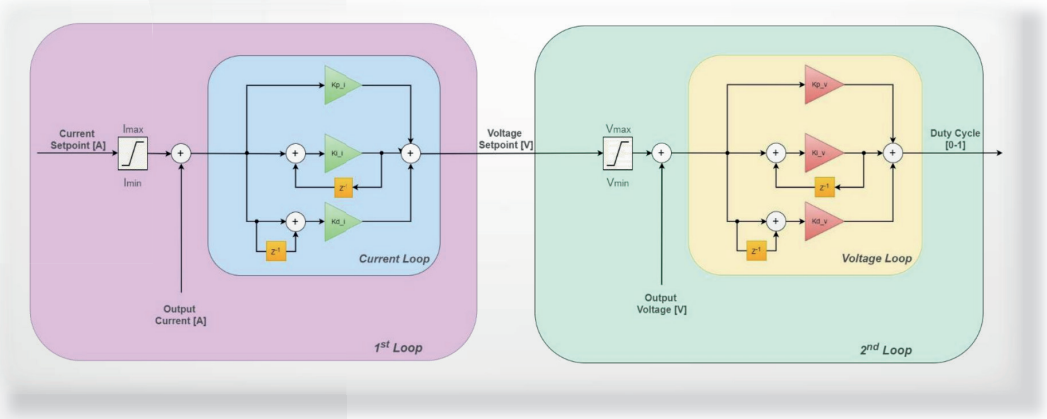
PROCEDURE FOR ADAPTING THE PID PARAMETERS FOR THE Fast-Bi-1k5

Pre-Information

All CAEN ELS power sourse are digitaly controlled. This means that an adaptation to any load can be achieved simply by changing the Software PID-Parameters.

Fast-Bi-1k5 power supply a have double control loop that continously controls voltage and current. Current Control Loop and Voltage Control Loop diagram is hereafter presented:



PID SETTINGS

Name	Value
PID Max Voltage	21
PID Min Voltage	-21
PID Max Current	101
PID Min Current	-101
PID V Kp	0.0005
PID V Ki	0.0002
PID V Kd	0
PID I Kp	0.05
PID I Ki	3e-05
PID I Kd	0

The PID-parameters consist in 6 values that can be input through the web-server interface: V Kp, V Ki, V Kd, I Kp, I Ki, and I Kd.

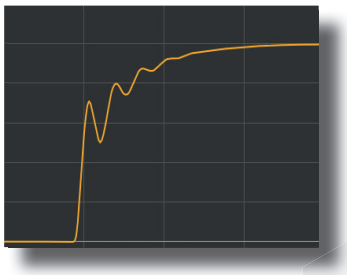
PID PARAMETER ADAPTATION

Target

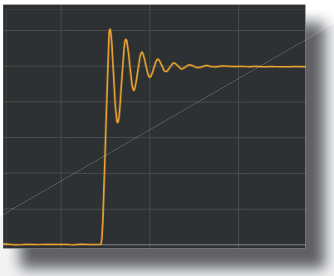
Target is to adapt PID values for a specific load connected to the Fast-Bi-1k5 power supplies that it is performing in an ideal way: Fast Rise Times, No Overshoot (or small Overshoot), No Oscillations.

UNWANTED STEP RESPONSE:

NO

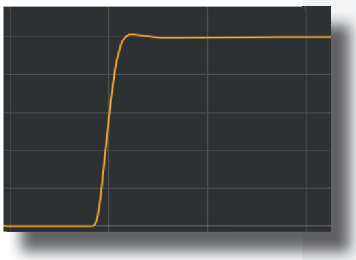


NO



DESIDERABLE STEP RESPONSE:

YES



PID Adaption-Procedure

Due to safety concerns for both the source and the load, caused by potential dangerous high-frequency oscillations, the PID parameters should be set to very low values at the beginning of each adaptation for an unknown load.

