



GREEN HOUSE KEEPER

Analyse • Automate • Grow



Languedoc
Roussillon
Incubation



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LA RÉGION OCCITANIE
Pyrénées-Méditerranée

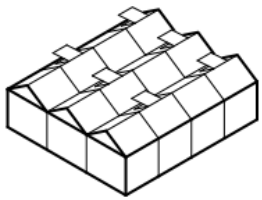


BUSINESS AND INNOVATION CENTRE
CAP ALPHA - CAP OMEGA - MIBI

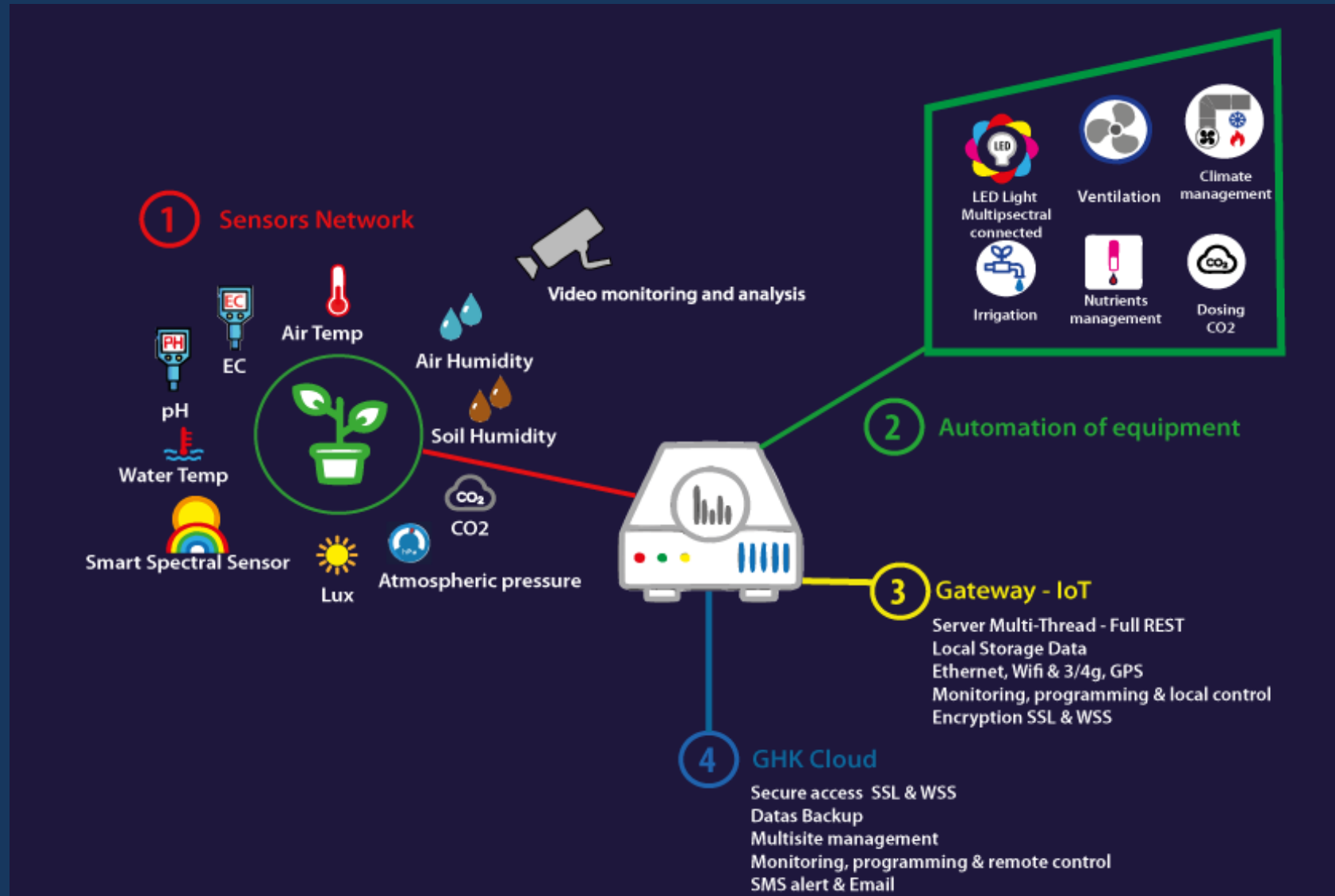
GreenHouseKeeper

Flexible and expert automation solutions for precision horticulture suitable for all types of crops:

- Conventional greenhouses
- Urban greenhouses
- Green roofs
- Culture Chambers
- containers



