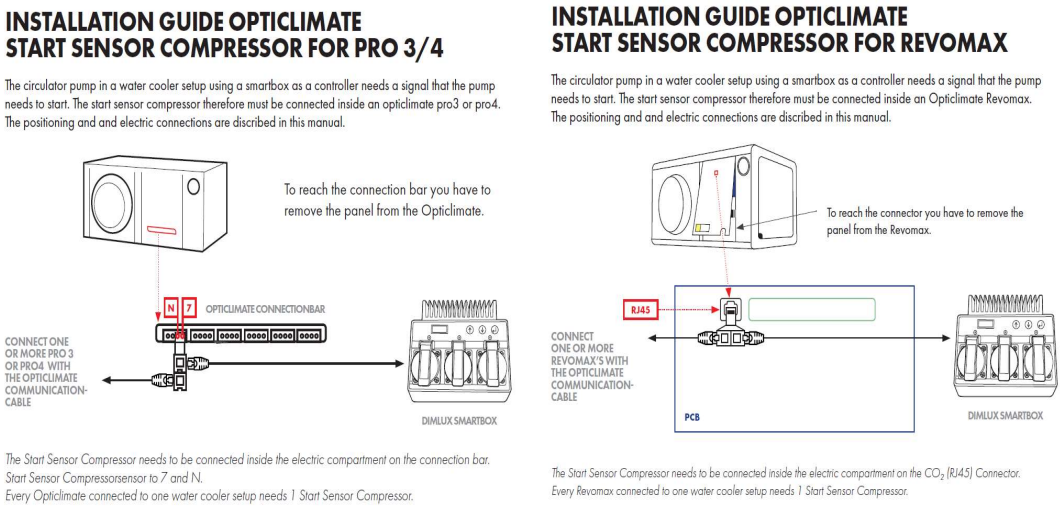
Make sure the sensor points sideways to prevent it from measuring air.



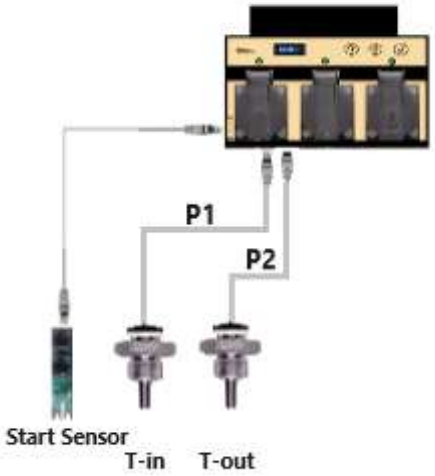
Connect the water cooler (fan) to the OUT1 outlet. (modulating)
Connect the pump to the OUT3 outlet. (on/off)

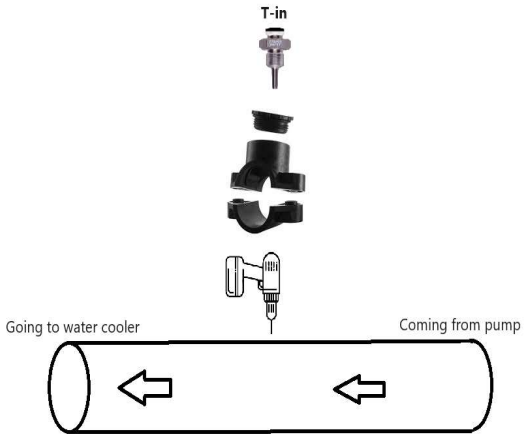
Connection *option 2,* *Smartbox 6/3 drives fan direct and drives pump using an inverter.*

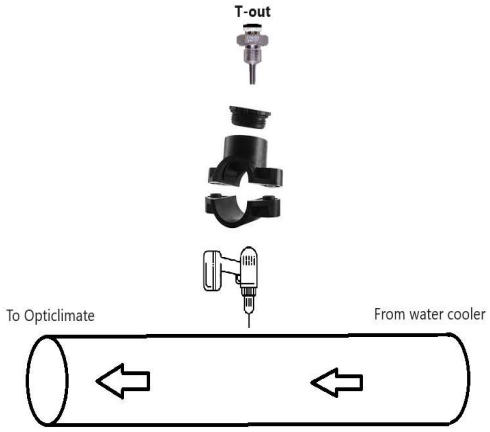
Connect the start sensor inside the Opticlimate. The start sensor determines when the pump must start or stop. The start sensor can be connected to the 6/3 Smartbox.

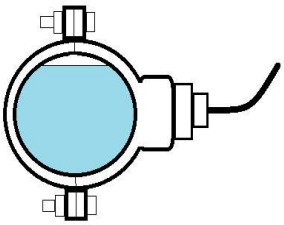


Connect the water temperature sensor T-in to P1 on the Smartbox. The other side must be connected on the water pipe going from the pump to the water cooler.
Connect the water temperature sensor T-out to P2 on the Smartbox. The other side must be connected on the water pipe going from the water cooler to the Opticlimate.

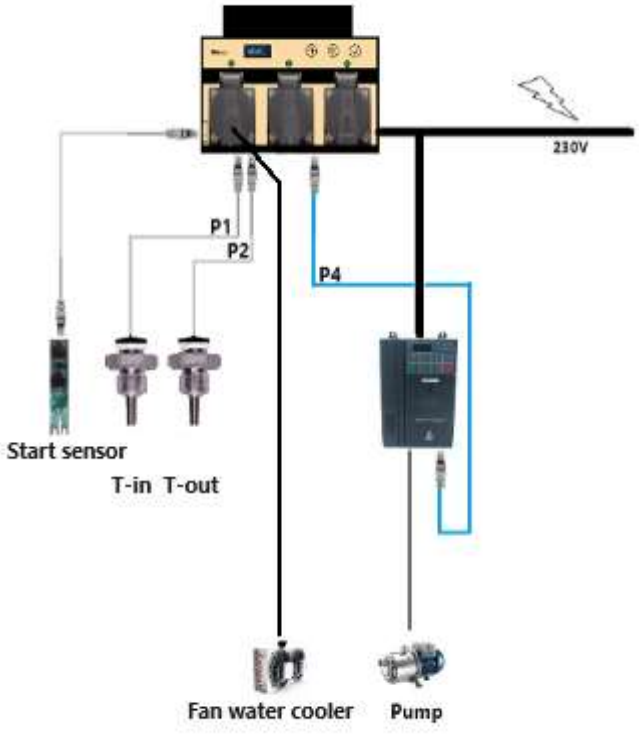




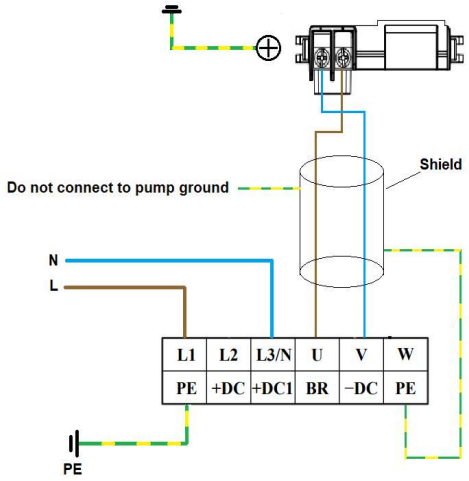




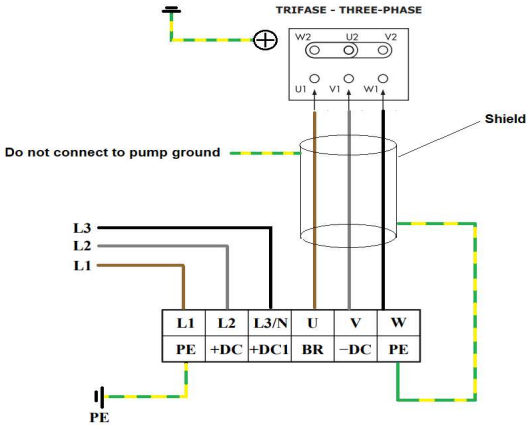
Make sure the sensor points sideways to prevent it from measuring air.



Connect the dedicated blue interlink cable to P4 and the other side to the inverter.
Be aware that the blue cable has a label on both ends. VFD-label goes to the inverter and Smart port-label goes to the Smartbox P4. The inverter will not work if the this cable is connected the wrong way around. Connect the water cooler (fan) directly into OUT1.



