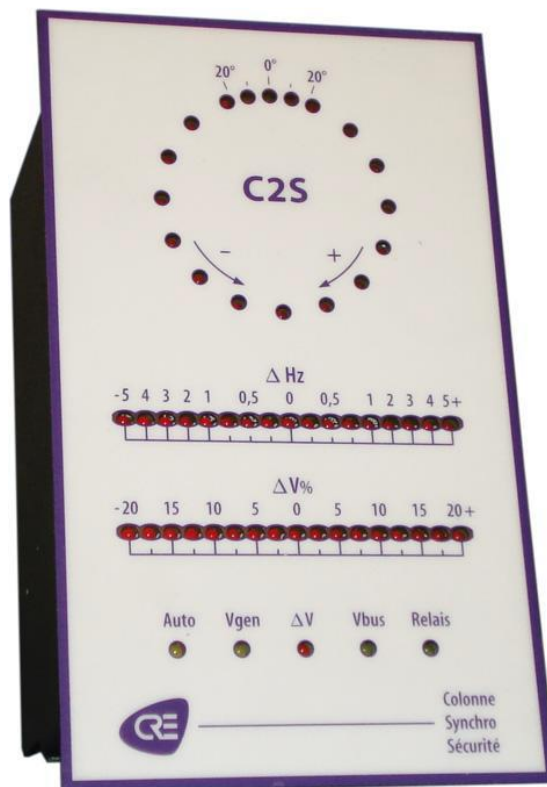




C2S

Technical documentation

"SYNCHRONIZATION AND SAFETY COLUMN"



CRE Technology believes that all information provided herein is correct and reliable and reserves the right to update at any time. CRE Technology does not assume any responsibility for its use. E & O E.

TECHNICAL DOCUMENTATION HISTORY

Date	Version	Commentaires
N/A	H	- Never released
03/29/2016	I	- "CE" gaskets reference deleted. - Note about non-CE marked gasket deleted
02/06/2016	J	- Reference to potentiometers RV1/RV2 instead of RV2/RV3. - Wrong terminal numbers in the text of the wiring chapter (wiring diagram was OK). - Removed obsolete mention of conductive paint and gasket. - Updated layout. - Minor typos.
05/29/2024	K	- Deletion of information relating to the C2S 230V model, which has become obsolete.

NOTE



Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Apply all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

Motors, turbines and any other type of generator must be equipped with appropriate protections (Overspeed, high temperature, low pressure, etc. depending on the power plant).

Any changes of the normal use of the equipment can cause human and material damage. For further information, please contact your CRE technology distributor or the After-Sales Service Team.

All CRE Technology products are delivered with one year warranty, and if necessary we will be happy to come on site for product commissioning or troubleshooting. The company also provide specific trainings on our products and software.



INFORMATION

You can download the most up-to-date version of this documentation and different other documentations relating to C2S on our web site: <http://www.cretechnology.com>.

TABLE CONTENT

1	INTRODUCTION	4
2	OPERATION	5
2.1	PUTTING INTO SERVICE	5
2.2	AUTO/MANUAL MODE.....	5
2.3	AUTHORISING SYNCHRO-CHECK RELAY	5
3	CONFIGURATION - FACTORY SETTINGS	6
3.1	POTENTIOMETERS	6
3.2	MICRO-SHUNTS	6
4	PUTTING INTO SERVICE – CONTROL	7
5	EMC PRECAUTION - CE MARK CONFORMITY	8
6	WIRING DIAGRAM	9
7	ENVIRONMENT – CHARACTERISTICS	10
8	SIZE	11
9	MOUNTING	12
10	CRE TECHNOLOGY, WHERE TO FIND US	13

1 INTRODUCTION

This second generation microprocessor module, created by CRE technology, is a module for manual coupling which integrates a synchronisation column and the synch-check authorisation relay. The synchronisation column allows visualisation of phase, frequency and voltage difference between one or several generating sets to be paralleled to a bus bar or reference bus. The authorisation relay allows safe coupling when all conditions meet the requirements of the installation.