HAAS GHK Architecture



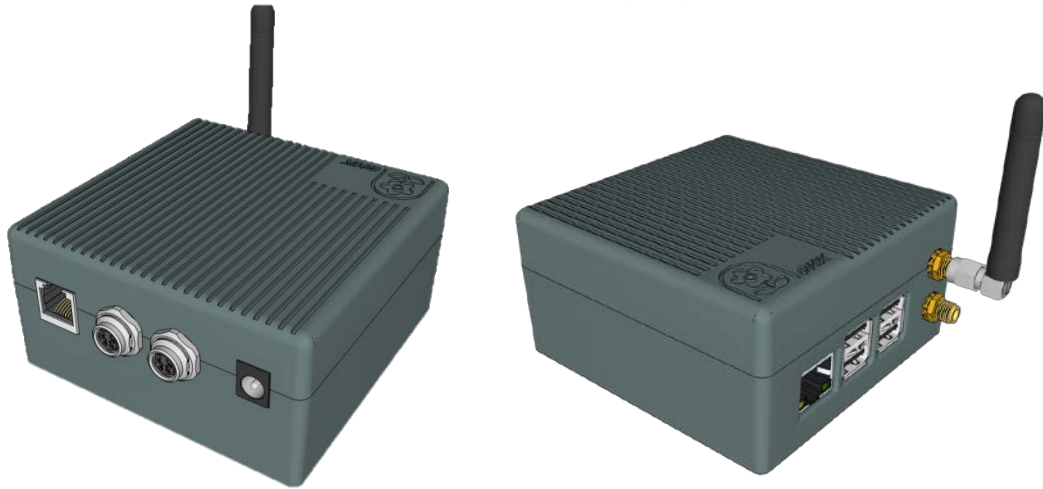
GHK Services

- Study and installation of LED lighting
- Custom multispectral LED light
- Remote management of the customer site
- Warranty and remote technical services
- Custom sensor
- Production unit design
- Mobile culture room rental
- Project study
- Electrical wiring



Automate – Gateway- IoT

PLC HerbroCore©

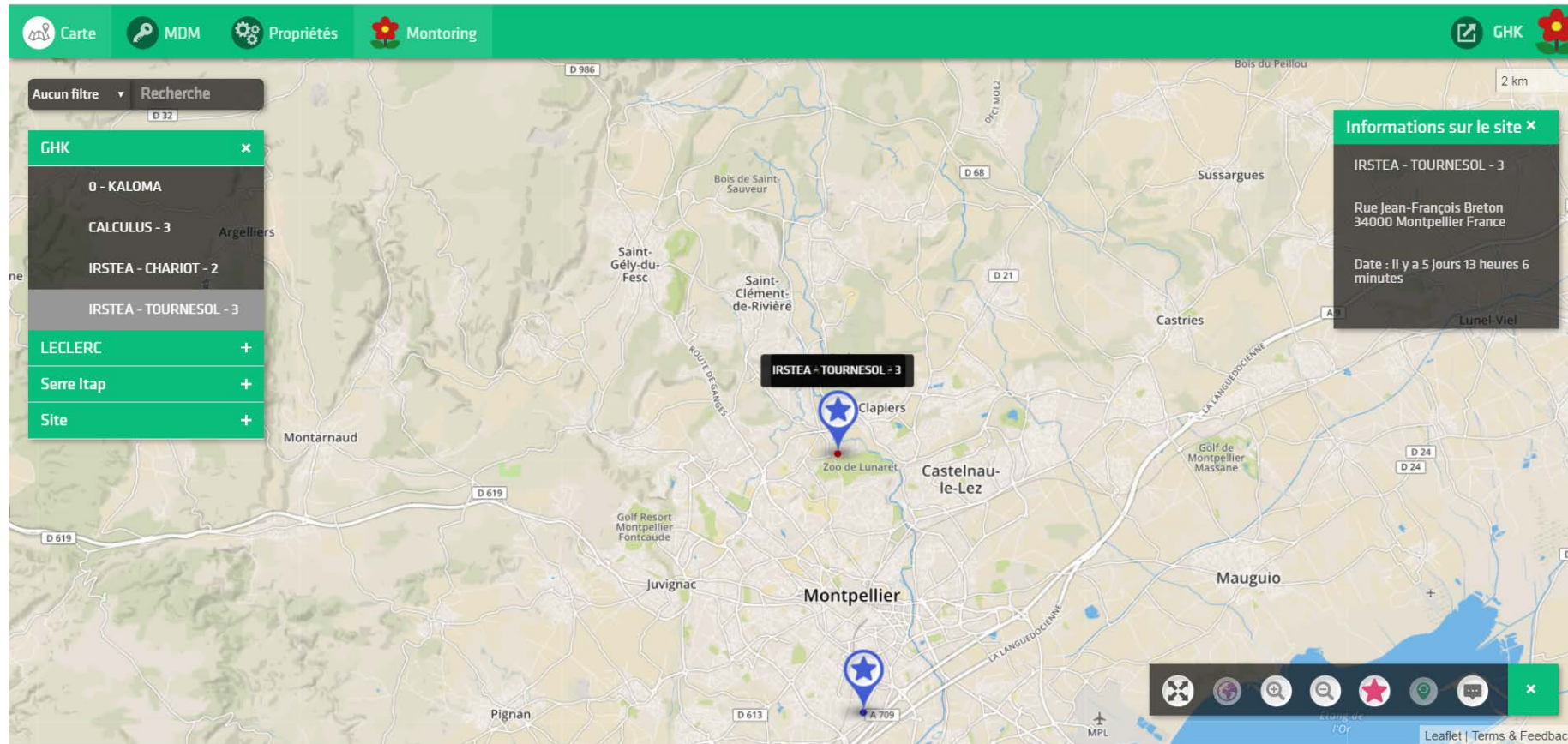


Specifications:

- Gateway - IoT
- Wifi/Ethernet/3-4g/GPS
- GUI multi-support
- Support camera USB
- Smart programming
- Encryption SSL & WSS
- Local Data Storage
- Horloge RTC
- GHK Cloud Link

Web APP

World Map of Growth Sites



Locate & Configure growth sites
Administer user rights

DashBoard

Real-time sensor data and
equipment operating status

With the ability to act in real time
on equipment



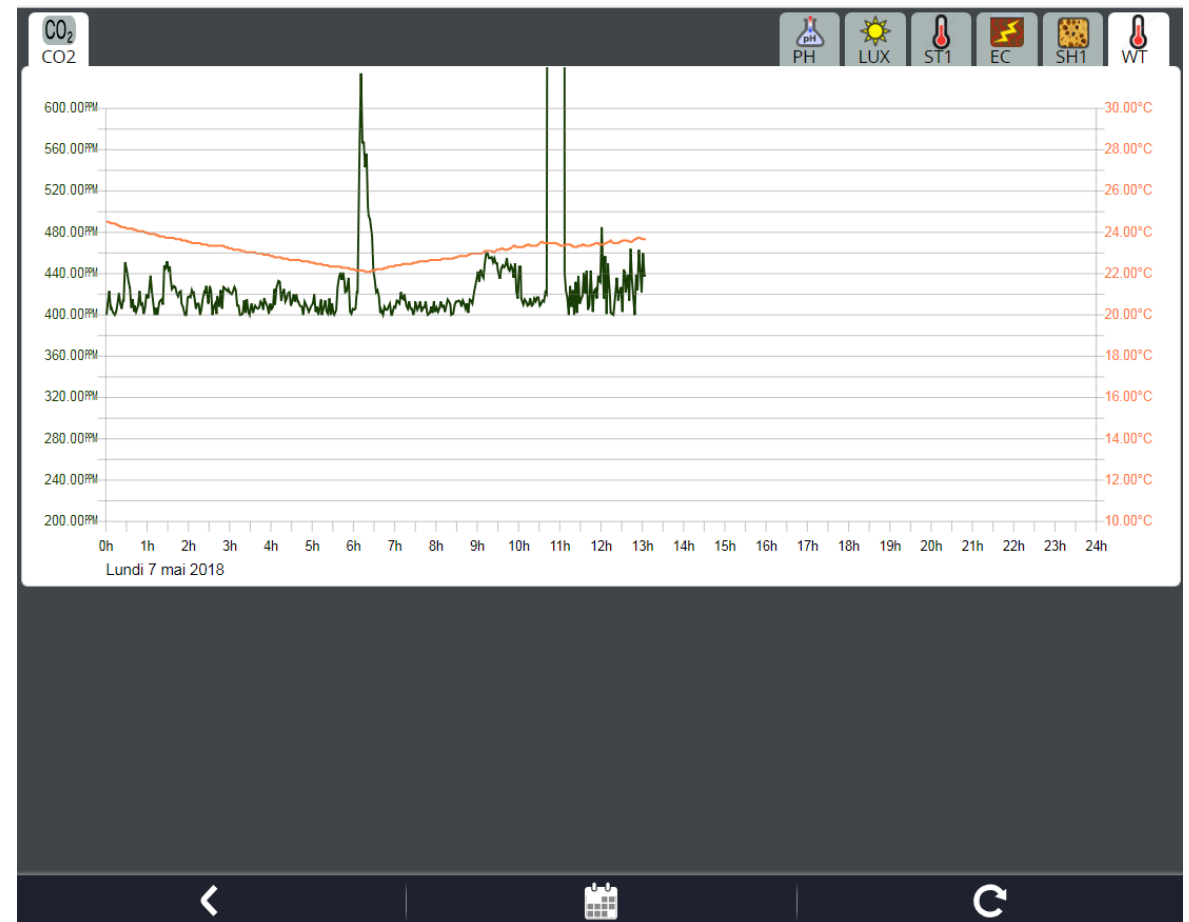
Monitoring

24h sensor graph

Calendar

Downloading data
to json, xml & csv

Customizable scale and color



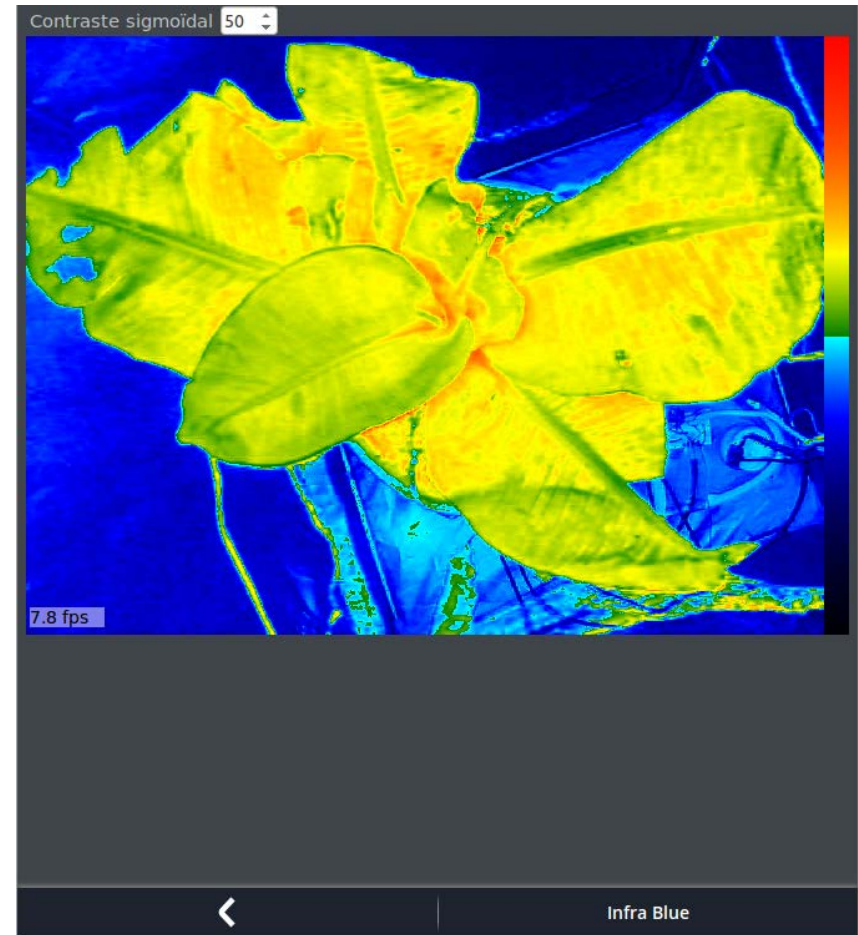
Video Monitoring

Measurement of photosynthetic activity

Compatible with multiple cameras

Real-time video & photo capture

TimeLapse function

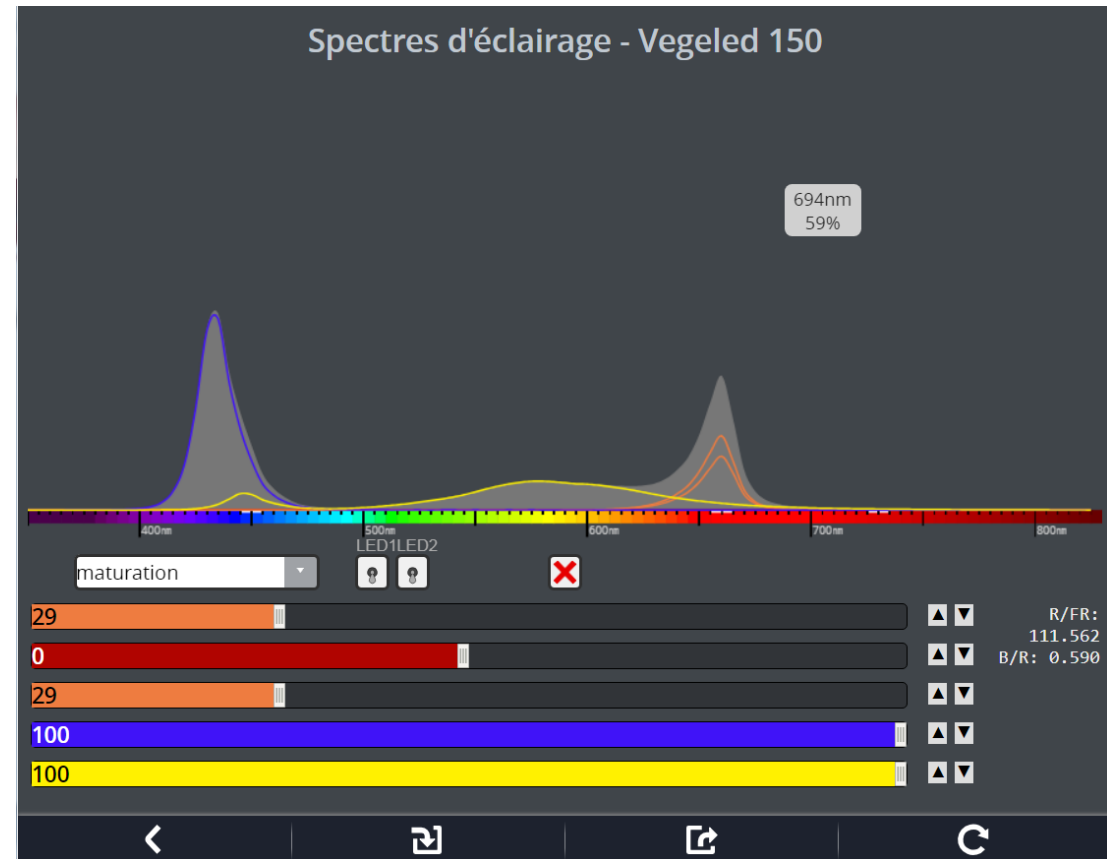


Create a light spectrum

Create your own recipes spectra

Adapt the spectrum according to the stage of growth of the plants