Single phase pump/inverter

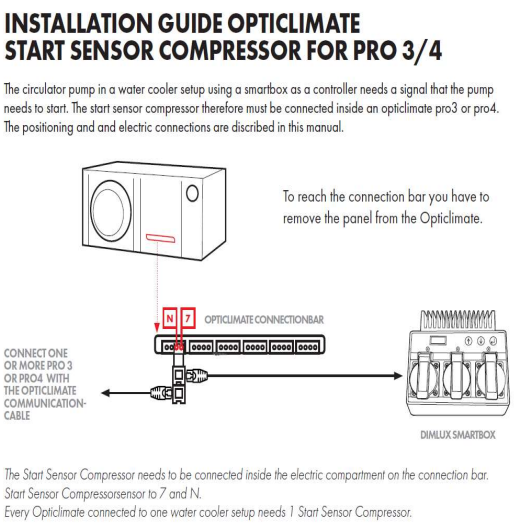


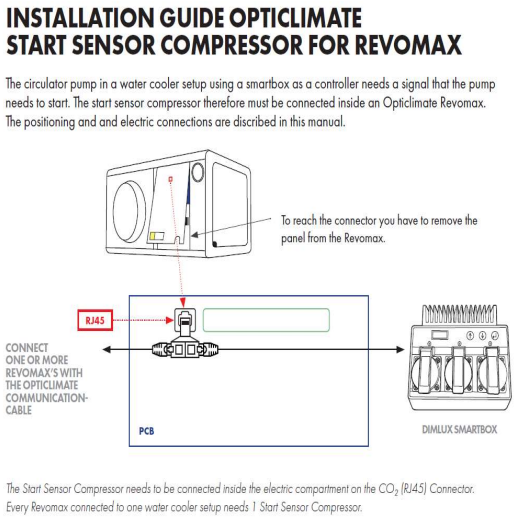
3 phase pump/inverter

Connect power supply to the inverter and wiring to the pump as shown in the diagram above.
-Use a shielded cable between inverter and pump.
-Connect ground from pump separate (not in the same cable that powers the pump)
-Keep distance between pump and inverter as short as possible.

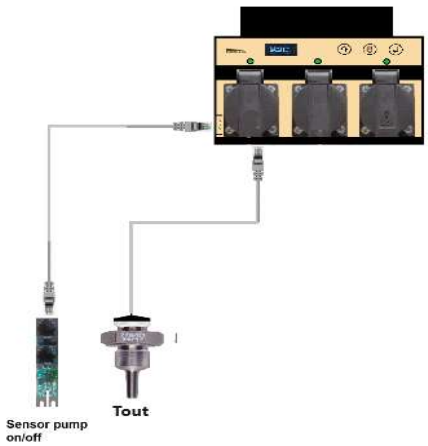
Connection Setup *option 3,* *Smartbox 6/3 drives pump direct and drives fan using an inverter.*

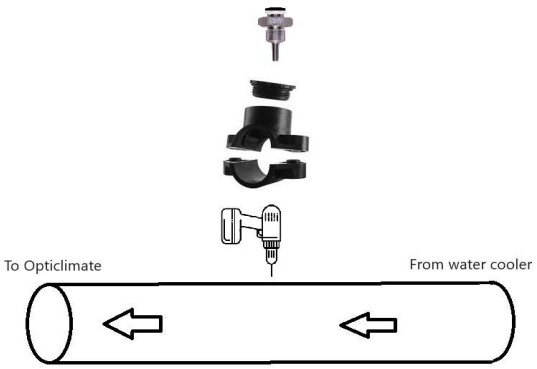
Connect the start sensor inside the Opticlimate. The start sensor determines when the pump must start or stop. The start sensor can be connected to a 6/3, 4/0 or 8/0 Smartbox.

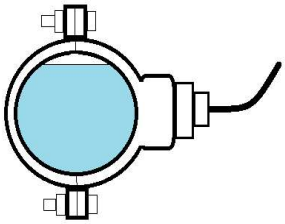




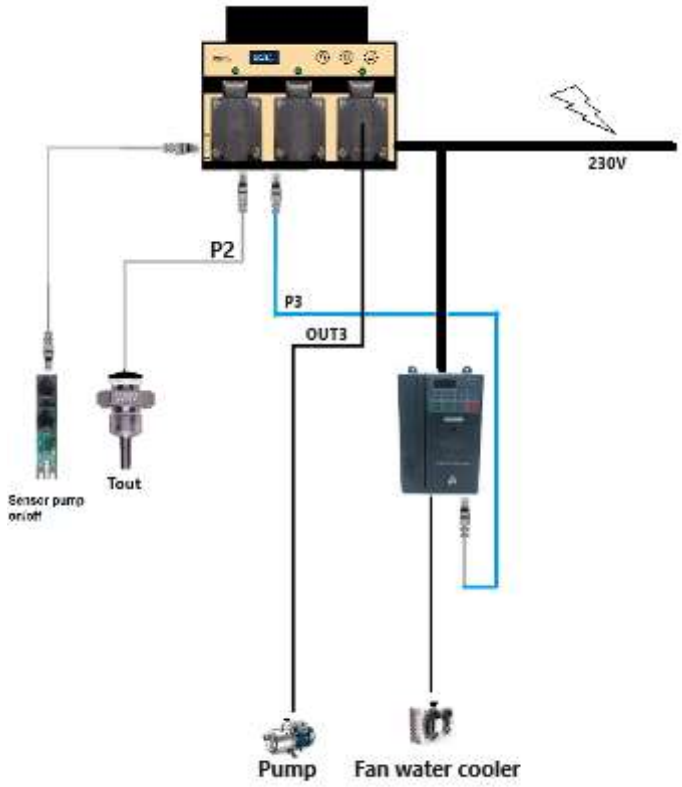
Connect the water temperature sensor to P2 on the Smartbox. The other side must be connected on the water pipe going from the water cooler to the Opticlimate. The temperature of the sensor can be seen on the Smartbox as Tout



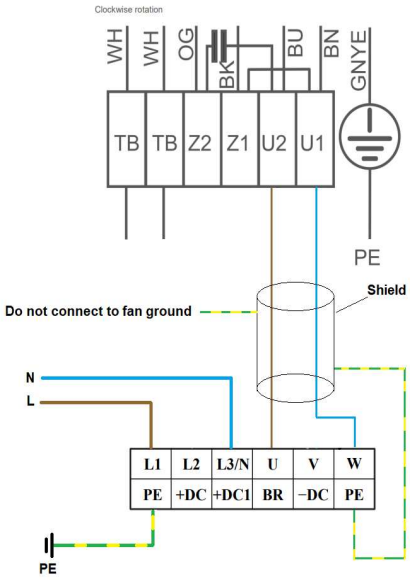




Make sure the sensor points sideways to prevent it from measuring air.



Connect the dedicated blue interlink cable to P3 and the other side to the inverter.
Be aware that the blue cable has a label on both ends. VFD-label goes to the inverter and Smartport-label goes to the Smartbox P3. The inverter will not work if the this cable is connected the wrong way around. Connect the pump direct in OUT3. (only single phase)

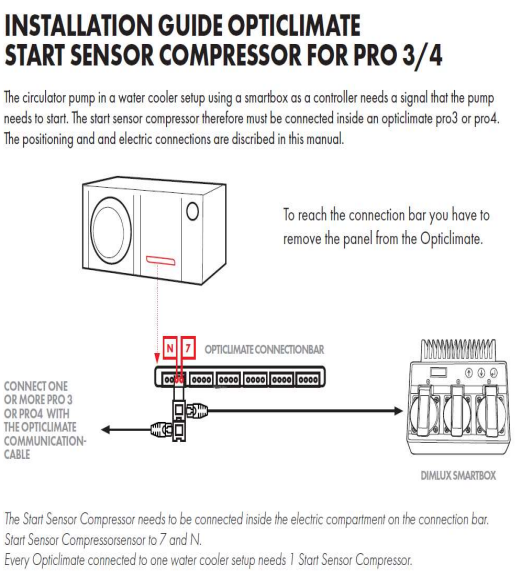


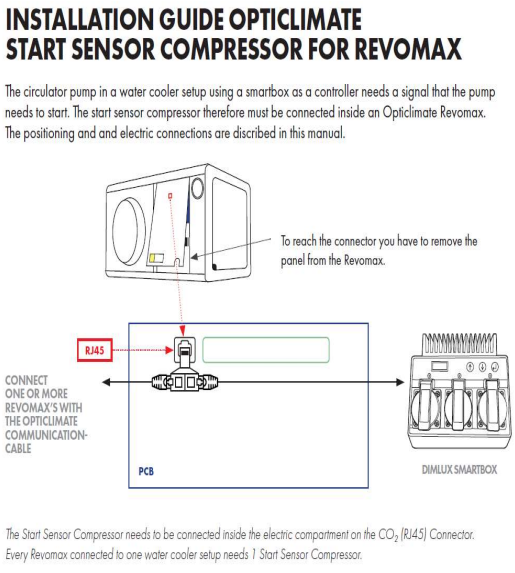
Connect power supply to the inverter and wiring to the fan as shown in the diagram above.
-Use a shielded cable between inverter and fan.
-Connect ground from fan separate (not in the same cable that powers the fan)
-Keep distance between the fan and the inverter as short as possible. (We recommend to

mount the inverter indoors.)