This new version of C2S features the following functions:

- CE mark conformity, thanks to a new electronic and mechanical design
- No need for external DC power supply. Unit is supplied through generator voltage V_{GEN} .
- Reduced size allowing the use of DIN92 tools.
- Measurement of generator voltage and reference bus in 100, or 400V_{AC} applications:
 - For 100 V_{AC}, ordering reference A25Z0.
 - For 400 V_{AC}, ordering reference A25Z2.
- Display of phase difference between the generating set and the reference bus by an 18 LEDs synchronoscope (360°).
- Display of frequency difference between the generating set and the reference bus by a 17 LEDs bargraph (+/-5Hz), the frequency set at 50 or 60 Hz.
- Display of voltage difference between the generating set and the reference bus by a 17 LEDs bargraph (+/-20%).
- Display by LEDs of the following information:
 - Presence of generator voltage (**V_{GEN}**).
 - Presence of reference bus voltage (**V_{BUS}**).
 - Voltage difference fault (**ΔV**).
 - Synchronisation/coupling in automatic mode (**Auto**).
 - Closed coupling authorisation relay (**Relais**).
- Paralleling authorisation in manual mode by an isolated contact (Checks phase, frequency and voltage difference).
- Micro shunt option to authorise the closure of the circuit breaker on a dead bus if $V_{BUS}=0$ and if V_{GEN} is between 85% and 115% of the nominal value.

2 OPERATION

2.1 PUTTING INTO SERVICE

The Synchronisation and Safety Column (C2S) is powered by the generator voltage connected on terminals 4 and 5.

WARNING: C2S unit is powered from 60% of nominal generator voltage value, and up to 115% as a maximum. Voltage higher than 115% of rated value will damage the unit.

2.2 AUTO/MANUAL MODE

The bargraphs and signalling of the C2S module function as follows:

- In manual mode (terminals 6-7 open), all the displays and functions are in order. "AUTO" LED is off.
- In automatic mode (terminals 6-7 closed), the synchronoscope and the 2 differential bargraphs (voltmeter and frequency meter) are in order. "Auto" LED is lit. Other LEDs are OFF and the relay will never be activated.

WARNING: The synchronoscope only comes back on line when the frequency difference is less than 0.5Hz.

2.3 AUTHORIZING SYNCHRO-CHECK RELAY

The relay authorising manual coupling is activated when all conditions below are met:

- Frequency difference is within the limits of $\pm 0,1\text{Hz}$ (no adjustment to be made).
If the synchronoscope is OFF then the frequency difference is more than 0.5 Hz and is displayed on the frequency bargraph. If the frequency bargraph ΔHz displays a negative difference then you should increase the speed of the generating set.
- Phase difference is within the limit set by potentiometer RV2 "Phase difference" ($\pm 5^\circ$ to $\pm 20^\circ$).
When the synchronoscope turns clockwise, the generating set is running faster than the busbar. You should slow down the engine speed.
- Voltage difference is within the limit set by potentiometer RV3 "Voltage difference" ($\pm 2.5\%$ to $\pm 20\%$).
If the voltage bargraph ΔV displays a negative difference then you should raise the voltage of the generating set.
- Bus and generator voltages are both between 85% and 115% of their nominal value.
- Bus and generator frequencies are both between 45Hz and 65Hz.

3 CONFIGURATION - FACTORY SETTINGS

To access potentiometers and micro-shunts, it is necessary to remove the back cover of the module.

WARNING: Check that no voltage is present on the terminal trip before removing the cover.