To proceed follow these steps:

1. It is recommended to start with these parameters (safe side):

   V Kp = V Ki = I Kp = I Ki = 0.00001 and V Kd = I Kd = 0

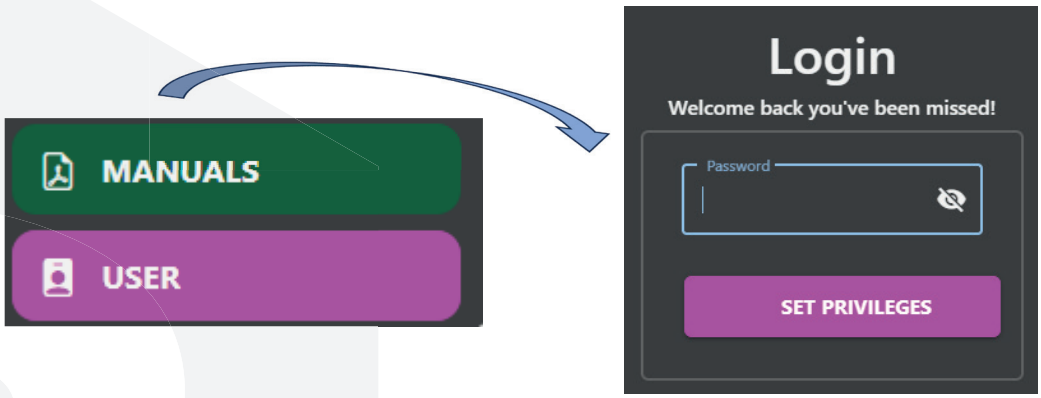
2. (Kd typically should not to be changed due to its minor influence on the result. Only in very special cases with exeptionally high demands , such as with superconducting magnets, might it be adjust).

3. During PID adaptation procedure, set current and voltage to approximately 10% of the nominal value.
   (i.e. if the PS is a 20 A - 100 V model set Current and Voltage from 0 to 2A/10V).

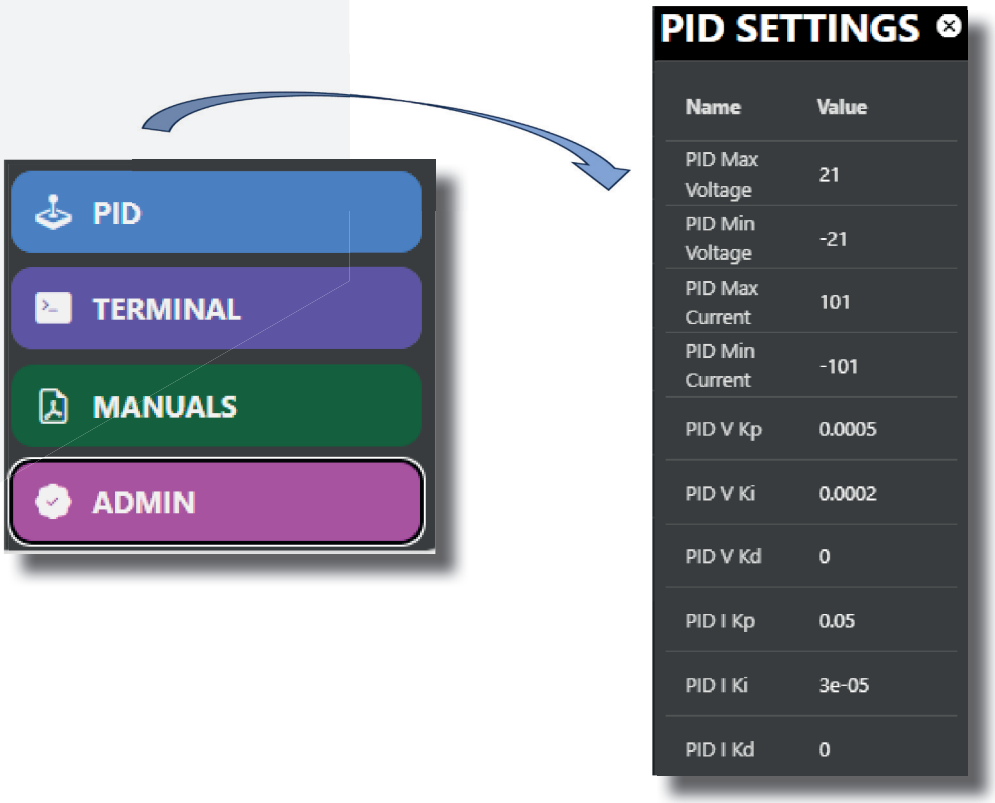
ATTENTION: The PID parameters are specific to each power source series. For example, it is not possible to use the same parameters for a Fast-Bi-1k5 020100X that were determined for a Fast-Bi-1k5 030050X!

