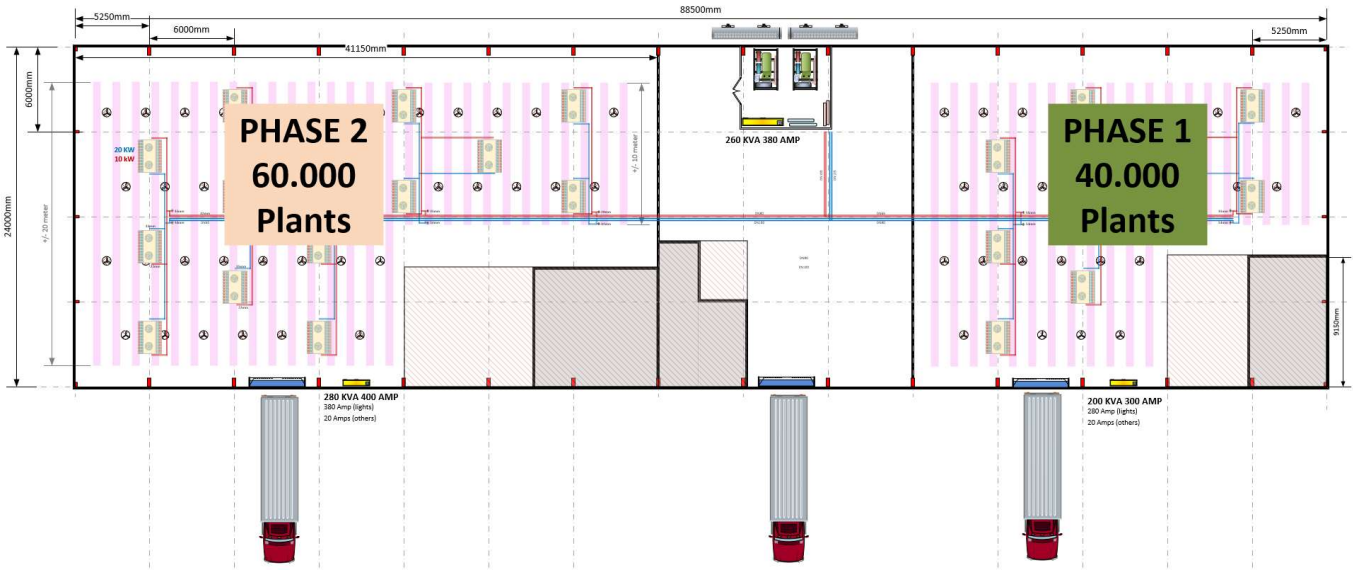
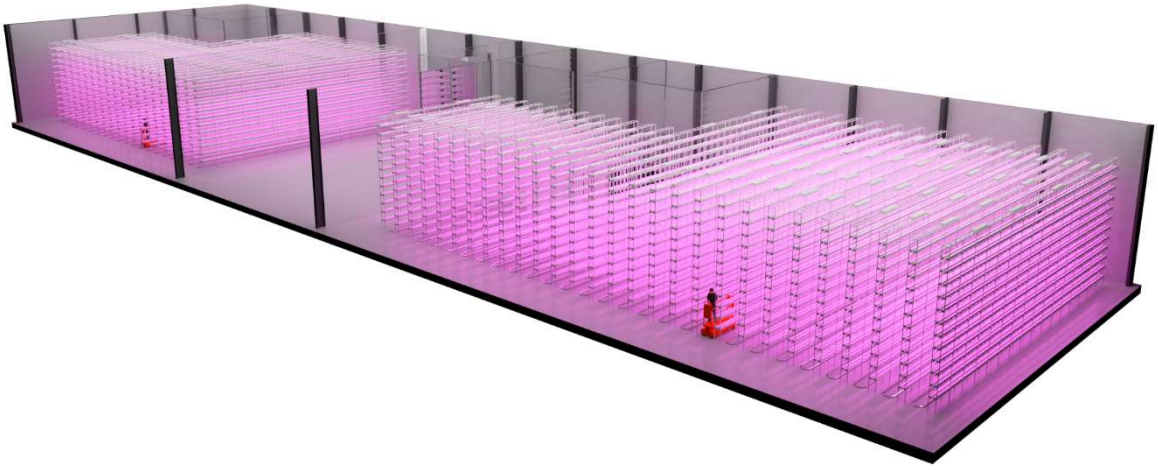
Project overview