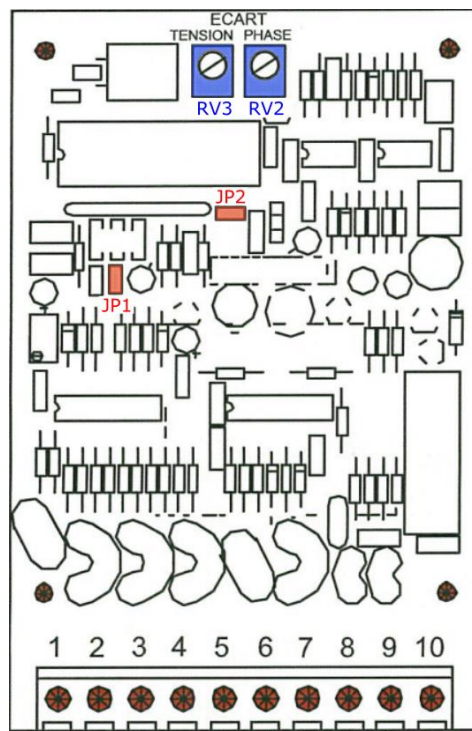
3.1 POTENTIOMETERS

- **RV2 "phase difference"**: adjustment of the allowed phase difference between $\pm 5^\circ$ (fully counter-clockwise) and $\pm 20^\circ$ (fully clockwise).
Factory setting: 10° .
- **RV3 "voltage difference"**: adjustment of the allowed voltage difference between $\pm 2.5\%$ (fully counter-clockwise) and $\pm 20\%$ (fully clockwise).
Factory setting: 10%.

Note: potentiometer RV1 is factory configured and should not be altered.

3.2 MICRO-SHUNTS

- **JP1**: authorises the closure of the output relay on a dead bus when the generator voltage is between 85% and 115% of the nominal value.
 - WITH: Closure of the relay if $V_{BUS}=0$ or if $V_{BUS}=V_{GEN}$
 - WITHOUT: Closure of the relay only if $V_{BUS}=V_{GEN}$
 - **Factory setting: WITHOUT.**
 - **JP2**: enables a self-test of all LEDs when the system is powered up.
 - WITH: Self-test in order.
 - **Factory setting: WITHOUT.**
- *NOTE: the test of the LEDs lasts approximately 8 seconds.*



4 PUTTING INTO SERVICE – CONTROL

- Disconnect the wires from the output relay (terminals 8-9), so as to prevent unintended coupling of the generator to the bus.
- Feed the C2S module with generator voltage V_{GEN} , on terminals 4 and 5 and connect bus voltage on terminals 2 and 3.

Both the generator and the bus voltage should be present before continuing this test.

- Check the relationship between the phases applied in V_{GEN} (terminals 4-5) and V_{BUS} (terminals 2-3) on the C2S

WARNING:

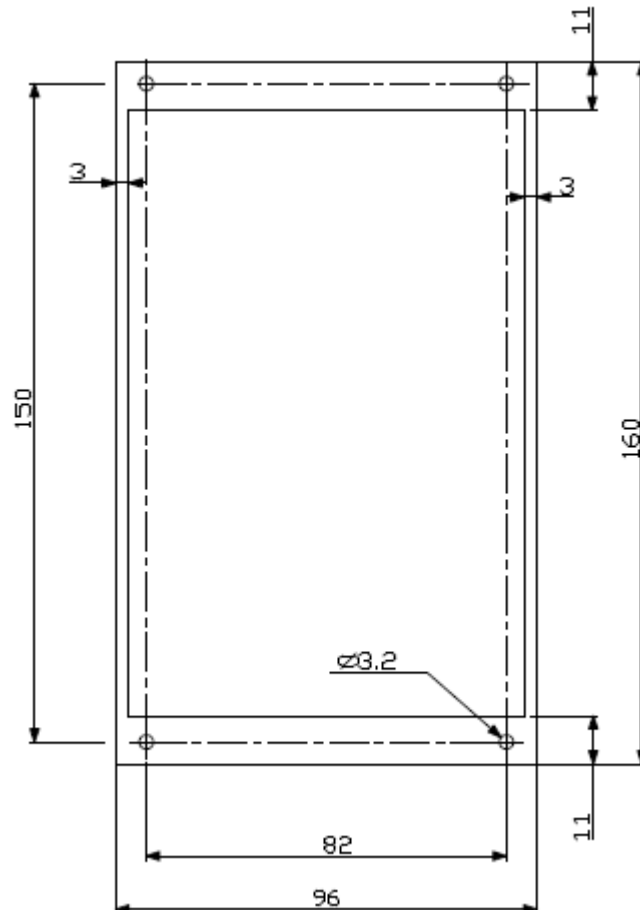
- *2 opposite phases will generate a 180° coupling.*
- *Different phases on V_{GEN} and V_{BUS} will generate a +/-120° coupling.*