Open the **Device Manager** main menu from web server:

- Click on **USER** at the lower right side of the screen.
- Enter the password (ps-admin) to log in with administrator privileges.

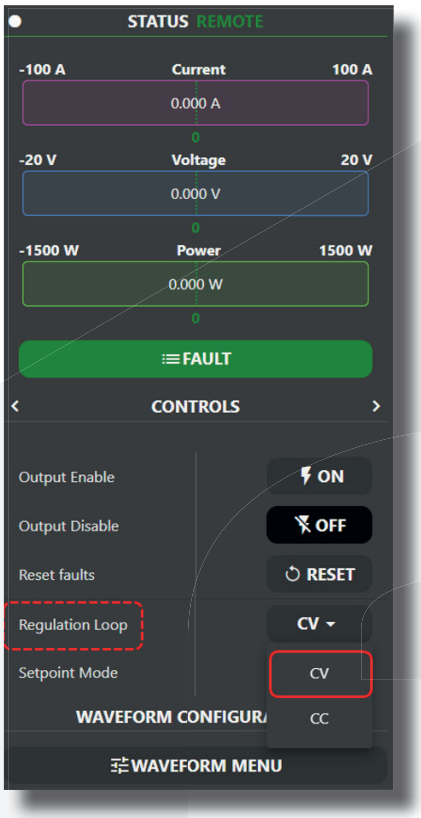


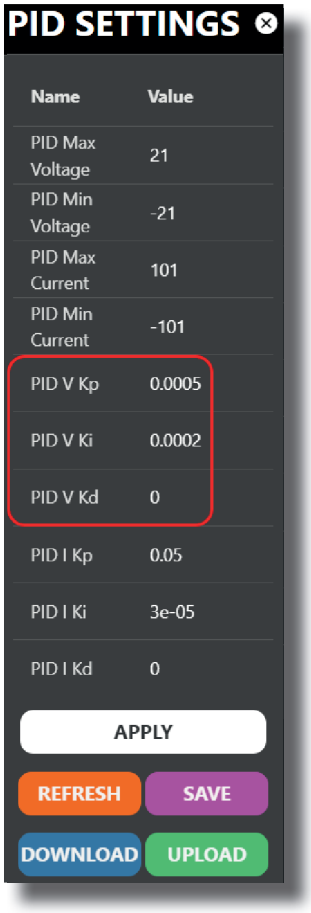
- Press **PID** button to access the **PID SETTING**.



From the main screen:

- In the drop-down **Regulation Loop** menu set **CV** (costant voltage).





CV-Mode

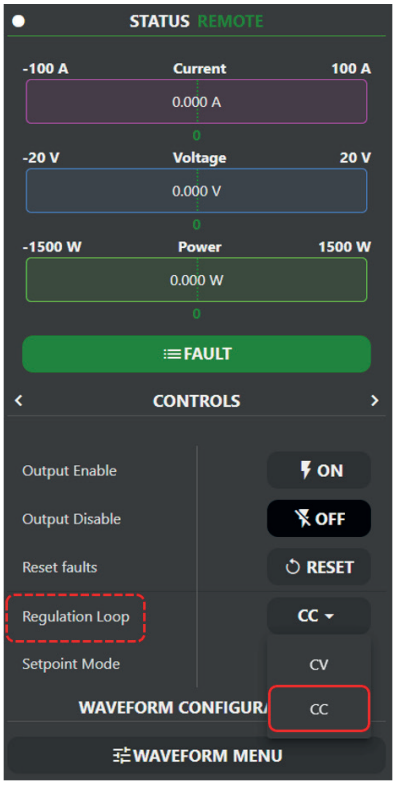
Following the **Voltage Control Loop Adaption** flowchart:

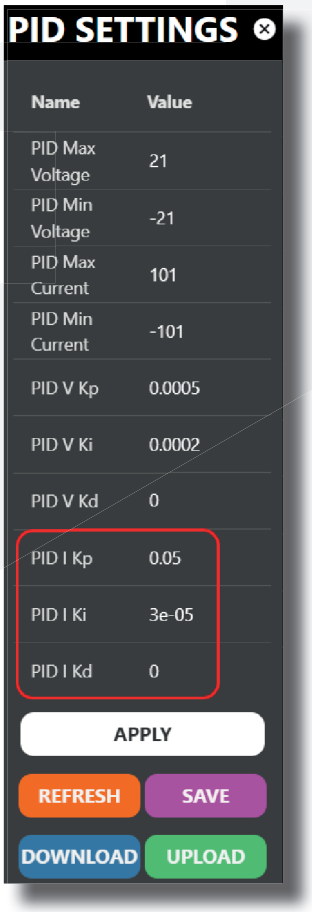
- Adapt the **V Kp** parameter.
- Adapt the **V Ki** parameter .

- For each parameter inserted, press **Enter**.
- Press **Apply** and **Save** to store the settings.

From the main screen:

- In the drop-down **Regulation Loop** menu set **CC** (costant current).





CC-Mode

Following the **Current Control Loop Adaption** flowchart:

- Adapt the **I Kp** parameter.
- Adapt the **I Ki** parameter .

- For each parameter inserted, press **Enter**.
- Press **Apply** and **Save** to store the settings.