Design parameters Phase 2 (Left side)

Product:	60.000 strawberries plants		
Room climate:	Temperature	+/- 20°C / RH 70%	
Lights on	Transpiration	100ml / plant / day:	250 liter/hour
Room climate:	Temperature	+/- 11°C / RH 90%	
Lights off	Transpiration	0 ml / plant / day:	0 liter/hour
	Temperature	+/- 23°C	
	Humidification	13000 gram water / hour	
Ambient temperature:	Calculate with 25°C.	*(Winter -10°C and summer 25°C)*	
Grow lights:	2150 pc.	x 120 Watt = 258 kW	
Air refreshment:	2200 m³/h	H13 filtered	

Design parameters Phase 1 (Right side)

Product:	40.000 strawberries plants		
Room climate:	Temperature	+/- 20°C / RH 70%	
Lights on	Transpiration	100ml / plant / day:	170 liter/hour
Room climate:	Temperature	+/- 11°C / RH 90%	
Lights off	Transpiration	0 ml / plant / day:	0 liter/hour
	Temperature	+/- 23°C	
	Humidification	13000 gram water / hour	
Ambient temperature:	Calculate with 25°C.	*(Winter -10°C and summer 25°C)*	
Grow lights:	1344 pc.	x 120 Watt = 160 kW	
Air refreshment:	2200 m³/h	H13 filtered	

Above-mentioned parameters, as well as the customer's requirements are applied for the technical design based on the international standard of Geerlofs Refrigeration B.V.

CENTRAL REFRIGERATION PLANT WITH INDIRECT COOLING SYSTEM

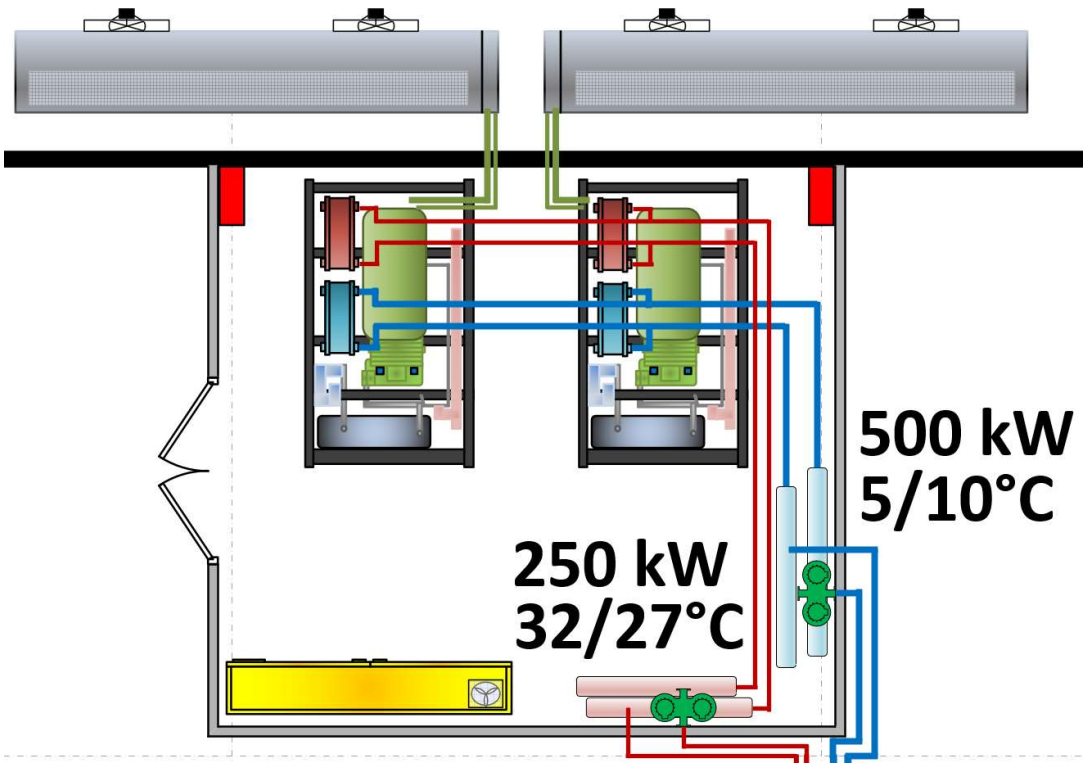
Water is used as cold carrier which will be cooled by an DX cooling system.