R / FR, B / R ratio display



Programming of automation

Programming interface

Created by GHK to facilitate complex system automation

JavaScript programming

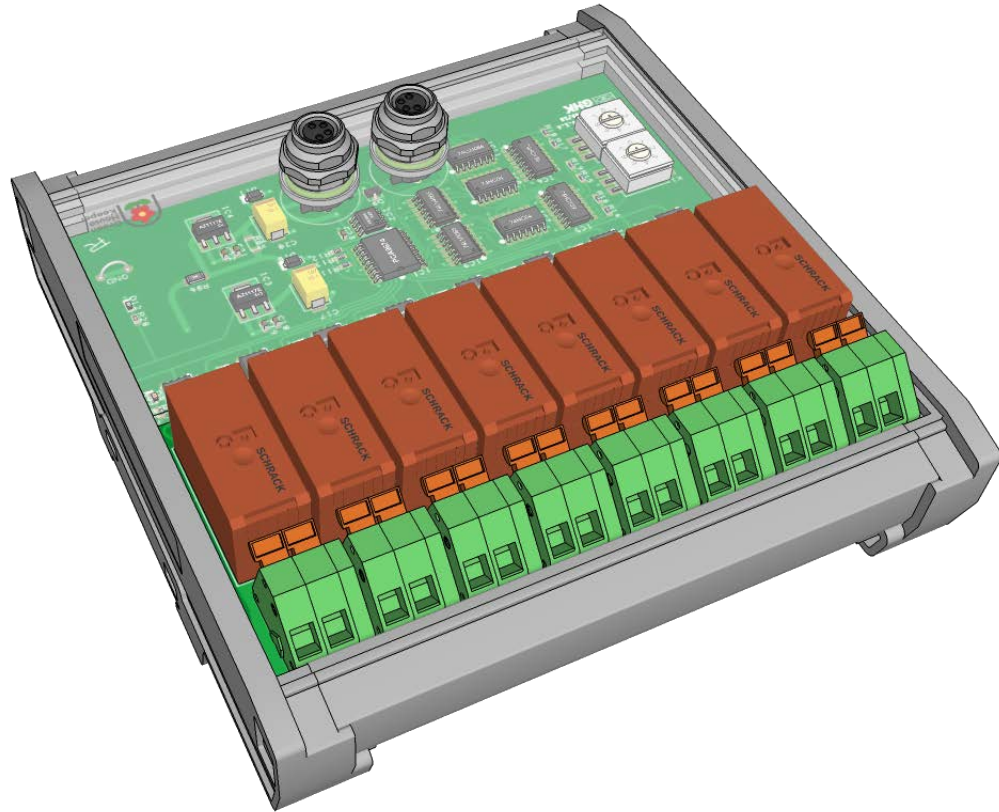
Several prerecorded modules & pre-programming service according to your growth book



```
1 var samples = plc_currentValues();
2 /*----- paramétrage du pH -----+
3 | Changer pour les bonnes valeurs |
4 +-----*/
5 var pH_moyen = 5.5; // moyenne de référence
6 var hysteresis_pH = 1; // variation
7 var fct_pump_PHD = 1; // en seconde
8 var analyse_tps_pH = 1; // en minute temps entre deux dosage
9 /*----- paramétrage de l'EC -----+
10 | Changer pour les bonnes valeurs |
11 +-----*/
12 var EC_moyen = 2000; // moyenne de référence
13 var hysteresis_EC = 100; // variation
14 var fct_pump_WN2 = 1; // en seconde pour pompe 2
15 var fct_pump_WN3 = 1; // en secondes pour pompe 3
16 var analyse_tps_EC = 1; // en minute temps entre deux dosages
17
18 /*----- tâche de dosage de l'EC -----+
19 | Mettre en marche les pompes péristaltique quand l'EC est trop bas. |
20 | Effectuer cette vérification toutes les x minutes. |
21 +-----*/
22 Dosage_EC();
23
24 function Dosage_EC() {
25   print("===Starting Dosing EC ===");
26   print("- EC: " + samples["EC"]["ec"] + " µS/cm");
27   if (plc_currentValues()["EC"]["ec"] < EC_moyen - hysteresis_EC) { // pH bas, on allume les pompes péristaltiques
28     print("EC bas");
29     plc_activate("WN2", 100);
30     plc_activate("WN3", 100);
31     setTimeout(periodesPumpWN2Stop, fct_pump_WN2 * 1000);
32     setTimeout(periodesPumpWN3Stop, fct_pump_WN3 * 1000);
33   } else {
34     print("EC ok");
35   }
36 }
37 setTimeout(Dosage_EC, analyse_tps_EC * 60000); // 1 min = 60000 ms
```

