

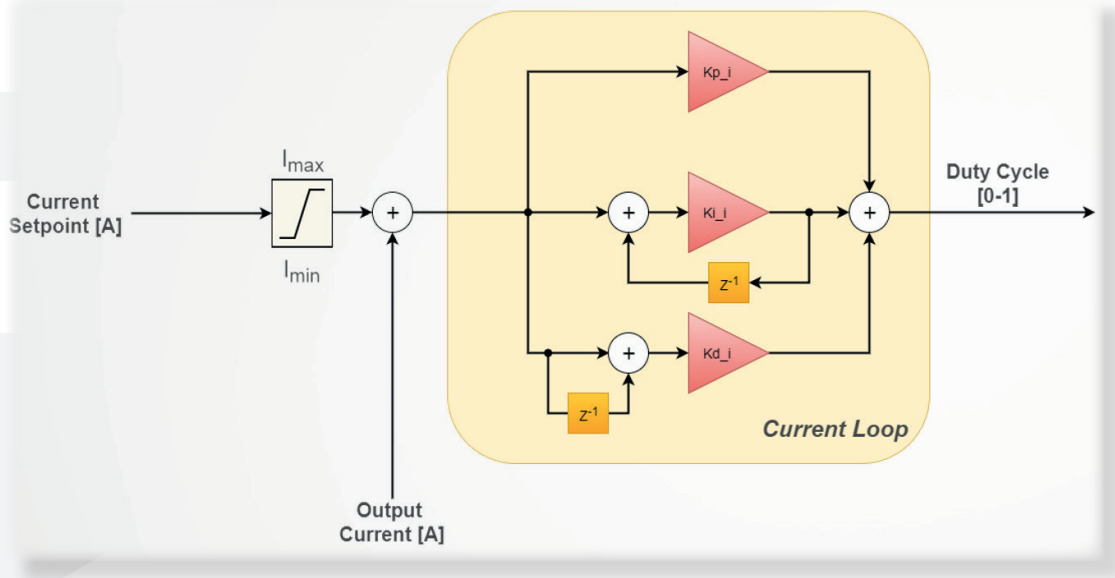


# PROCEDURE FOR ADAPTING THE PID PARAMETERS FOR THE *Easy-Driver*

**>>** Pre-Information

**T**HE Easy Driver is a digitally controlled power supply. This means that an adaptation to any load can be achieved simply by changing the Software PID-Parameters.

**Easy-Driver** power supply has a control loop that continuously controls output current. Current Control Loop diagram is hereafter presented:



The PID-parameters consist in 3 values, Kp, Ki and Kd, that can be input through the Visual Easy Driver software.

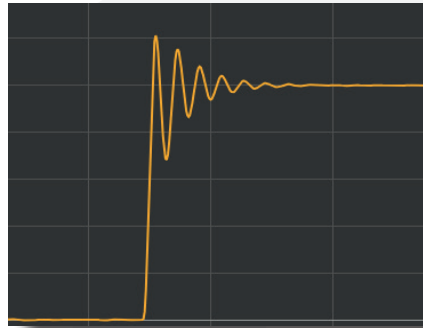
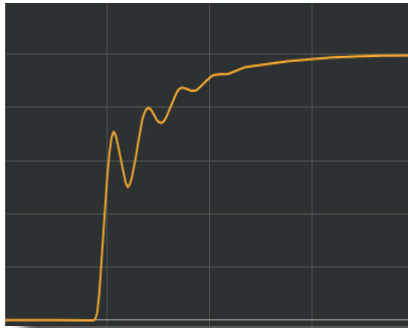


# PID PARAMETER ADAPTATION

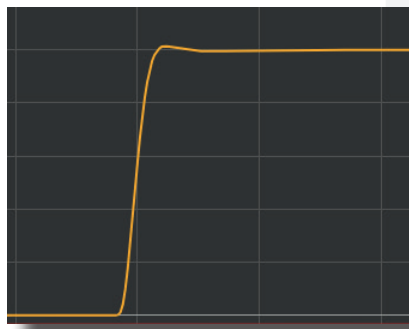


Target is to adapt PID values for a specific load connected to the **Easy-Driver** that is performing in an ideal way: Fast Rise Times, No Overshoot (or small Overshoot), No Oscillations.