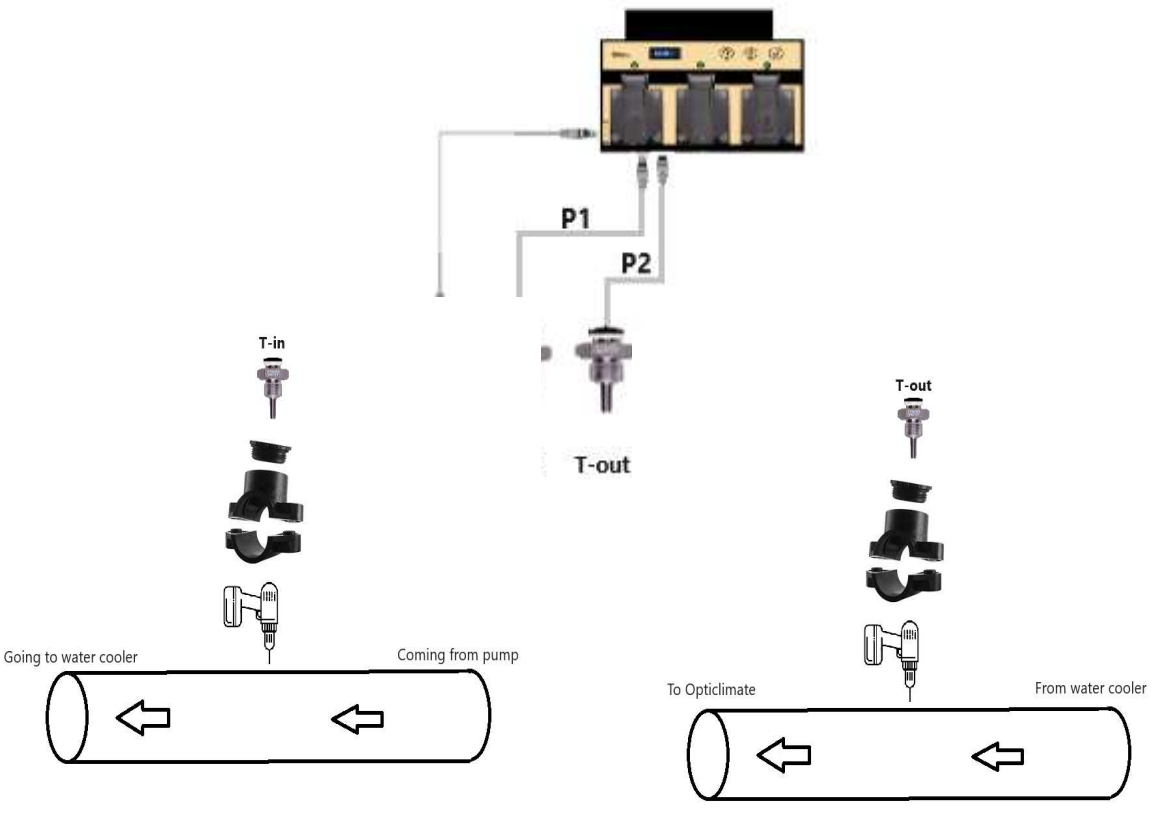
Connection Setup option 4, *Smartbox 6/3 , 4/0 or 8/0 drives both fan and pump using an inverter.*

Connect the start sensor inside the Opticlimate. The start sensor determines when the pump must start or stop. The start sensor can be connected to a 6/3, 4/0 or 8/0 Smartbox.

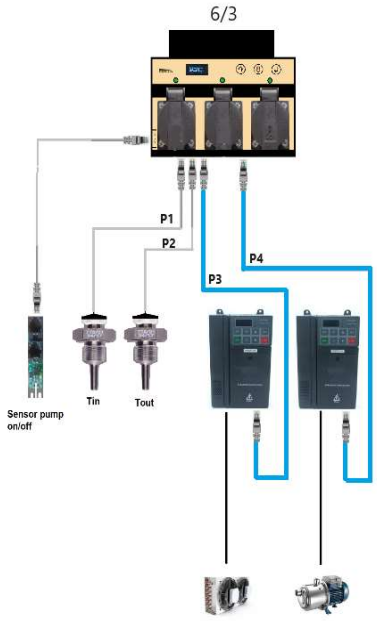


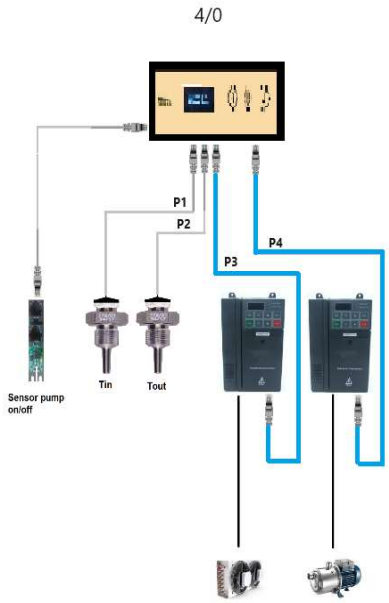


Connect the water temperature sensor T-in to P1 on the Smartbox. The other side must be connected on the water pipe going from the pump to the water cooler.
Connect the water temperature sensor T-out to P2 on the Smartbox. The other side must be connected on the water pipe going from the water cooler to the Opticlimate.

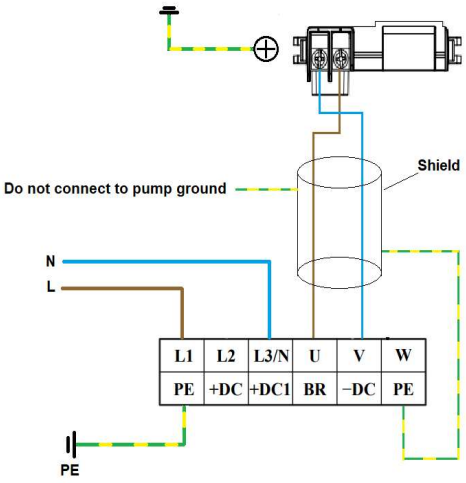


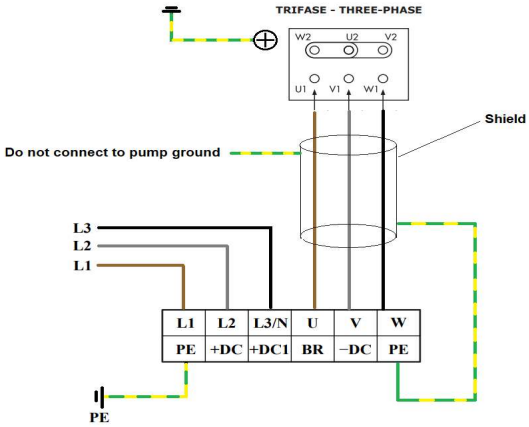
Make sure the sensor points sideways to prevent it from measuring air.





Connect the dedicated blue interlink cable to P3 and the other side to the fan inverter.
Connect the dedicated blue interlink cable to P4 and the other side to the pump inverter.
Be aware that the blue cables have a label on both ends. VFD-label goes to the inverter and Smartport-label goes to the smartbox P3 and P4. The inverter will not work if these cables are connected the wrong way around.