As a result of this transfer of cold energy from the synthetic refrigerant to the water, the refrigerant content is limited to a minimum, which has a favorable influence on the service and maintenance costs with regard to the usually compulsory checks.

The water is accurately kept at temperature by means of a modulating control, also per room. In this way, the various rooms can be kept at different temperatures without installing additional cooling and control technology.

Each temperature zone is controlled by a modulating 3-way control valve of 0-100%.
The simple change and / or adjustment of the cooling installations is a major advantage when using this system. The pipe network consists of insulated copper / stainless steel pipes. The insulation material used is from Armaflex, which is distinguished by its high vapor density.

It is possible to re-use the residual heat from the cooling installation for various purposes. In this situation we also use part of that heat to pre-treat the air intake via the air handling unit.
An additional pipeline route has been included for this with a mixing arrangement and extra connections for the future.



2 pc. Screw compressor, unit is include heat recovery

Compressor	Bitzer
type	CSH8573-110Y
Refrigerant	R513A
Cooling capacity (Qo)	246 kW
Engine power of the compressor (Pe)	52.5 kW
Capacity control	25 .-.-.100%
Evaporation temperature	+0 °C
Condensation temperature	+35 °C
Location	Installed inside

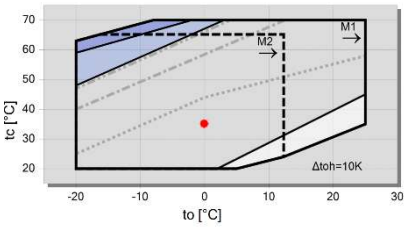


Plate exchanger (cooling system):

Make evaporator	ALVA LAVAL
Type evaporator	AC-xx
Refrigerant	R513A
Cooling capacity (Qo)	250 kW
Water in/out	+5 / +10 °C

Plate exchanger (heating):

Make	ALVA LAVAL
Type	AC-xx
Refrigerant	R513A
Cooling capacity (Qo)	125 kW
Water in/out	+5 / +27 °C

1 pc. cooling main double pump

Make	Wilo/Lowara
Flow	85 m³/h
resistance	+/- 100 KPA
Power consumption	+/- 10 kW

1 pc. heating main double pump

Make	Wilo/Lowara
Flow	73 m³/h
resistance	+/- 140 KPA
Power consumption	+/- 7 kW

2 pc. cooler pump

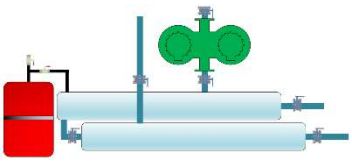
Make	Wilo/Lowara
Flow	43 m³/h
resistance	+/- 50 KPA
Power consumption	+/- 4 kW