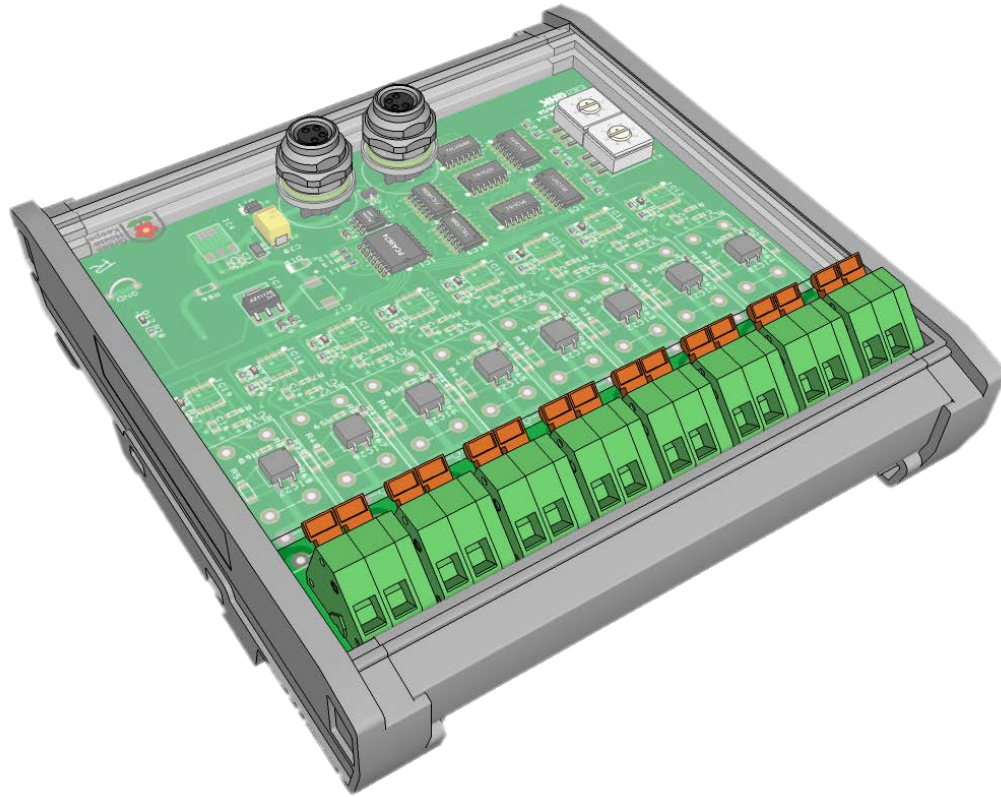
Equipment Control

Electromechanical relay box



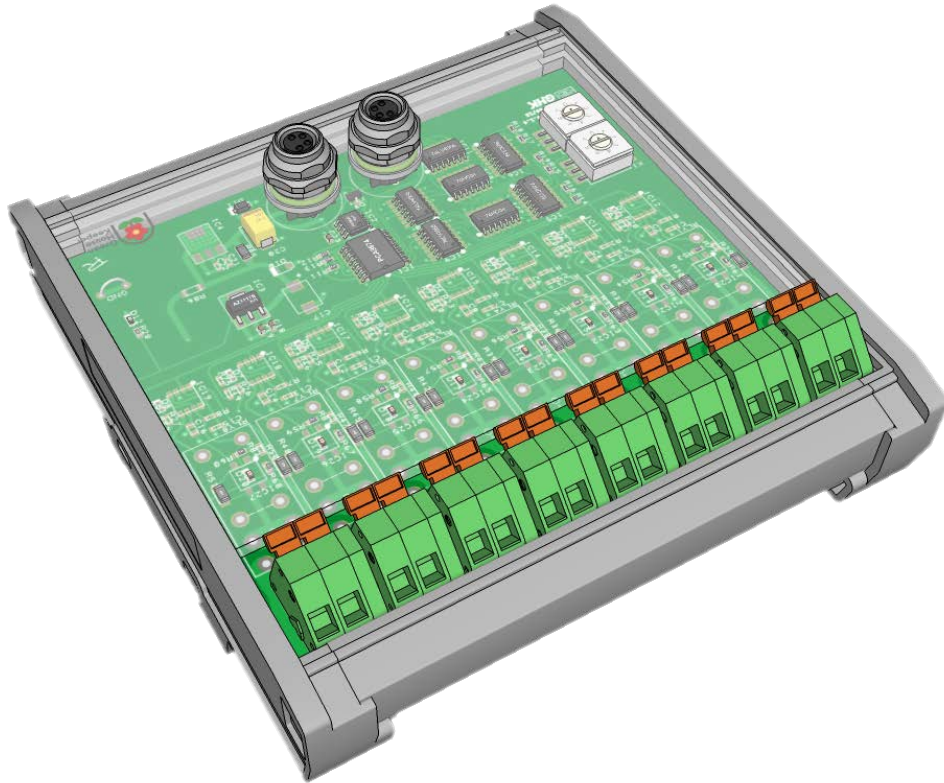
- 8 relays 16A
- DIN Rail Version
- Support any voltage 5V / 12V / 24V / 110V / 220V
- ON / OFF action of equipment
- Ventilation, peristaltic pumps, watering pumps, lighting ...