## UNWANTED STEP RESPONSE:

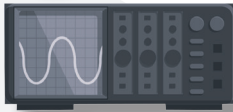


## DESIDERABLE STEP RESPONSE:



# PID PARAMETER ADAPTATION

## Setup Devices



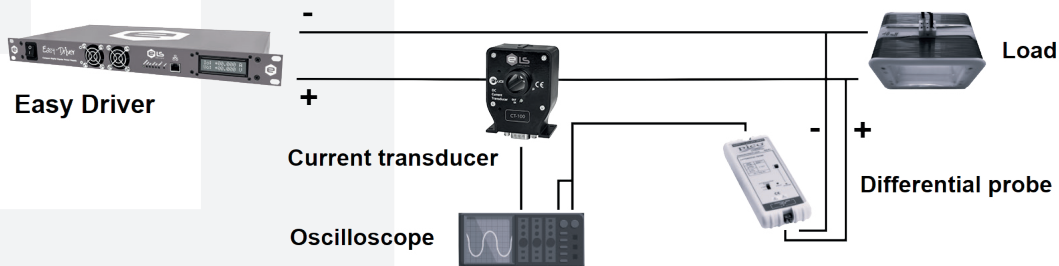
**Easy-Driver** connected to the Load

**CT-100** –current sensor clamp; for instance and **PSi2151**  
(or another setup for measuring current)

Oscilloscope

Differential Probe to measure the output Voltage

Connect the devices as describe in the following diagram:



## 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):

$$K_p = K_i = 0.00001 \text{ and } K_d = 0$$

2.  $K_d$  typically should not to be changed due to its minor influence on the result. Only in very high-demanding cases, such as superconducting magnets, it might be adjusted.
3. During PID adaptation procedure, set current to approximately **10%** of the nominal rating. (i.e. if the Easy Driver is a 10A - 20 V model set Current and Voltage from 0 to 1A).

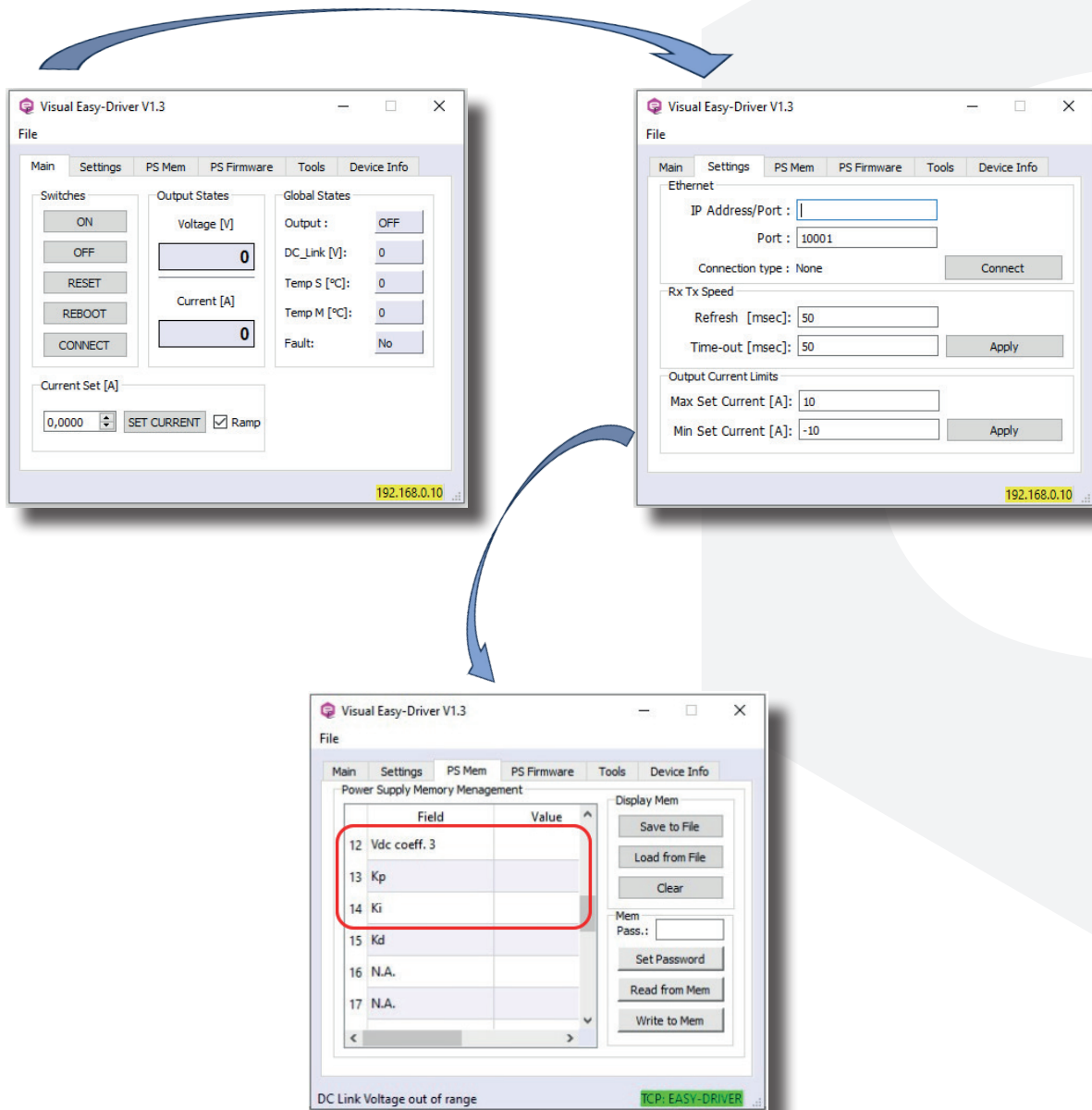
**ATTENTION:** The PID parameters are specific to each power source model. For example, PID parameters for a Easy Driver 0220A and for the Easy-Driver1020A can significantly differ.