1 pc. heating main double pump

Make	Wilo/Lowara
Flow	22 m³/h
resistance	+/- 50 KPA
Power consumption	+/- 3 kW

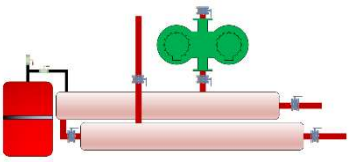
1 pc. divider with expansion vessel

Make	Geerlofs
Flow	86 m³/h



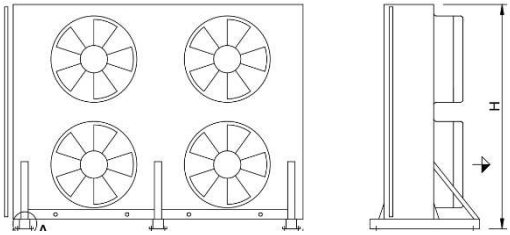
1 pc. divider with expansion vessel

Make	Geerlofs
Flow	43 m³/h

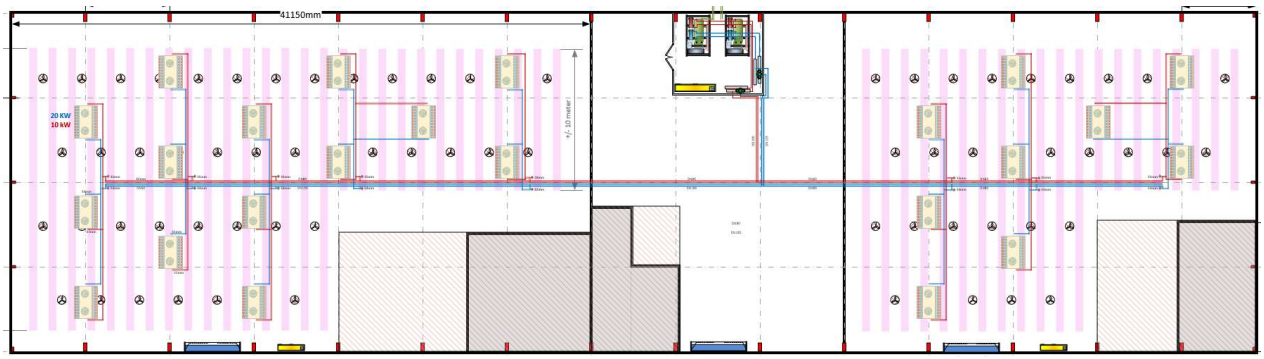


2 pc. Aircooled condenser

Make	Güntner
Type	GCVV RD 090.2OF/22E-58
Airflow	103.000 m³/h
Fans	1x 9.15 kW EC (400VAC 50Hz)
Volume	147 liter
Capacity	281 kW (10K)
Weight	+/- 1200 kg
Size	4740 x 1153 x 2341mm LWH
Location	Installed next to the grow room inside the building on 2 bricks.



Coolers and pipework:



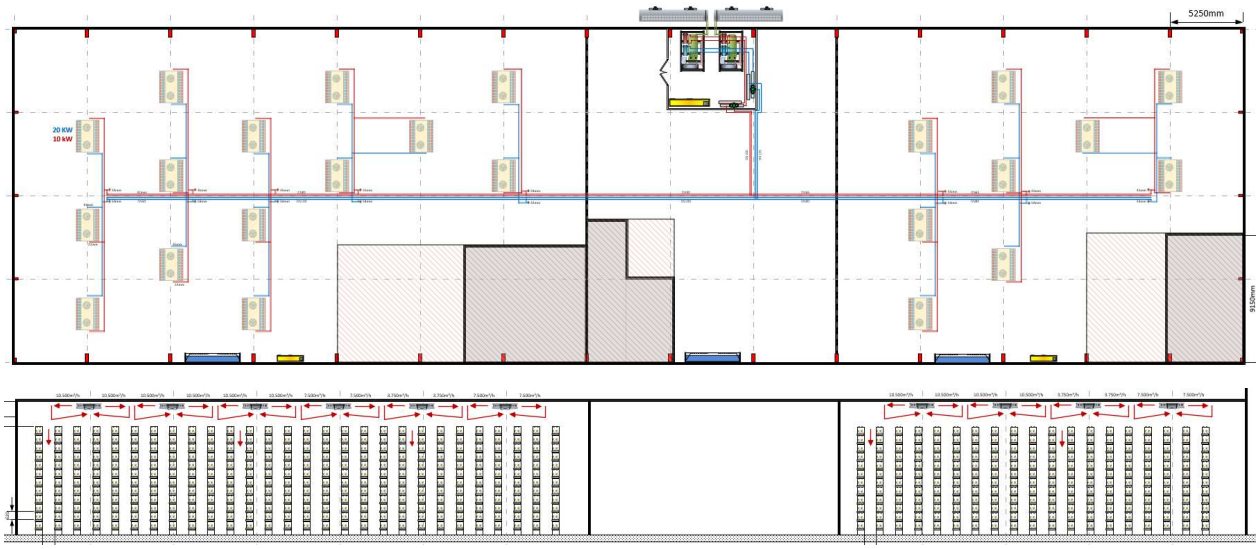
Piping water	22 mm Pipes set	100 meter
	28 mm Pipes set	10 meter
	35 mm Pipes set	150 meter
	42 mm Pipes set	30 meter
	54 mm Pipes set	14 meter
	DN50 Pipes set	18 meter
	DN65 Pipes set	35 meter
	DN80 Pipes set	60 meter
	DN100 Pipes set	55 meter
	DN125 Pipes set	30 meter
	Various drainpipes, Clamps, rails, elbows, T-sprongs and isolation.	