-
- Check that the voltage presence LEDs for the generator (V_{GEN}) and the bus (V_{BUS}) are lit. They light up as soon as their corresponding voltage reaches a level between 85% and 115% of the nominal value. If one of those 2 LEDs is not lit, then the output relay will never be activated.
 - The "voltage difference fault" LED (ΔV) indicates that the voltage difference between the generator and the bus is greater than set by potentiometer RV2 "voltage difference". This difference is displayed on the differential voltmeter. If this LED is lit, the authorisation relay will never be activated.
 - The automatic mode LED (**AUTO**) indicates that the synchronisation and coupling are carried out by an automatic synchroniser. If this LED is lit, other information LEDs are inhibited except voltage and frequency bargraphs. In this mode, the output relay will never be activated.
 - The relay LED (**RELAIS**) lights up when the output relay is activated. The relay and this LED remain activated as long as the phase, frequency and voltage differences are within the pre-set limits. If micro-shunt JP1 is in place, then both the relay and its corresponding LED are active when $V_{BUS}=0$ and V_{GEN} is present.

5 EMC PRECAUTION - CE MARK CONFORMITY

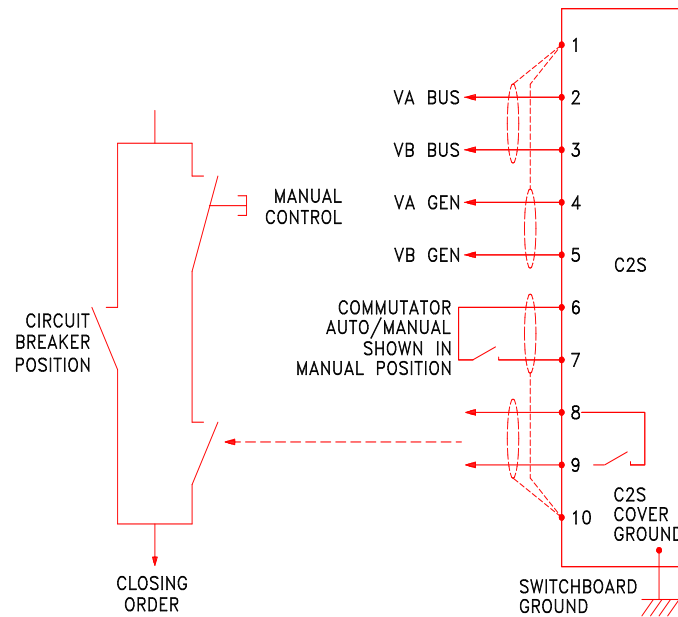
The C2S version A25Zx is conform to European CE mark requirements. Here below some tips to use the C2S.

- Faraday cage effect:
If the back cover needs to be removed, replace it afterwards and check that screws are fully tightened.
- For IP65 protection, use a gasket. For more details about the positioning and the dimensions (in mm) of the gasket, refer to the following diagram.



- Equipotentiality:
To assure an efficient potential ground line between the C2S and the switchboard, we recommend connecting the switchboard ground directly to the C2S terminal ground on the back cover (see connection diagram below).
- Shielding connection:
To avoid EM interference we recommend connecting shielding of signal wires on terminals 1 and 10.

6 WIRING DIAGRAM



The voltage V_{BUS} of the reference bus is connected by 2 wires on terminals 2 and 3.

The voltage V_{GEN} of the generating set is connected by 2 wires on terminals 4 and 5.

If the supplying voltages are greater than the C2S nominal inputs, use reducing transformers.

WARNING: Check carefully that the phases connected on the generator voltage are the same as those connected on the reference bus voltage and in the same order. Remember that 2 opposite phases will generate a 180° coupling and that different phases used on the generator and the bus sides will generate a $\pm 120^\circ$ coupling.

7 ENVIRONMENT – CHARACTERISTICS

- **Power supply / Alternative input voltages:**

- Generating set voltage (V_{GEN}) and power supply: 50 and 60 Hz (maximum consumption < 4VA).
- Reference bus voltage (V_{BUS}): 50 and 60 Hz (maximum consumption < 0.1VA).