Voltage Control Loop Adaption

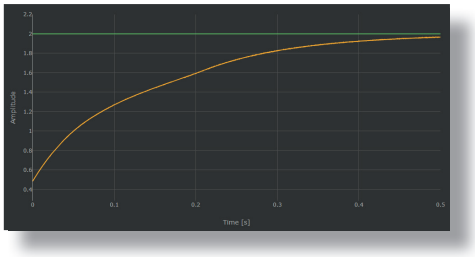


Fig. A

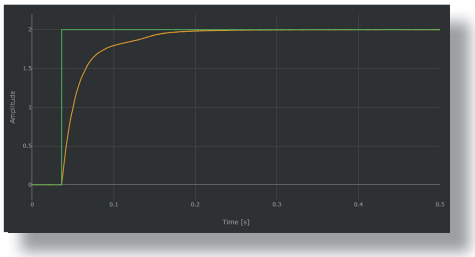


Fig. B

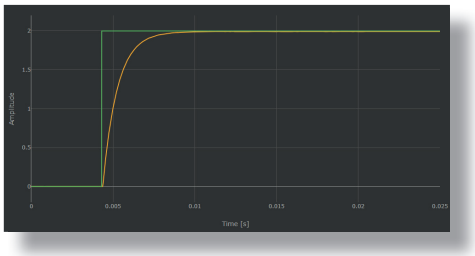


Fig. C

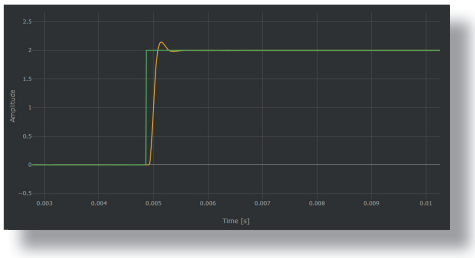
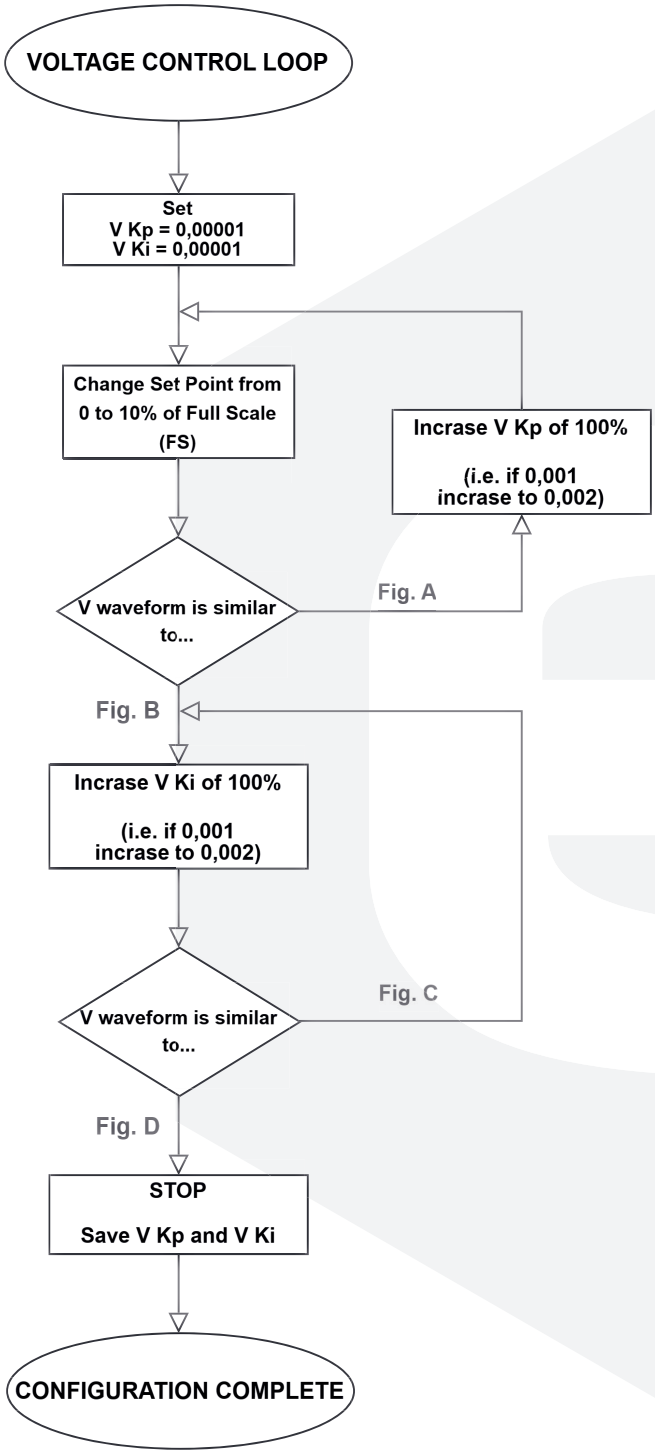


Fig. D



NOTE: In some cases when Fig.D is obtained, a further increase of Kp may reduce the voltage overshoot.