All refrigerant piping is made out of stainless steel or copper and, (where needed) insulated with vapour tight insulation.

Condenser	67mm Gas line	20 meter?
	54mm liqued line	20 meter?

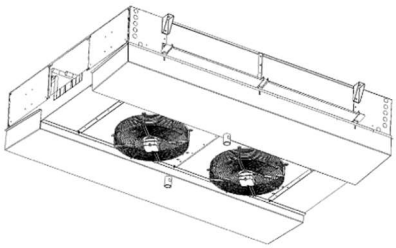
Compressor	DN100 mm Gas line	10 meter?
	42mm liqued line	10meter?

Coolers:

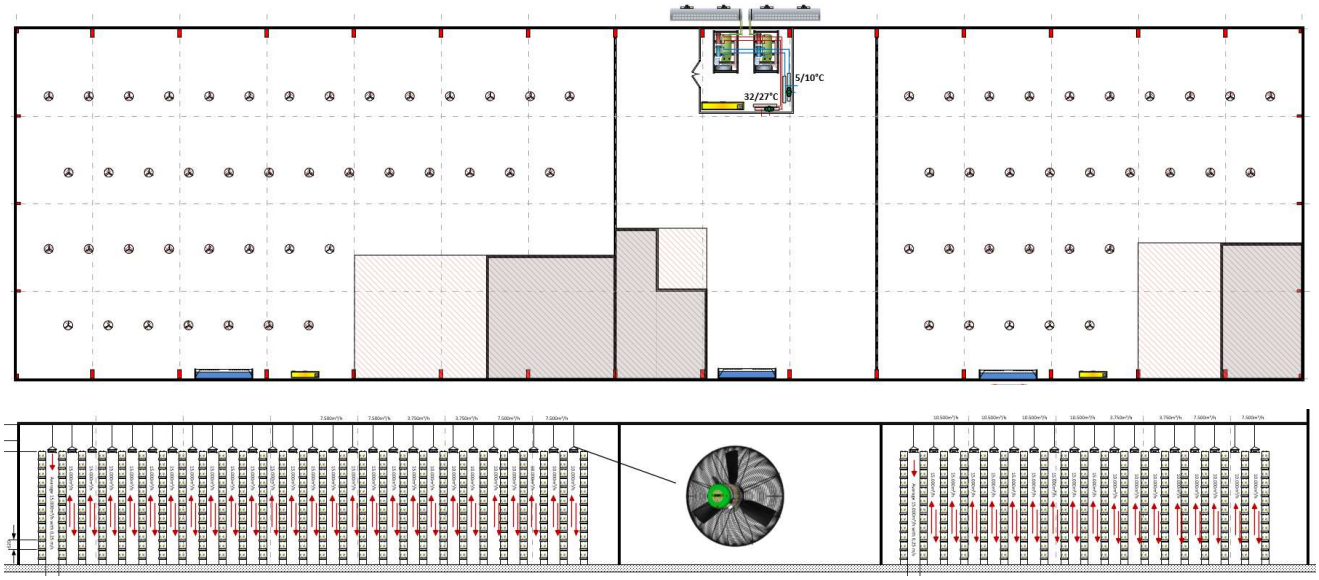


Cooler 14 pc.	Make	Luve IDB452-AC-W10AL7-04-G8E EC
Phase 2	Capacity	23 kW
(Left side)	Air flow	2.500m³/h to 7.800m³/h
	Fans	2 pc: 0.3/0.82 kW (240VAC) **EC**
	Sound level	49 dB(A) 3 meter
	Dimensions	2321 x 487 x 487 mm (LxWxH)
	Heating coil	1x 2 pc. 6 kW
	Dehumidification	+/- 20 liter/hour