# PID PARAMETER ADAPTATION



From the **Visual Easy-Driver** main menu:

- Go to **Settings** menu and enter the power supply's IP address .
- Click on **PS Memory** to access the PID settings.



- Press the **Write to Mem** button to save the values to the internal memory.

# PID PARAMETER ADAPTATION



In the following figures the current is represented in yellow and voltage in red.

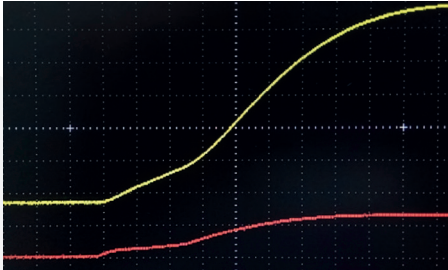


Fig. A

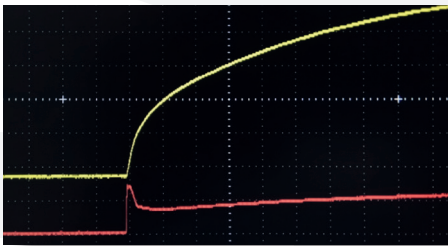


Fig. B

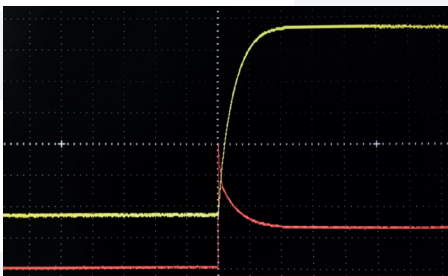
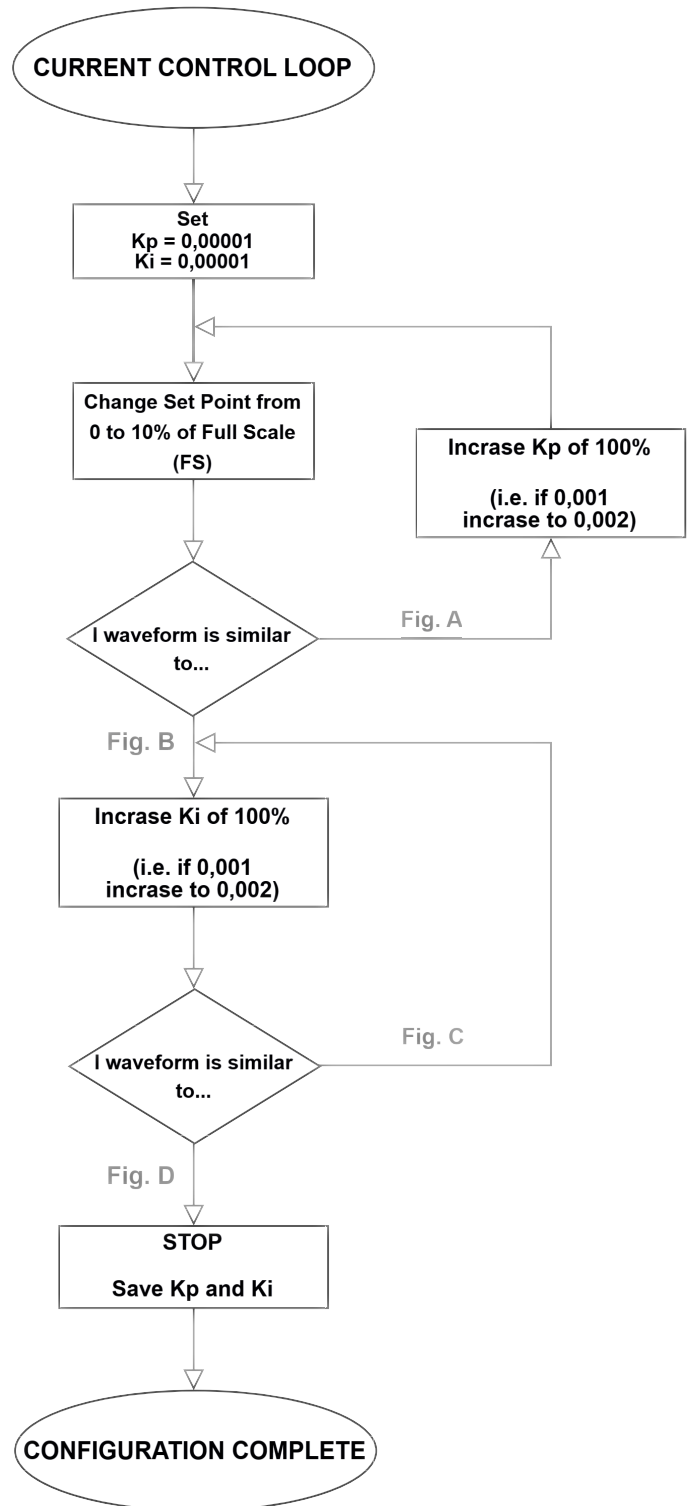