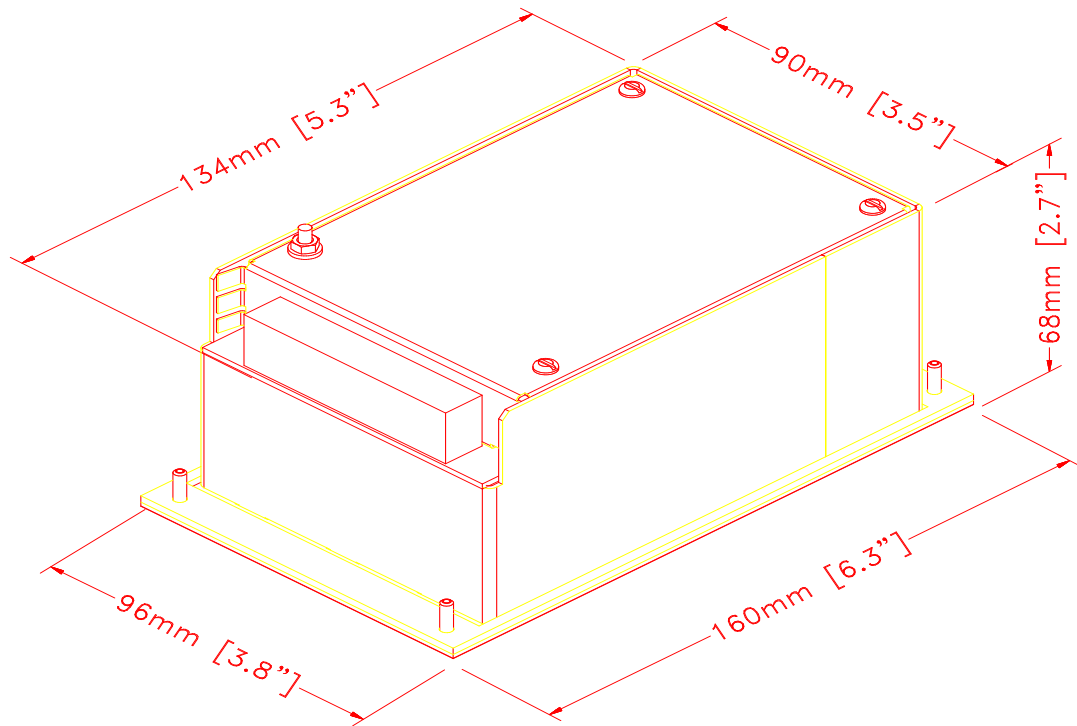
Ordering reference	Measuring range	Max voltage
A25Z0	100V ± 15%	130V
A25Z2	400V ± 15%	480V

- **Operating temperature:** -25 à +85°C.
- **Humidity:** Tropic-proof circuits for normal operation in humid conditions.
- **Tightness:** Front panel IP65 Protection if using an appropriate gasket.
- **Weight:** 0.9 kg.
- **Size / Mounting:** see dedicated chapters.
- **Output relay contact:**