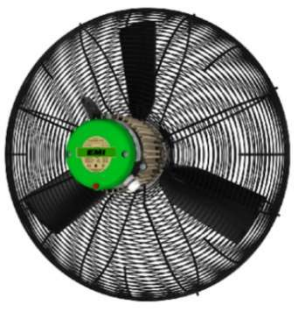
Cooler 9 pc.	Make	Luve IDB452-AC-W10AL7-04-G8E EC
Phase 1	Capacity	23 kW
(Right side)	Air flow	2.500m³/h to 7.800m³/h
	Fans	2 pc: 0.3/0.82 kW (240VAC) **EC**
	Sound level	49 dB(A) 3 meter
	Dimensions	2321 x 487 x 487 mm (LxWxH)
	Heating coil	1x 2 pc. 6 kW
	Dehumidification	+/- 20 liter/hour

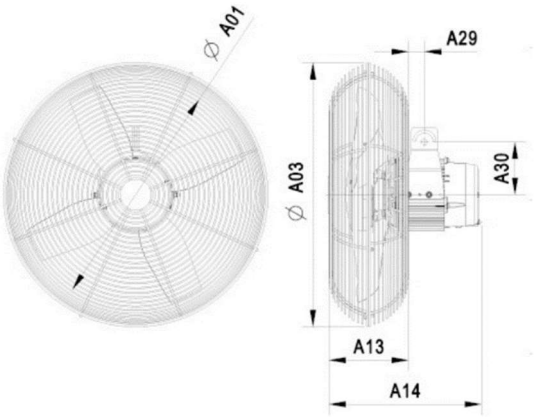


Support fans

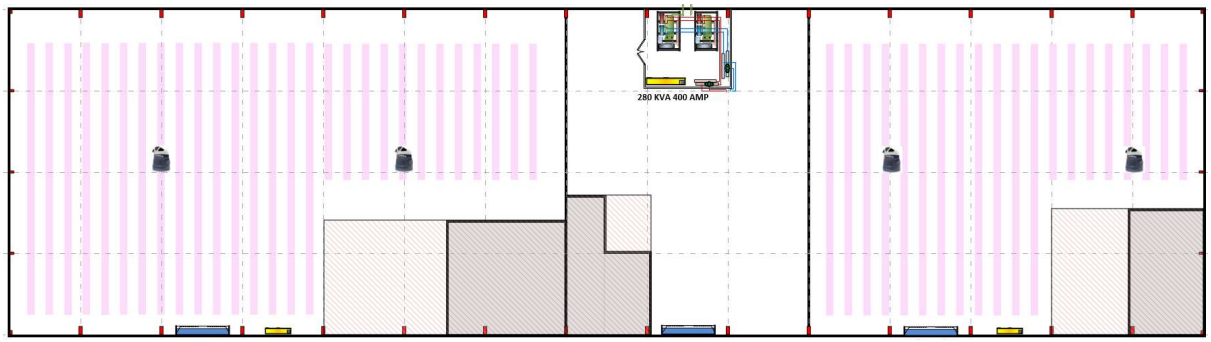


Support fans 42 pc. Phase 2 (Left side)	Make Capacity Fan Sound level Dimensions	EMI K6S6300E11100 10.000 m³/h Variable speed 610 Watt (240VAC) 68 dB(A) 2 meter 830 x 413 mm (WxH)
Support fans 30 pc. Phase 1 (Right side)	Make Capacity Fan Sound level Dimensions	EMI K6S6300E11100 10.000 m³/h Variable speed 610 Watt (240VAC) 68 dB(A) 2 meter 830 x 413 mm (WxH)
Regulators	Each for fans is connected to 1 speed control and relays/fuse in our switchboard	