Current Control Loop Adaption

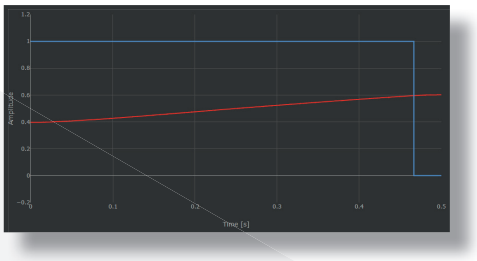


Fig. A

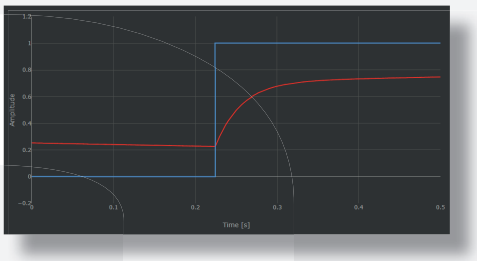


Fig. B

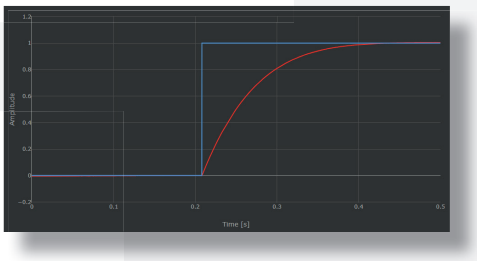


Fig. C

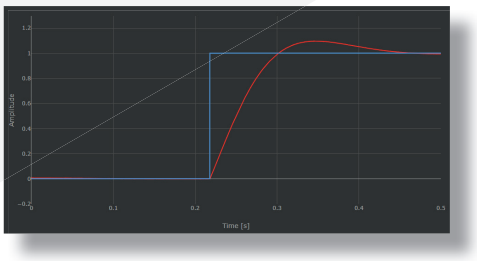
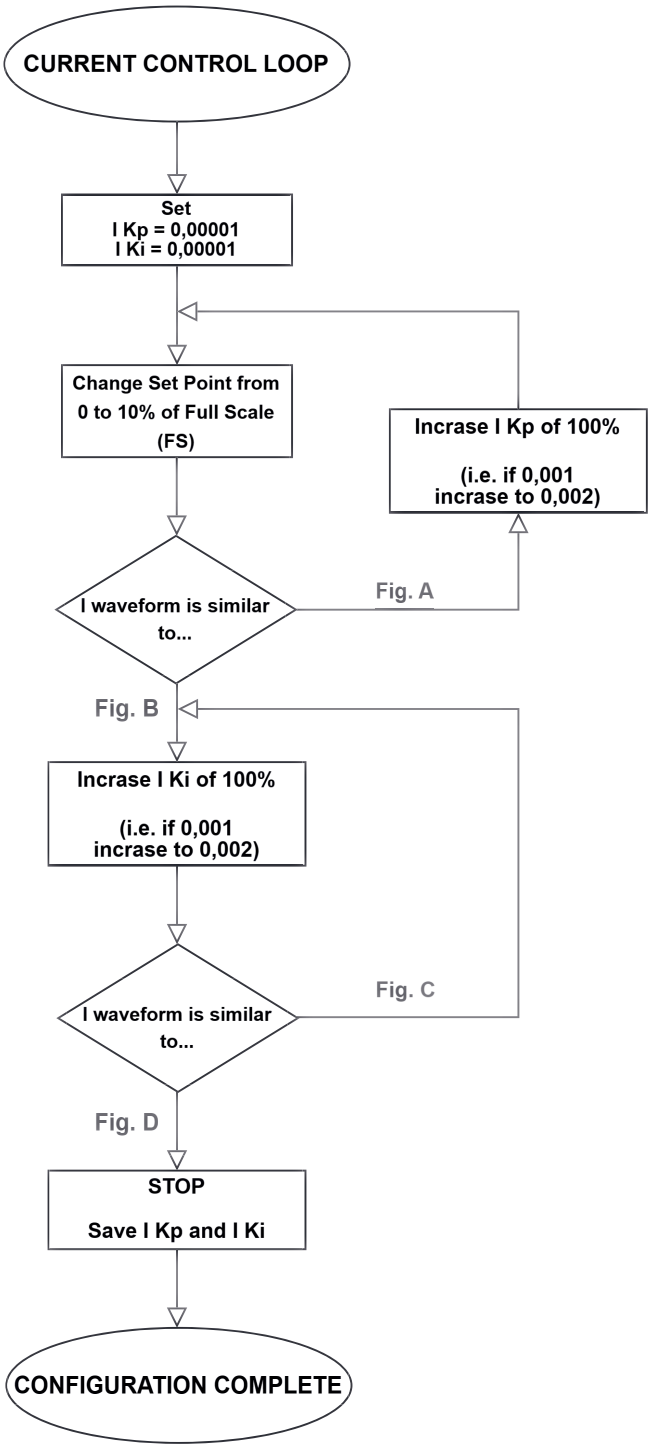


Fig. D



NOTE: In some cases when Fig.D is obtained, a further increase of Kp may reduce the current overshoot.