Fig. C



Fig. D







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

# PID PARAMETER ADAPTATION



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ELS Instruments (formerly CAEN ELS) is a leading company in the design of power supplies and state-of-the-art complete electronic systems for the Physics research world, having its main focus on dedicated solutions for the particle accelerator community and high-end industrial applications.

-  Power Supply Systems
-  Precision Current Measurements
-  Beamline Electronics Instrumentation
-  FMC and MicroTCA

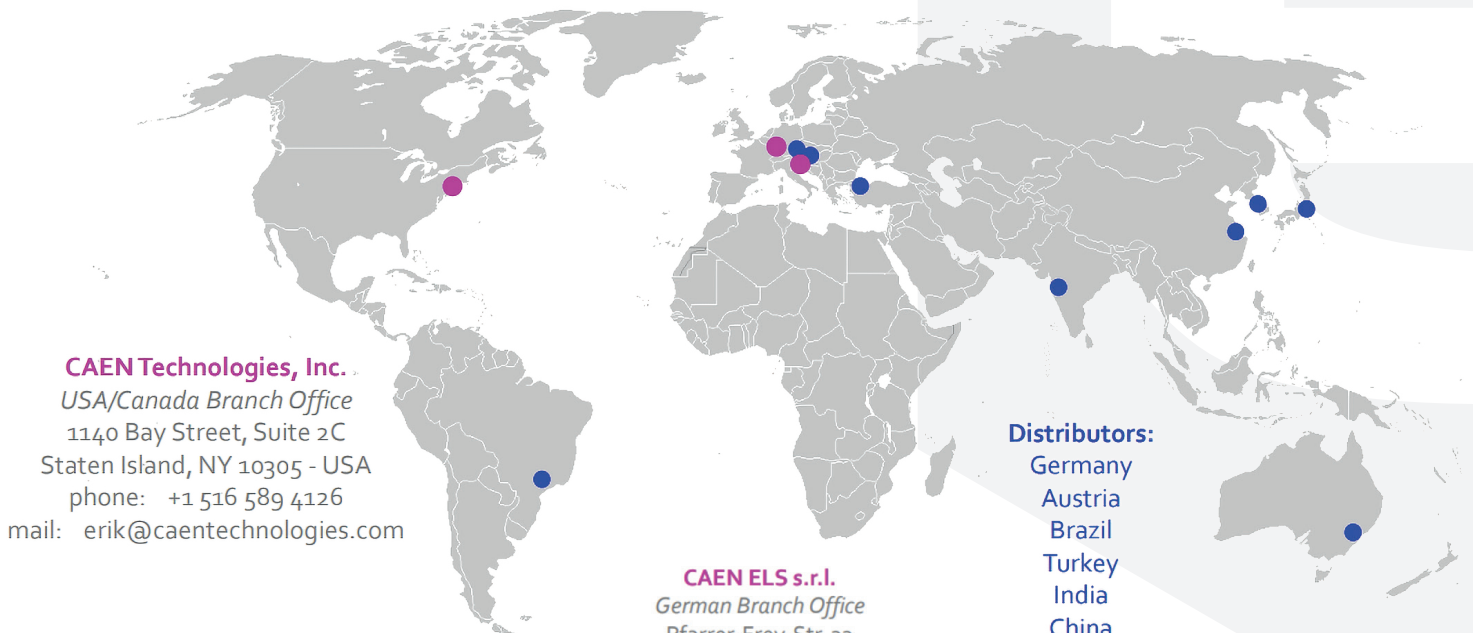
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