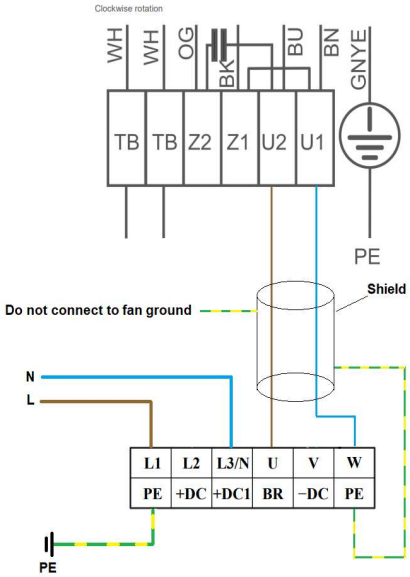




Single phase pump/inverter

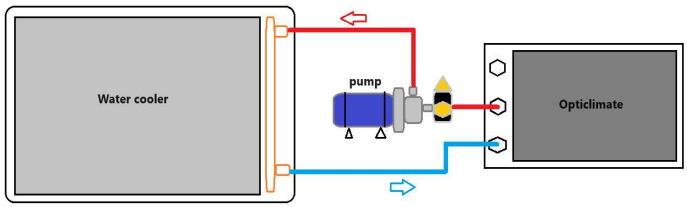
3 phase pump/inverter

Connect power supply to the inverter and wiring to the pump as shown in the diagram above.
-Use a shielded cable between inverter and pump.
-Connect ground from pump separate (not in the same cable that powers the pump)
-Keep distance between pump and inverter as short as possible. (We recommend to mount the inverter indoors.)

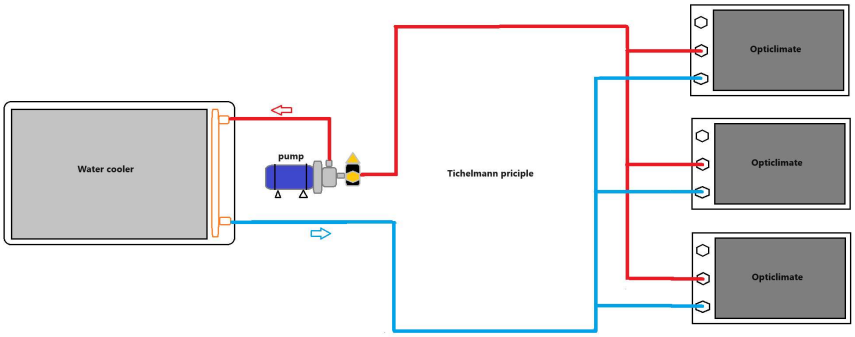


Connect power supply to the inverter and wiring to the fan as shown in the diagram above.
-Use a shielded cable between inverter and fan.
-Connect ground from fan separate (not in the same cable that powers the fan)
-Keep distance between the fan and the inverter as short as possible (We recommend to mount the inverter indoors.)

Water loop setup



Basic water loop 1 Opticlimate



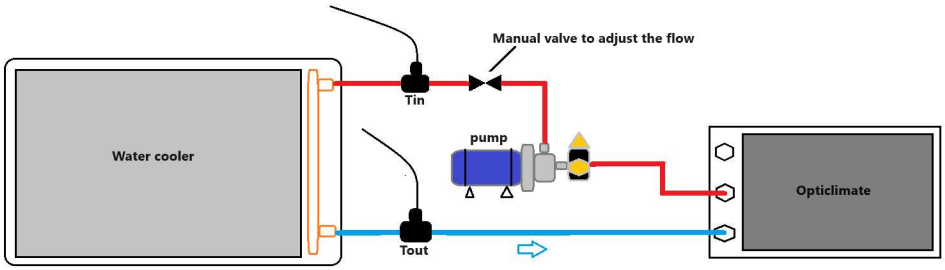
Basic water loop multiple Opticlimates

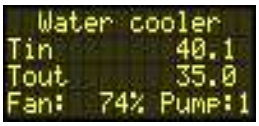
In a multiple Opticlimate setup, flow and return pipes from each individual Opticlimate must have the same lengths vs other Opticlimates in the same loop to prevent uneven water distribution.
When this not possible use valves to balance the system (PCIV valves or similar)

Flow

When using an inverter controlled pump the flow is controlled by the speed of the pump. The Smartbox receives temperatures from the flow and return and the inverter adjusts pump speed to maintain a differences (Delta) of 5°K between flow and return.

When not using an inverter controlled pump, the flow must be adjusted manual by opening or closing a valve in the water loop. The flow needs to be set so the differences between flow and return is 5°K when all Opticlimates are on and in 100% cooling mode.



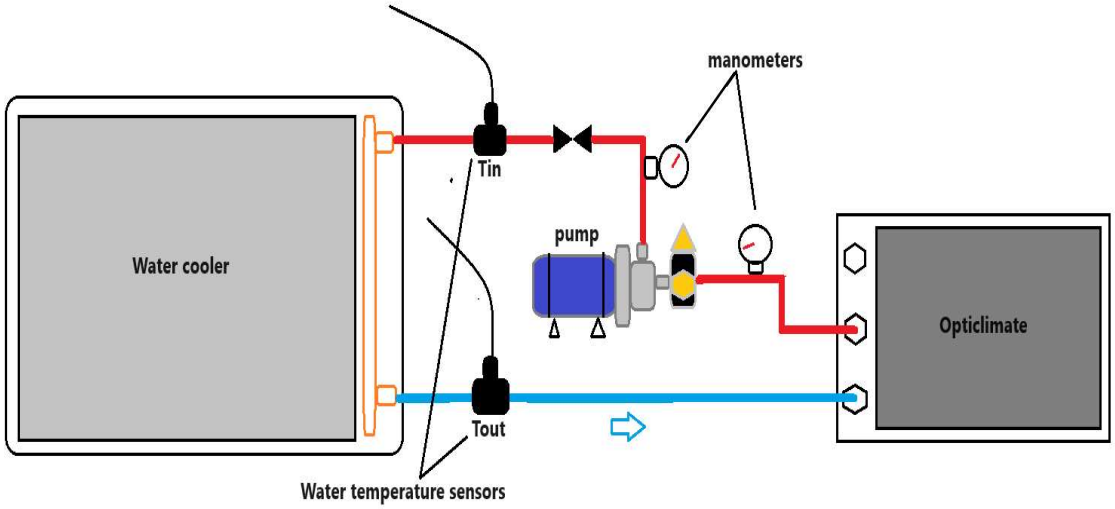


The differences between flow and return must be adjusted to 5°K (or 5°C) and can be monitored in the display on the Smartbox.

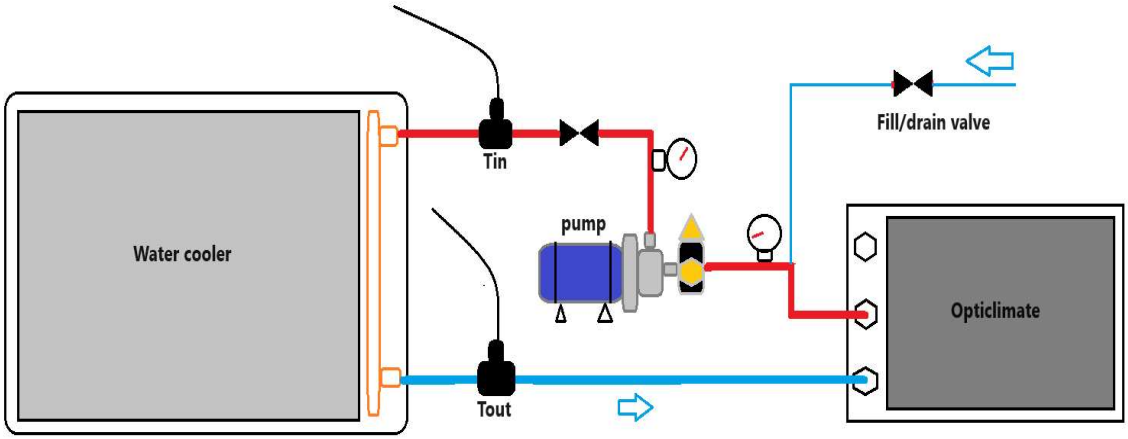
Pressure (drop)

The pump is sized to give enough flow at a given pressure. The pressure is determent by the resistance in the water loop. When the pressure becomes too high, the flow reduces and the system will fail. Resistance in the water loop comes from;
-Opticlimate (plate heat ex changer)
-Water cooler (Finned heat ex changer)
-Friction in piping
-Too small diameter piping
-Bends and elbows
-Auxiliary components (strainers, separators, etc)
-Clogged filters or strainers

On the other hand, when there is no resistance (no pressure), the pump will fail or leak. Not enough pressure comes from;
-No water or glycol in the system
-Air in the system
-Pressure at the suction side of the pump to low
-Frozen liquid in the system.