PID PARAMETER ADAPTATION

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- Beamline Electronics Instrumentation
- FMC and MicroTCA

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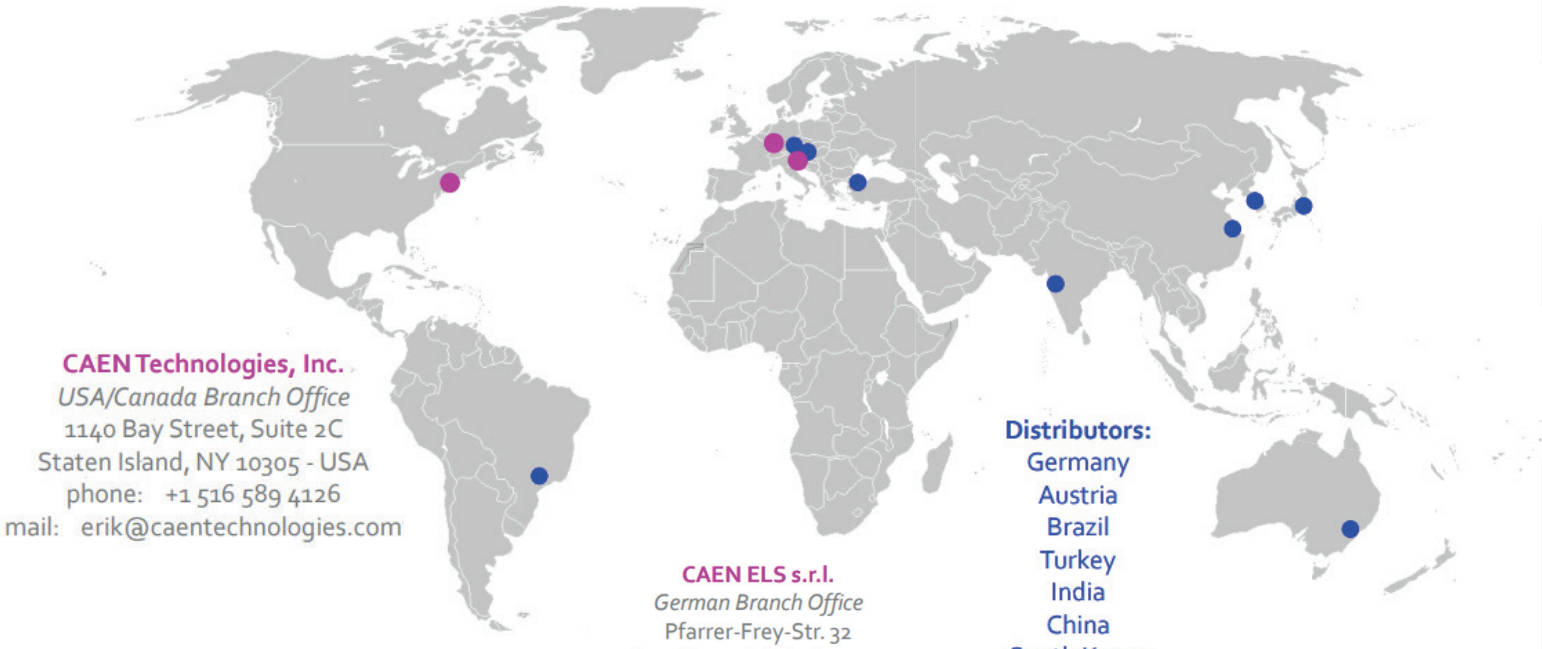

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