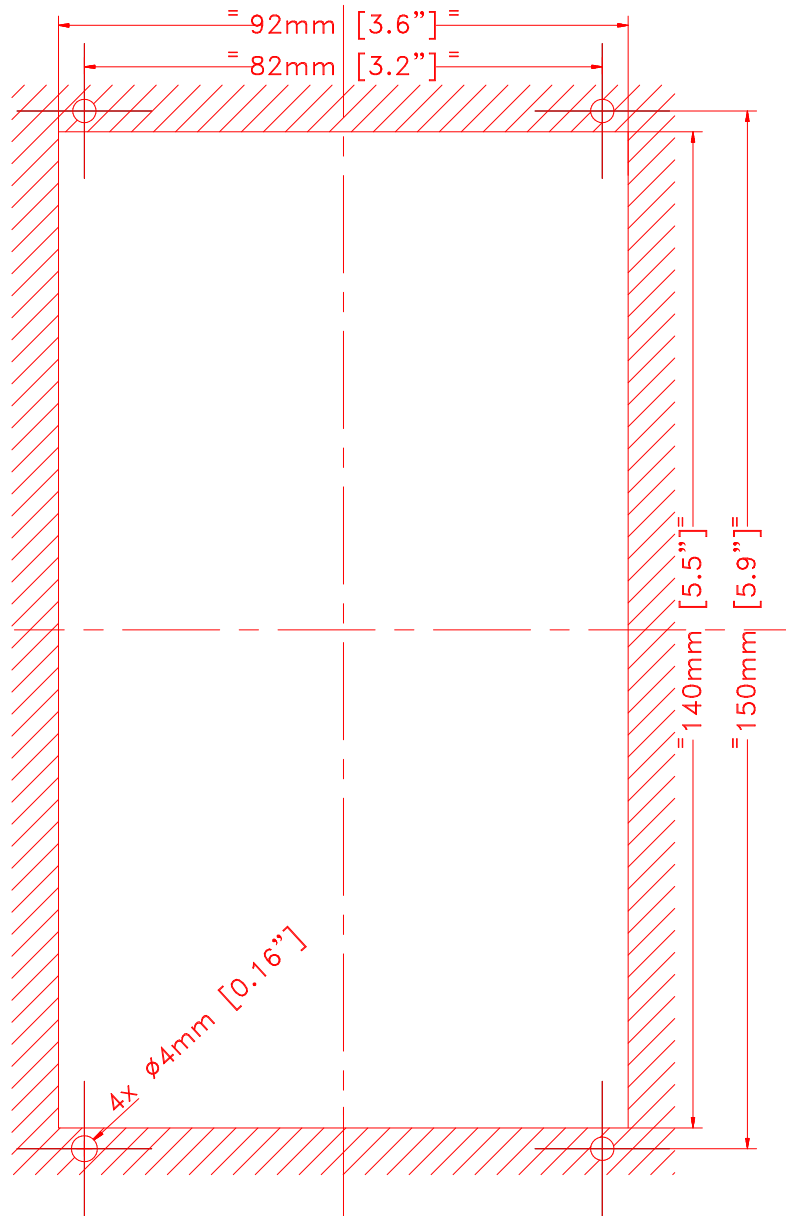
Cutting power:	2000VA resistive load
Nominal voltage /Maximal cutting voltage	250V _{AC} /440V _{AC}
Nominal cutting current	8A

NOTE: Differential voltage bargraph is flashing when one or both of the voltage is out of the nominal range (see above) and different than zero.