Static contact box



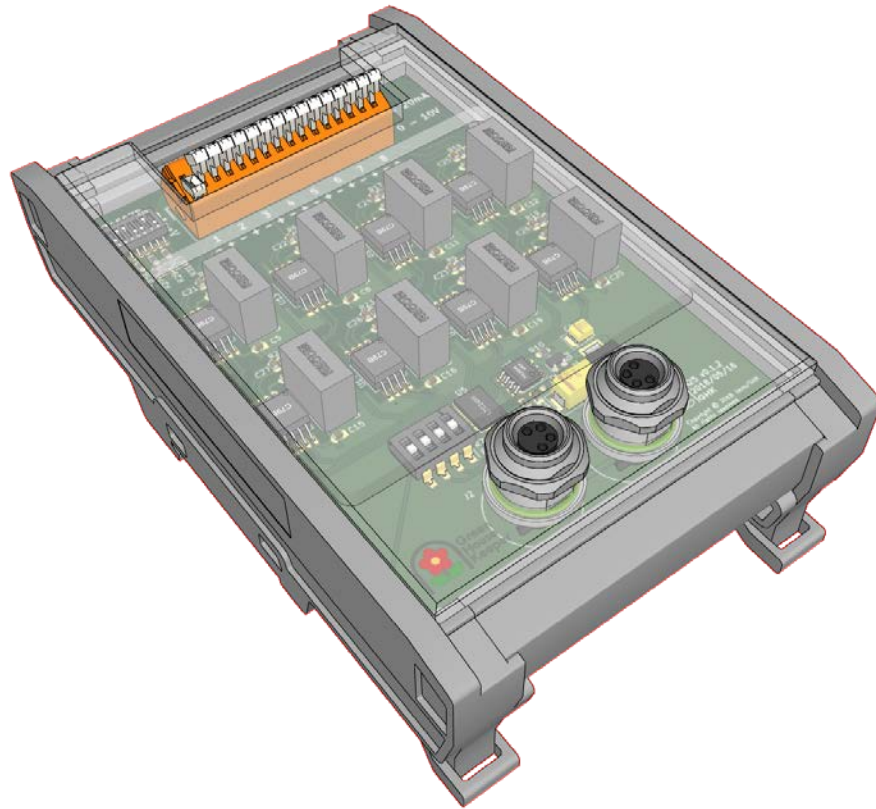
- 8 SSR relays
- DIN Rail Version
- Support voltage 5V / 12V / 24v
- ON / OFF action of equipment
- Lifetime / reliability of millions of switching cycles
- High switching frequency
- Ventilation, peristaltic pumps, irrigation pumps, solenoid valve, lighting ...

Dry contact card



- 8 dry contacts
- DIN Rail Version
- Works with all NO / NC contact sensors
- Water level, pressure switch, rain sensor, fault detector ...

4-20mA & 0-10v card



- 8 sensors contacts
- DIN Rail Version
- Works with all sensors 0-20mA & 0-10v
- Compatible with all industrial sensors on the market

Air analysis

Weather probe

Multi-sensor all in one :

- Temperature
- Humidity
- Lux
- CO2 / TVOC
- Atmospheric pressure



Sensor extension



- **Allows multiple identical sensors to be installed at the production site**
- **Measure a large area of culture evenly**
- **Up to 7 identical sensors**

Water analysis & Nutrient Solution

pH / EC / T ° sensor



- pH / EC / T ° receiver
- Hanna-Instrument Probe
- Temperature correction
- Software Calibration



Peristaltic pump



- Custom construction
- Up to 8 pumps per case
- Two models to choose ECO or PRO
- Several flows of your choice

LED lighting

LED lighting range

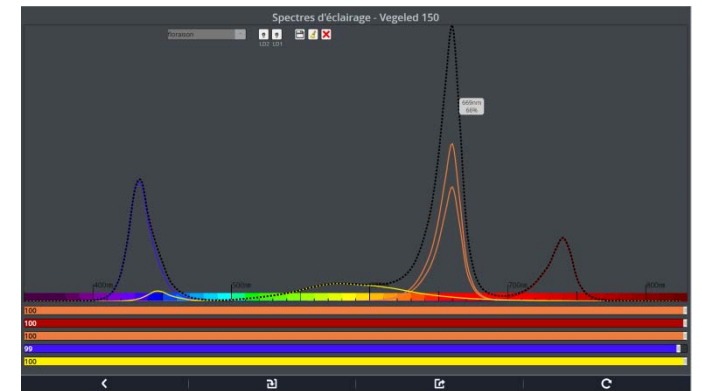
- Wide choice of projectors and LED strips from our partner Vegeled
- Consulting and project study
- Realization of lighting plan
- Achievement of connected lighting
- Custom design



Multispectral LED Light Connected



- Model LX243
- From 2 to 6 controllable wavelengths
- Creating custom spectrums
- LED power: 250W
- Up to 1500 μmol at 50 cm
- Customized offer the choice of wavelengths (UV -> NIR)
- IP65
- Angle beam calculate according to the lighting area
- Passive cooling