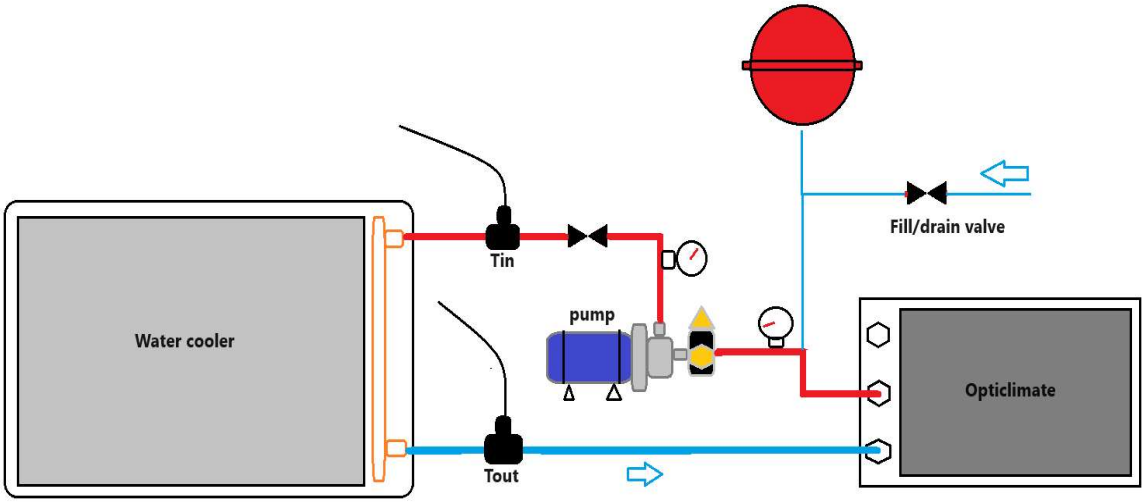
In order to set the correct pressure and monitor pressures in the system we suggest to use 2 manometers in the water loop. 1 manometer at the return side of the pump and 1 manometer at the flow side of the pump. The pressure needs to be set at min. 0,5bar at the manometer on the suction side of the pump when the pump is on.



We suggest to fill the system with water and check for leaks or other problems before using a water/glycol mix. In order to fill the system you need a fill/drain point to fill water or glycol. The fill/drain valve should be positioned on the pump return pipe. Placing the fill/drain valve somewhere else in the system could make it very hard to fill the system because the pressure is much higher elsewhere when the pump is on. The pressure needs to be set at min. 0,5bar at the manometer on the suction side of the pump when the pump is on.

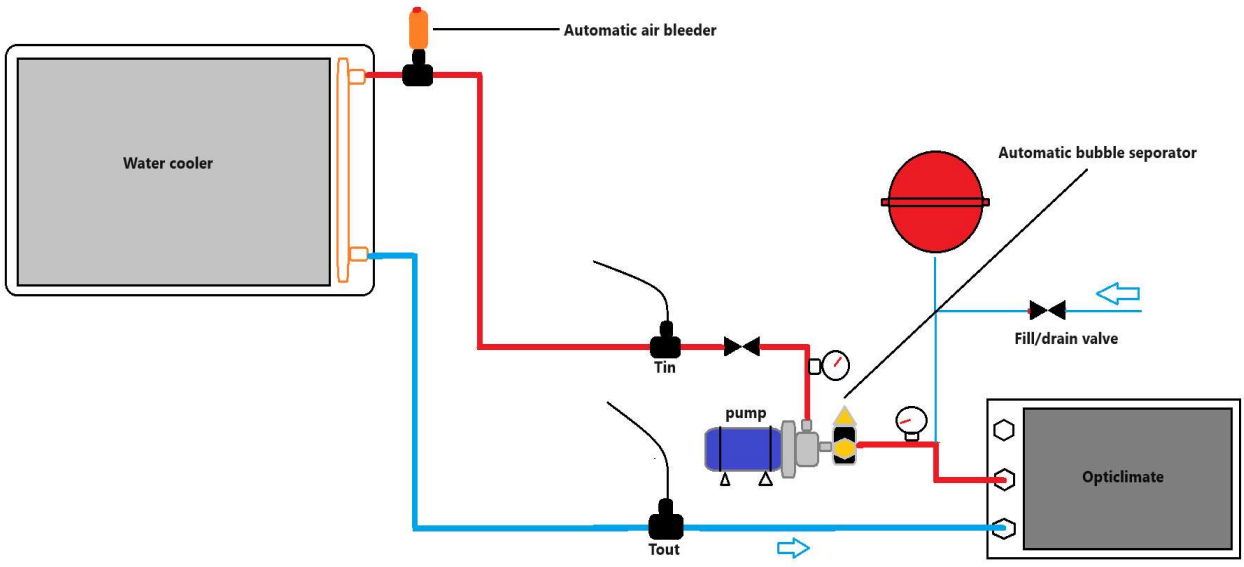
We suggest to put both the pump and the fill/drain valve on the lowest point of the water loop.

Note;
When the pressure on the suction side is 0,5bar and on the flow side is 3bar, this means the pressure (drop) in the system is 2,5bar. It is good practice to write this down for future fault finding when the system is still new and clean.



You can add an expansion vessel on the suction side of the pump. The water expands when it gets warmer. you can also add an high pressure safety valve or a combination of both. Check your local code or this is required. An expansion vessel also gives you some leverage when there is small leak in the system. An expansion vessel and safety valve are not supplied.

Air



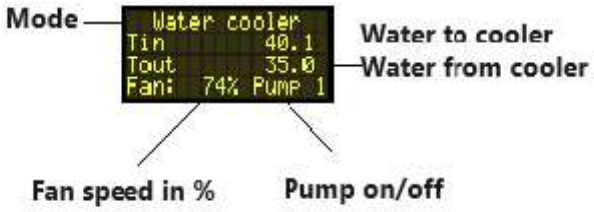
When you fill he system, the air inside the system has to escape. We supply an automatic air bleeder and a bubble separator. The automatic air bleeder has to be positioned at the highest point of the water loop. Air always travels up, so most of it will collect at the highest point. The automatic air bleeder will only work when the pump is off.
The automatic bubble separator is positioned at a low point in the water loop just before the pump. It will catch small air bubbles when the water rushes through the separator. The separator will only work when the pump is on and not so much when the pump is off.

Procedure filling the water loop.

-Check all water connections before filling
-Connect mains water using a garden hose to the fill/drain valve
-Open the cap on the automatic bleeder a few turns
-Fill the system slowly with water, the air escapes through the automatic bleeder.
-When the pressure in the system is approx 1 bar stop filling.
-Wait for all air to escape and check pressure again.
-Power up the Opticlimate (do not start) and wait for the remote to initialize.
-Pro3 and Pro4 go to the parameter menu and set D:09 to 1 (the pump will start)
-Revomax turn on dip-switch 3 on the circuit-board (the pump will start, and the internal water-valve will open fully)
-Monitor the manometer on the return side of the pump. The pressure will drop.
-Add water until pressure on return side manometer is > 0,5bar.
-Monitor the system for leaks, monitor the pressure because air will escape and pressure will drop. Let the pump run for 30minutes.
-Stop the pump (pro3 and pro4 set D:09 to 0 and revomax set dip-switch 3 to off.
-There could still be air in the system, check the automatic bleeder.
-When no air escape, start the pump again and check pressure on return side pump.

Repeat all steps until all air is out.
When outdoor temperatures are well above freezing, monitor the system for a few days.
When everything is 100% leak free, drain the system and repeat the above using a glycol mix. (antifreeze) Use Propylene glycol in an Agriculture environment.

Settings in Smartbox water cooler mode.
The home screen shows.....



When you want to enter the settings always start by pressing “up”
Pressing “up” repeatedly will scroll you through the settings in the Smartbox.