8 SIZE



9 MOUNTING



10 CRE TECHNOLOGY, WHERE TO FIND US



130 Allée Charles-Victor Naudin
Zone des Templiers – Sophia Antipolis
06410 – BIOT
FRANCE



Phone: +33 492 38 86 82

Fax: +33 492 38 86 83

Website: <http://www.cretechnology.com>



Email: info@cretechnology.com



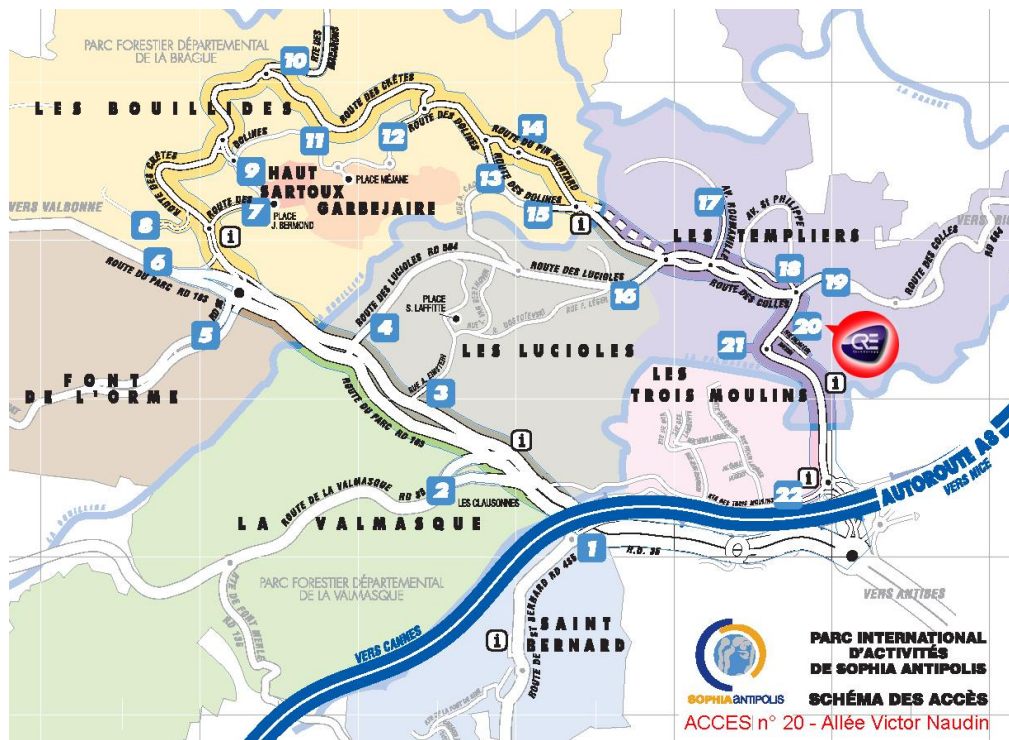
Technical support: +33 492 38 86 86 (8H30-12H00 / 14H00-18H00 GMT+1)

Email: support@cretechnology.com



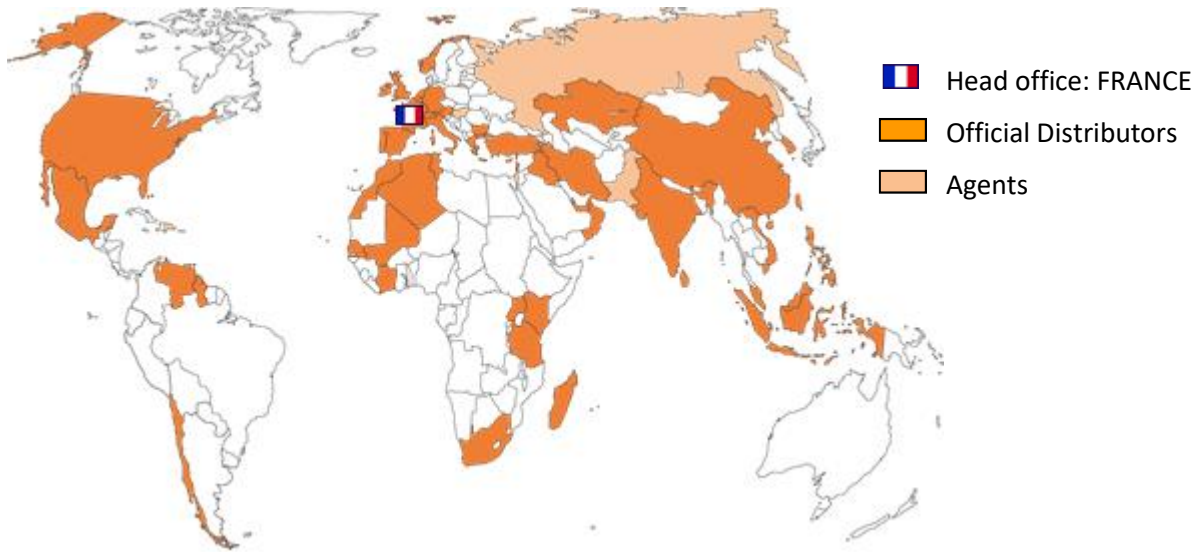
SKYPE: support-cretechnology.com

SARL au Capital de 300.000 Euros - RCS Antibes: 7488 625 000 15 N°TVA FR54 488 625 583



Access to CRE Technology

Check our distributor network around the world, www.cretechnology.com tab "DISTRIBUTORS"



CRE Technology distributors

CRE Technology retains all copyrights in any text, graphic images, and software owned by CRE Technology and hereby authorizes you to electronically copy documents published herein solely for the purpose of transmitting or viewing the information.

© copyright
all rights reserved