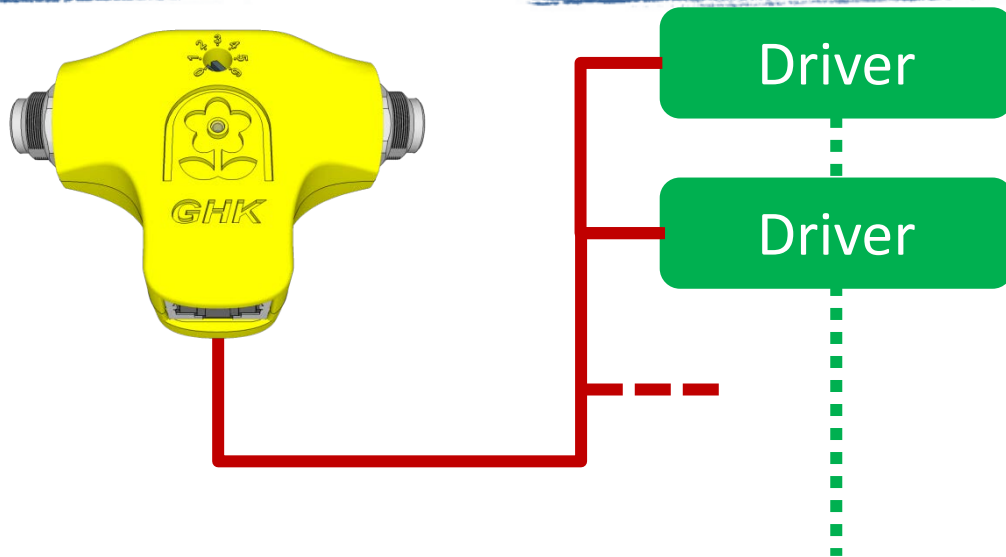


DMX controller



- DMX 512 Controller
- Up to 7 per site
- Control LED Drivers DMX, & 0-10v power supplies
- Dimming 0 to 100%

DMX Lighting Control



- DMX bus 512
- Light intensity controlling a majority of light sources in the market
- Creation or modification of spectrum
- Increase or decrease in bright intensity
- Ideal with LED strips

DMX decoder



- 5-channel DMX decoder
- Constant current
- Up to 3 A & 48v max per channel
- Dimming 0 to 100%
- LED projector and led strip controller
- RJ45 DMX input and output

Culture trolley

Danish Trolley custom

**Trolley design for germination,
planting
or plant production**

**Wide choice of automation and options
(lighting, water nutrients station, irrigation ...)**



Sample projects

Projects completed

Agripolis

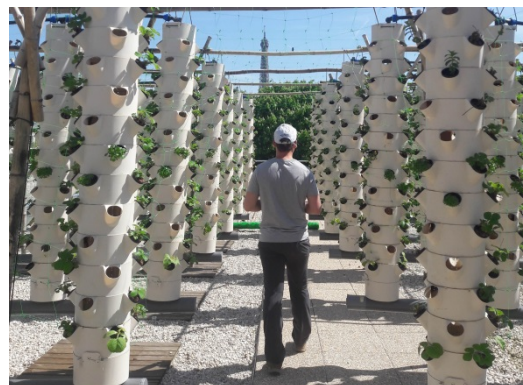
Hôtel Mercure Boulogne Billancourt (Accor)-Mars 2017-2018

Immeuble Belleville (Syndicat)-Juin 2017

Siège de Carrefour, Massy Mai 2017

Carrefour St Geneviève Mai 2017- 2018

Paris 16E - Collège Eugène Delacroix



Automate & crop monitoring Roof Top



Projects completed



Automate & crop monitoring container



Projects completed



Multipsectral LED lighting installation, February 2017



Projects completed



REFARMERS

Lighting & crop monitoring in Sweden



Projects completed



Custom Multispectral lighting



Projets réalisées



Installation of a smart LED lighting system for mosquito study, May 2017



Aquaponics container monitoring system, April 2017

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IRSTEA

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GreenHouseKeeper at a glance

- January 2017 creation
- Maturation of solutions with 4 years of R & D (2013-2016)
- Commercial launch of connected solutions: Q1 2017
- Backed by BIC, LRI
- associates:
 - -Pierre Joram | CEO, Dr. Pharmacy and specialist in Plant Physiology
 - -Pierre Richard CTO (PhD, Dev HW & SW) | «Training electronics technician»
- Scientific & academic partner IRSTEA
 - -Ministry of Agriculture, Agri-Food and Forestry
 - -Ministry of Research
- Advanced technology
- Multithreaded Linux Server
 - -PLC Ecmascript program
 - - LED spectral dimming
 - -Library of culture programs (algorithmic resulting from the sciences of agriculture)
 - - Multispectral camera development analysis of physiological parameters of plants (real-time warning of deficiencies and symptoms related to diseases) | end Q2 2018
- -Multisupports digital (smartphone / tablet PC / laptop)



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