-Tout setup: Sets the target water-out temperature.
-Tdelta setup: Sets the target dT between T-out and T-in.
-NTC setup: Sets offset of the temperature sensors.
-Fan Setup: Sets the minimum and maximum fan speed.
-Pump setup: Sets the minimum and maximum pump speed (inverter only)
-PID Fan setup: Sets the PID of the fan. (don't change this)
-PID pump setup: Sets the PID of the pump.(Don't change this)
-Mode setup: Sets the mode. (The application you are using the Smartbox for)
-Beep setup: Sets beep on/off.
-Sys info: Shows the version.
-Exit: The display goes back to home.

When there are settings that need to be changed, find the correct setting, press “enter” and change the value. Find Exit to go back to home.

Typical settings are:
Water temperature 29°C (pro 3/4) 32°C (Revomax)
Delta T 5K
Min fan speed 10%
Max fan speed 100%
Min pump speed 65%
Max pump speed 100%
PID fan P: 95 I: 30 D: 0
PID pump P: 22 I: 6 D: 0

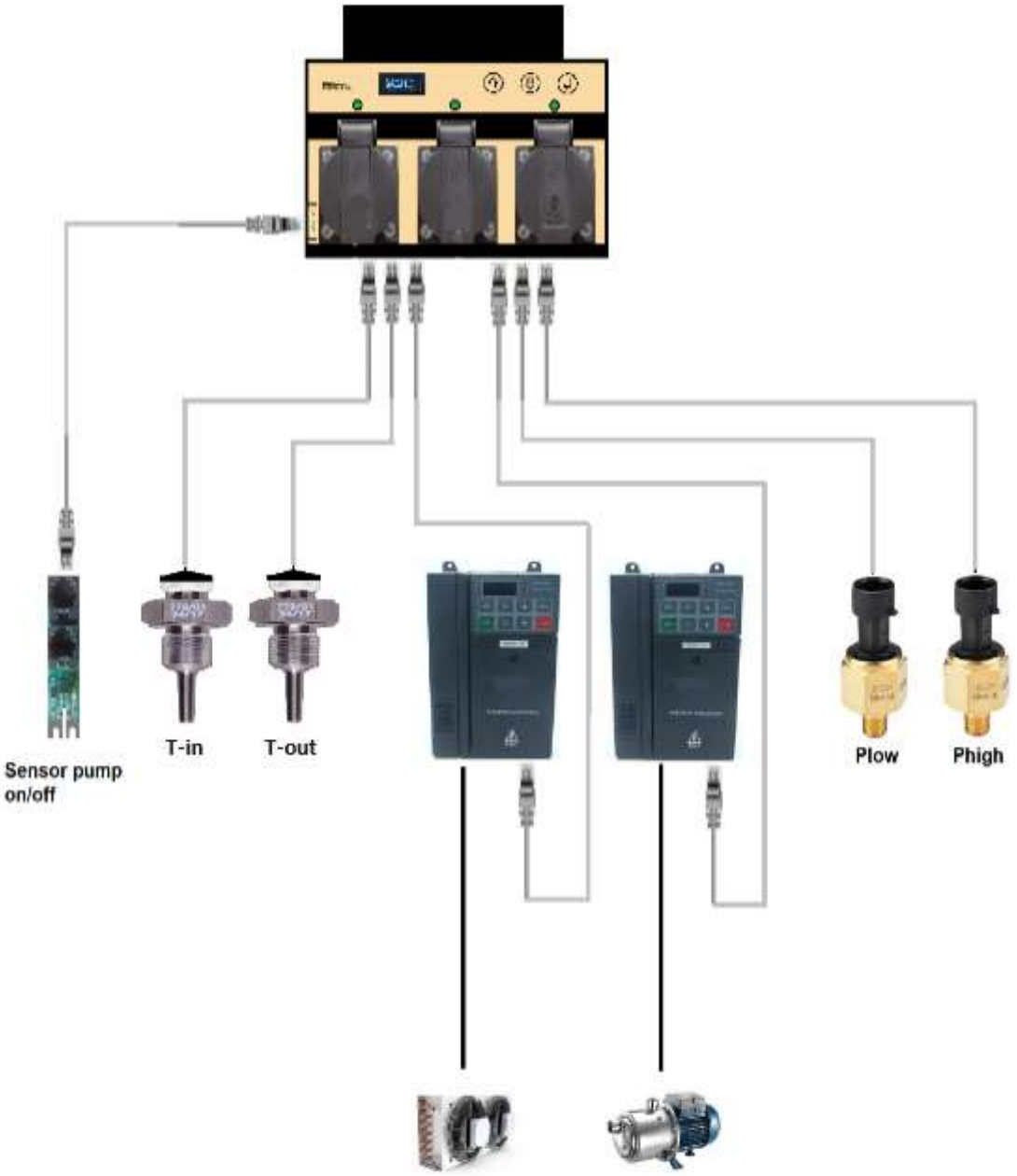
Note:
Only change settings when you are familiar with the system. Changing settings can cause damage and the system can fail to operate.

Installation and modification to the electrical systems must be performed by a Licensed Master Electrician.

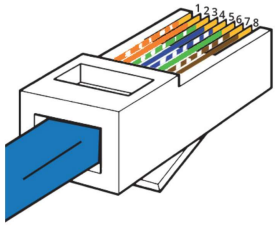
Installation and modification to the water cooler systems must be performed by a Licensed Master Installer.

Always check local code before installing a water cooler system.

Aditional information:

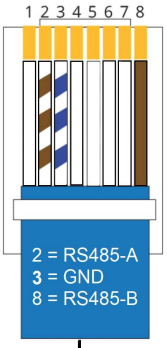


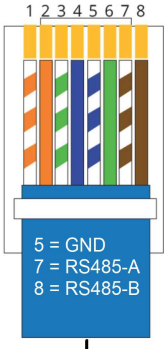
When using Smartbox 6/3 or 8/0 you can add 2 extra pressure switches Plow and Phigh.
P-low will stop the pump when the pressure in the water loop is too low.
P-high will give a warning in the Smartbox display.
Be aware that when the pump stops, eventually the whole system shuts down.