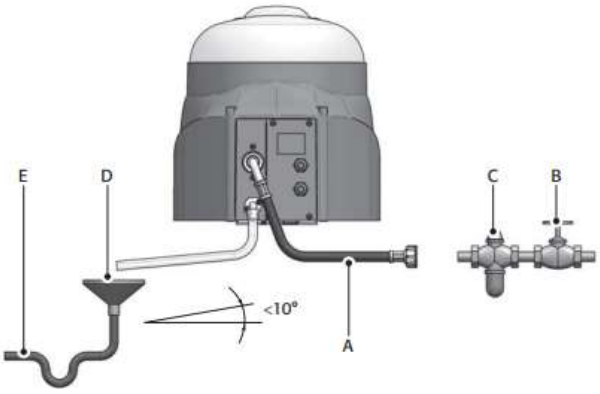


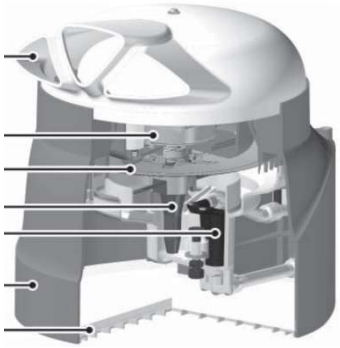
Humdifyer



Humidifier Phase 2 (Left side)	2 pc Carel Humidisk 6.5 liter/hour 230 VAC / 230 Watt Water supply max 16°DH conductivity 100 to 1.250 µS/cm

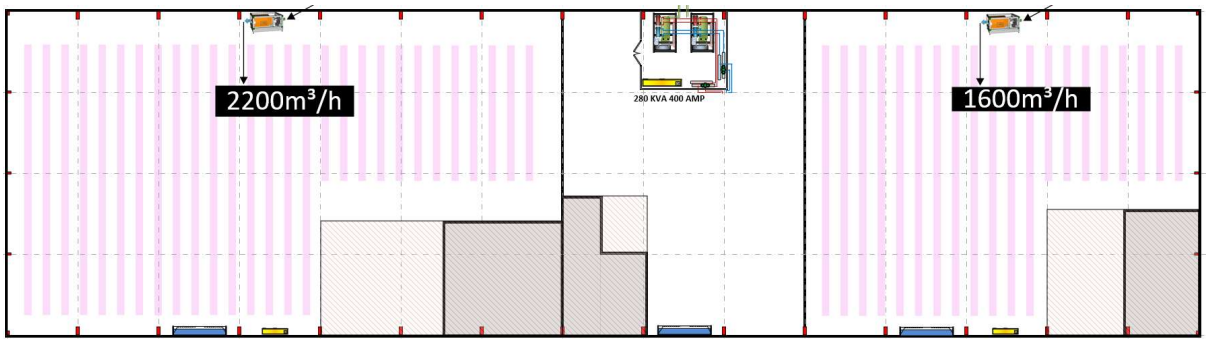
Humidifier Phase 1 (Right side)	2 pc Carel Humidisk 6.5 liter/hour 230 VAC / 320 Watt Water supply max 16°DH conductivity 100 to 1.250 µS/cm



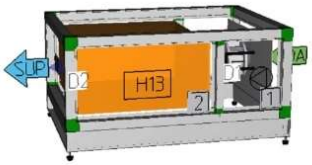


AIR TREATMENT

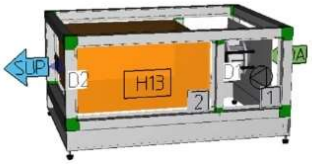
The laboratory part is built according to a box-in-box principle. To give the possibility to create an air refreshment we place an small Airhandling unit which take air from the large inside front area. The capacity is based on 7 times a day the whole inside volume



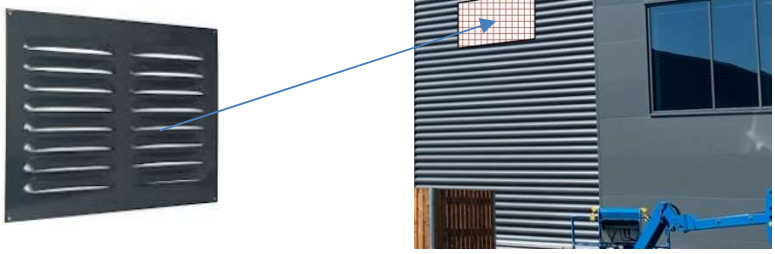
Humidifier Phase 2 (Left side)	TCA Filter H13 400 VAC / 400 Watt Airflow 2200 m³/h