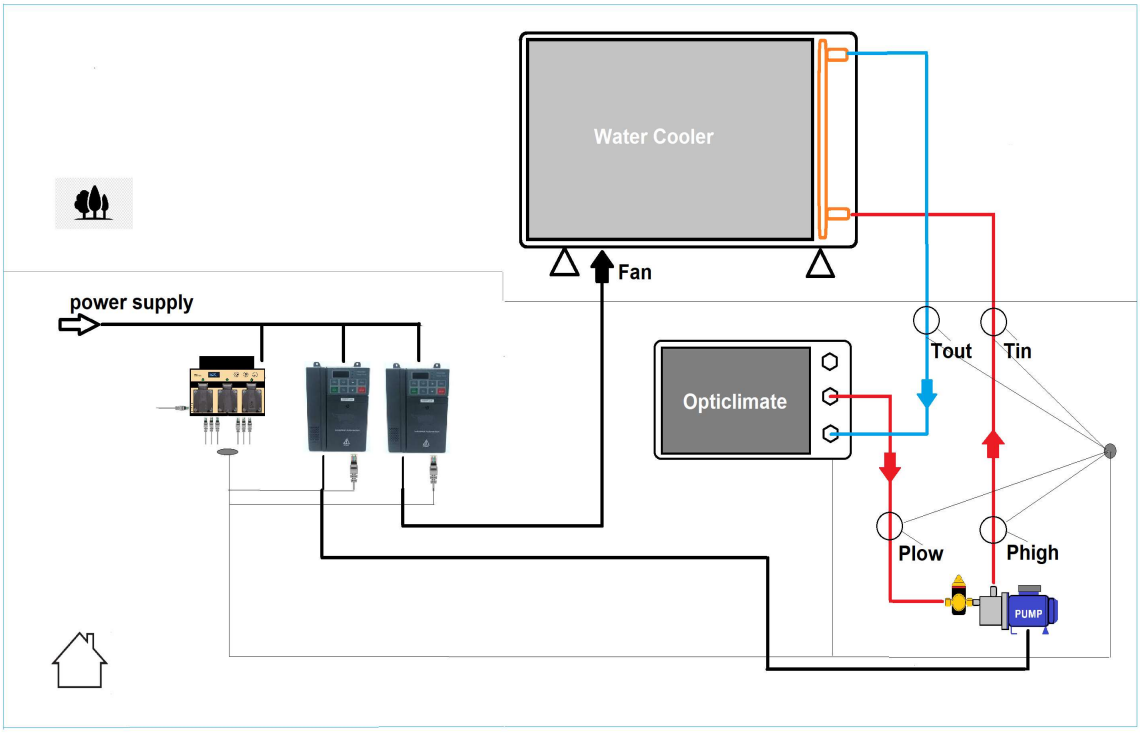


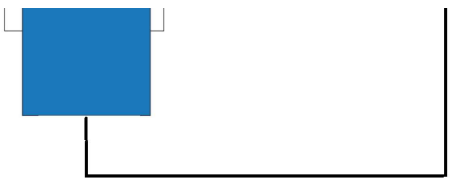
RS485

RS485

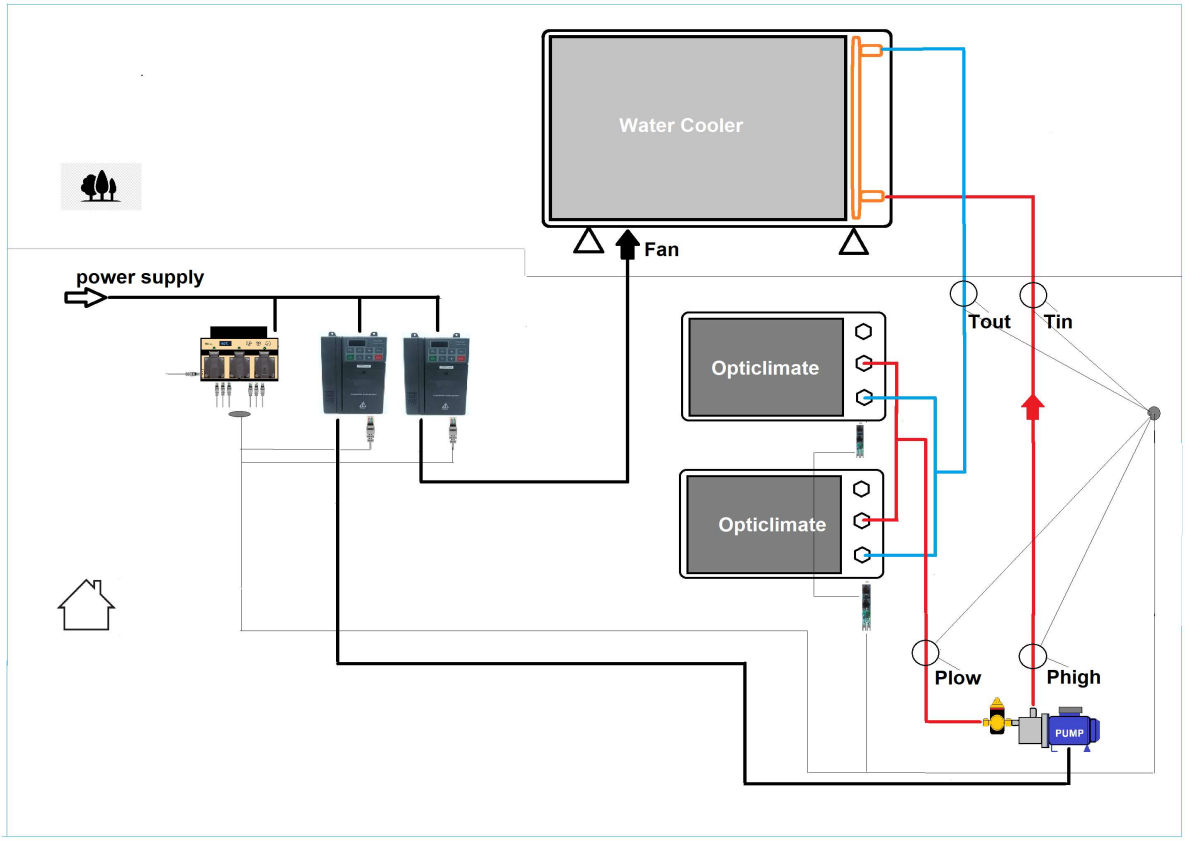

1 2 3 4 5 6 7 8
2 = RS485-A
3 = GND
8 = RS485-B


1 2 3 4 5 6 7 8
5 = GND
7 = RS485-A
8 = RS485-B

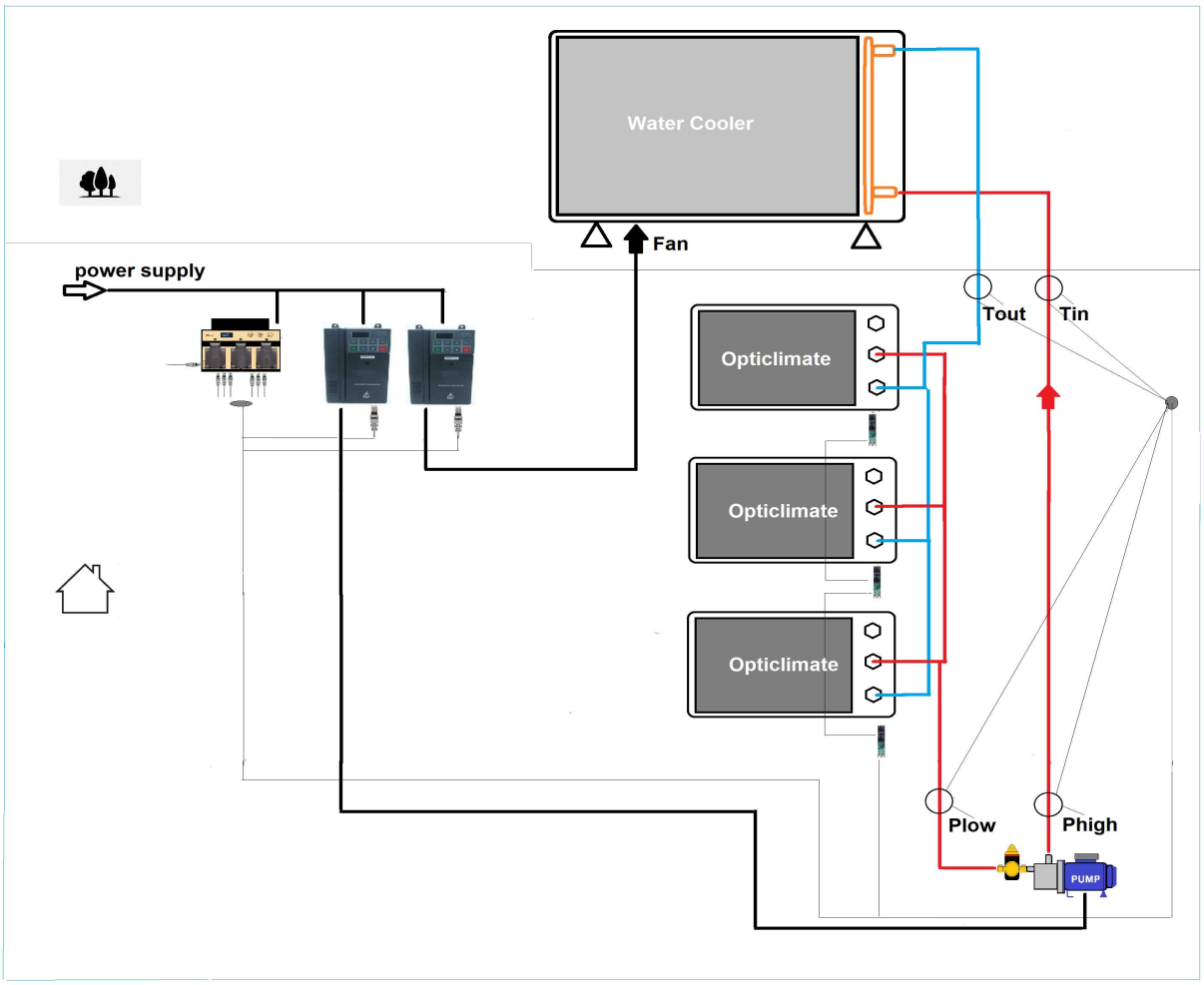

Water Cooler
Fan
power supply
Opticlimate
Tout
Tin
Plow
Phigh
PUMP



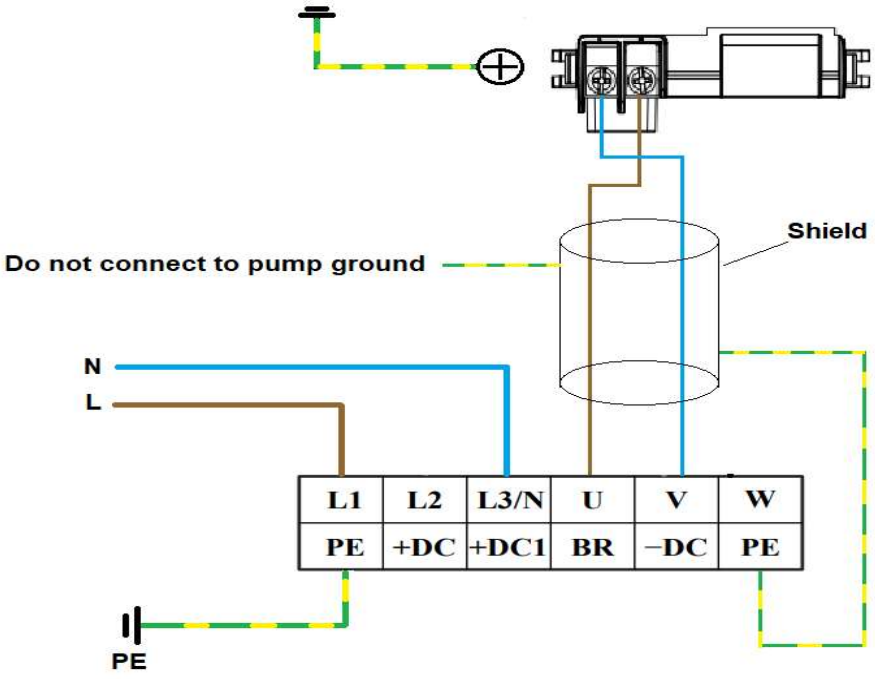
Position of sensors and general overview



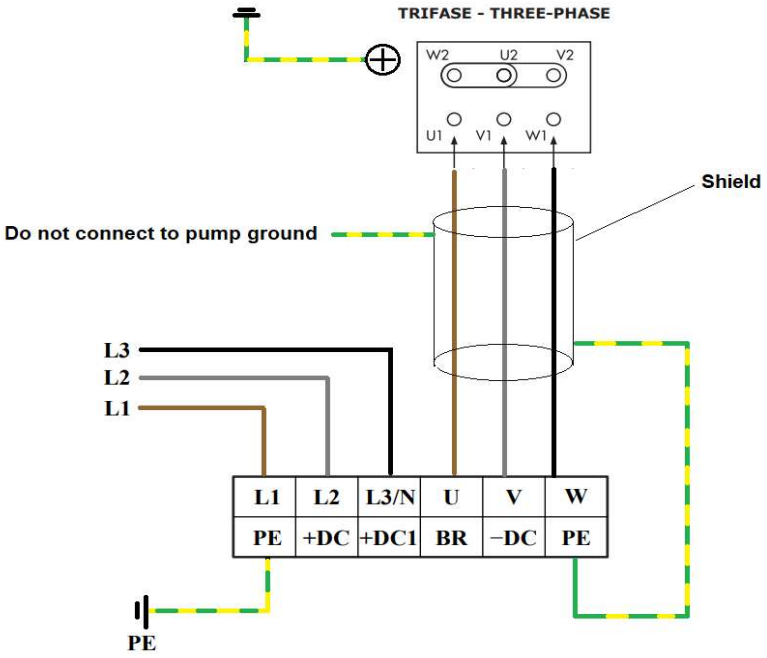
Position of sensors and general overview



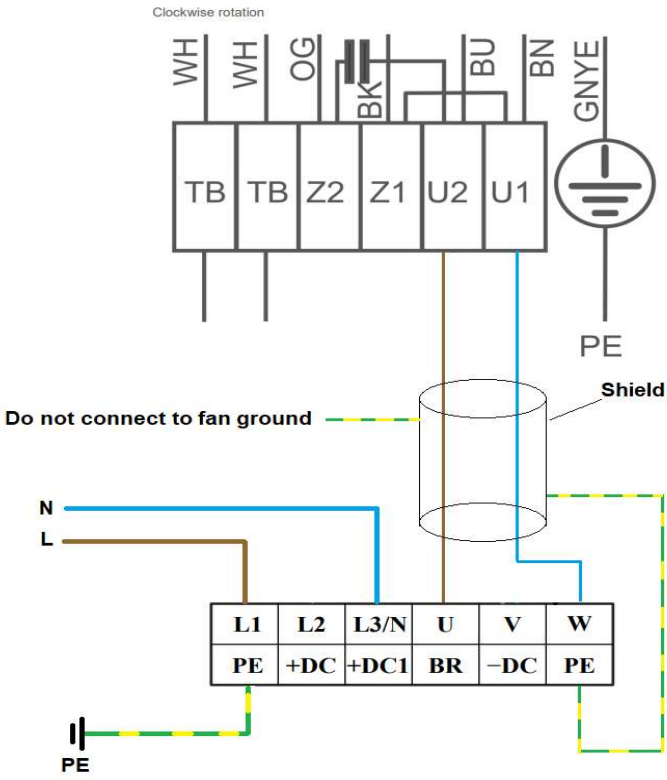
Position of sensors and general overview



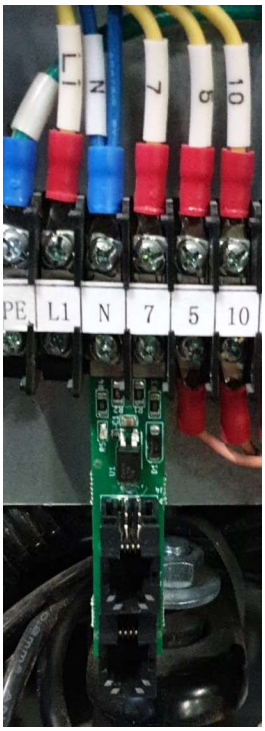
Single phase pump connection



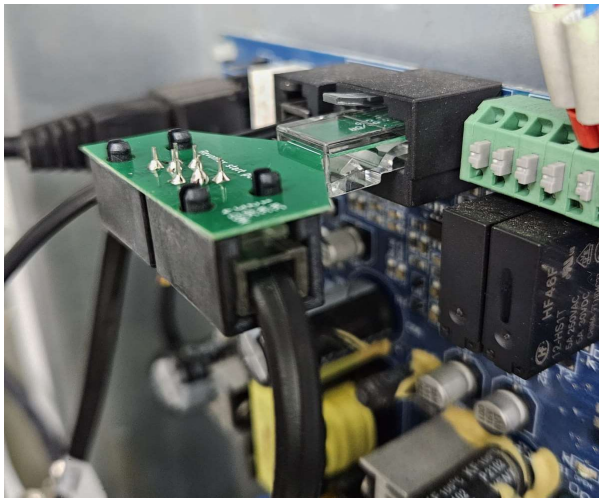
3 phase pump connections



Fan connections (Ziehl abegg)

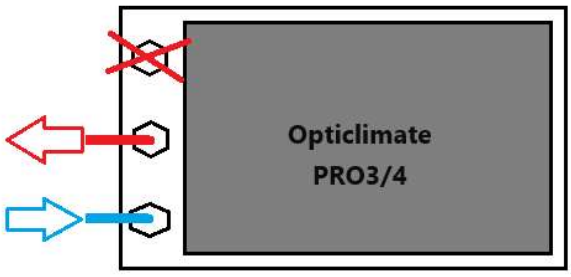


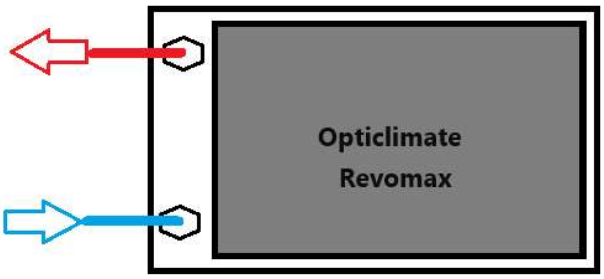
PRO



Revomax

Picture of start sensor





In all Opticlimates the cooled down water from the water cooler enters at the bottom water inlet.

In a PRO3/4 the warm water going to the pump is connected to the middle water outlet, the upper water outlet must be capped off.

In a Revomax the warm water going to the pump is connected to the upper water outlet.

More options are possible for larger facilitys , contact us for more info.