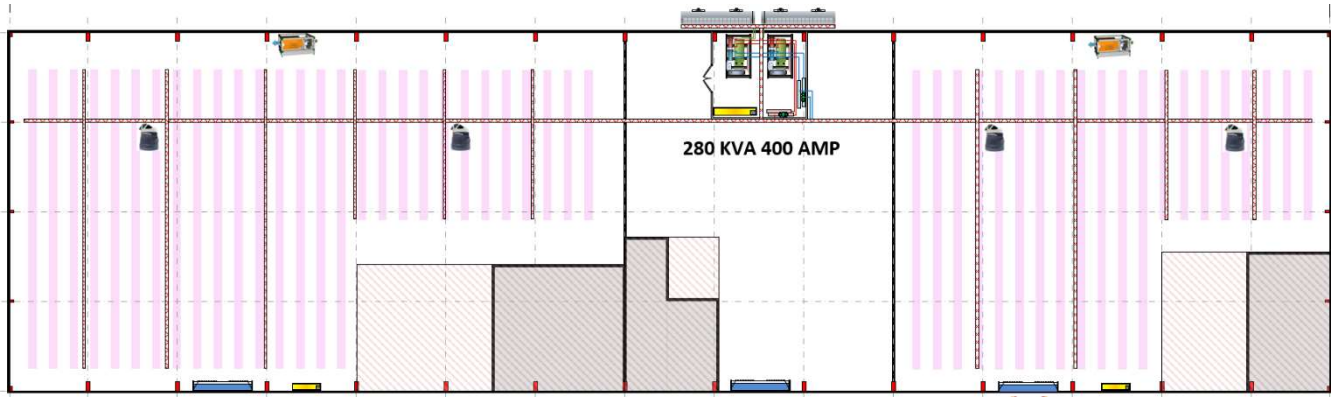
Humidifier Phase 2 (Left side)	TCA Filter H13 400 VAC / 400 Watt Airflow 1600 m³/h



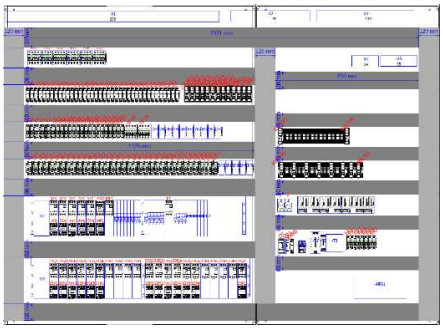
Inlet grid — 2 pc in same color as building



Electric installation.



Swichtboard is suitble for cooling accessoires as compressor skids, condensers, air handling unit, exhausting fans, coolers The unit is equipped with a switchboard. The switch board is assembled and tested in our factory and includes among others:



- Main switch
- Cooling grid and fan
- Breakers/fuses
- Relays and overload indicators
- Under and over voltage monitor
- Indicating lights
- PLC SAIA

Powered From switchboard

- Compressors, condenser and pumps
- AHU unit.
- Humidifyers.
- Coolers, valves and others.
- 0-10 VDC for light fixtures.

Estimated total valleus for switchboard :
400 VAC (3PH+N+GR) 280 KVA / 400 AMP

Control system Gis*pro*®.

The complete system will be controlled with a new PLC system, **Gis*pro*®**. All rooms can easily be accessed for making various settings and reading history. For the mechanical engineers there is clear overview of machinery status. In concept the lay-out is based on experience from other installed grow rooms.

The visualization give the possibility for:

- Temperature Settings for all areas.
- Temperature Settings for low and high alarms
- Overview client, rooms and fast read outs.
- Overview technicians , status components and read outs.
- Settings for all equipment like compressors and airtreatment
- Read out for status compressors and evaporators
- Possibility to switch Grow lights on/off and intensity.