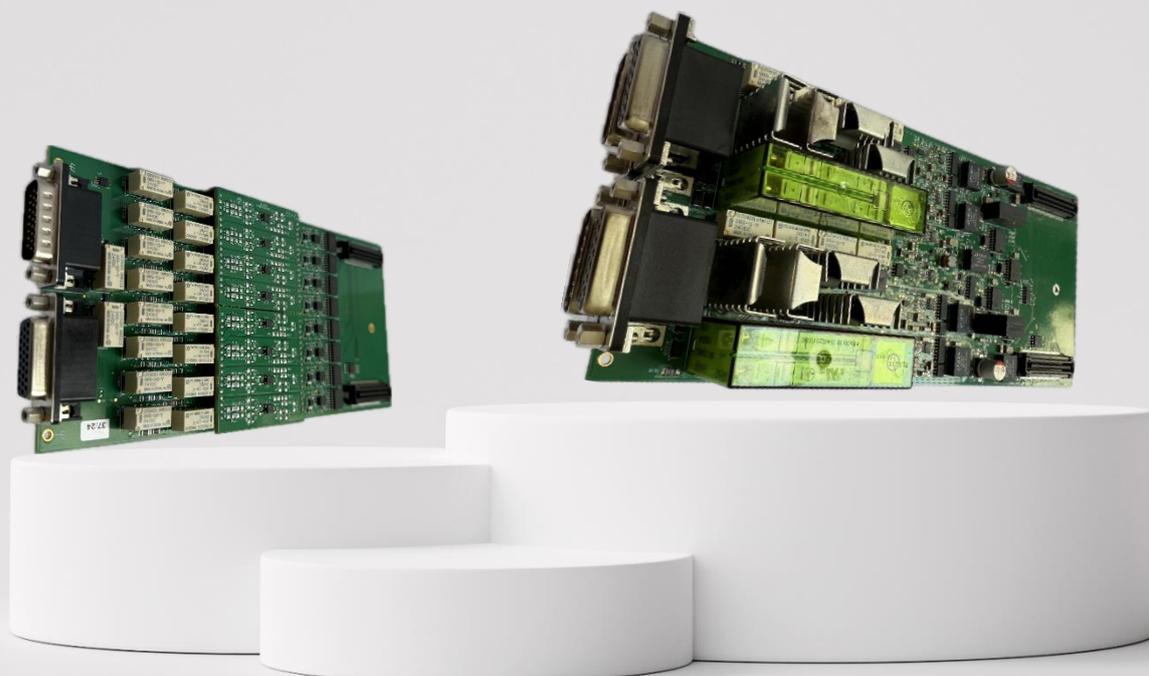


CLEMESY

EIFFAGE
ÉNERGIE SYSTÈMES

SyCTRL. PRODUCT LINE



SCALABILITY & MODULARITY

The 19" / 3HU standard chassis accommodates up to four HF modulo width boards with a backplane connection for power and communication, enabling a scalable and modular architecture with customizable slave board arrangements.

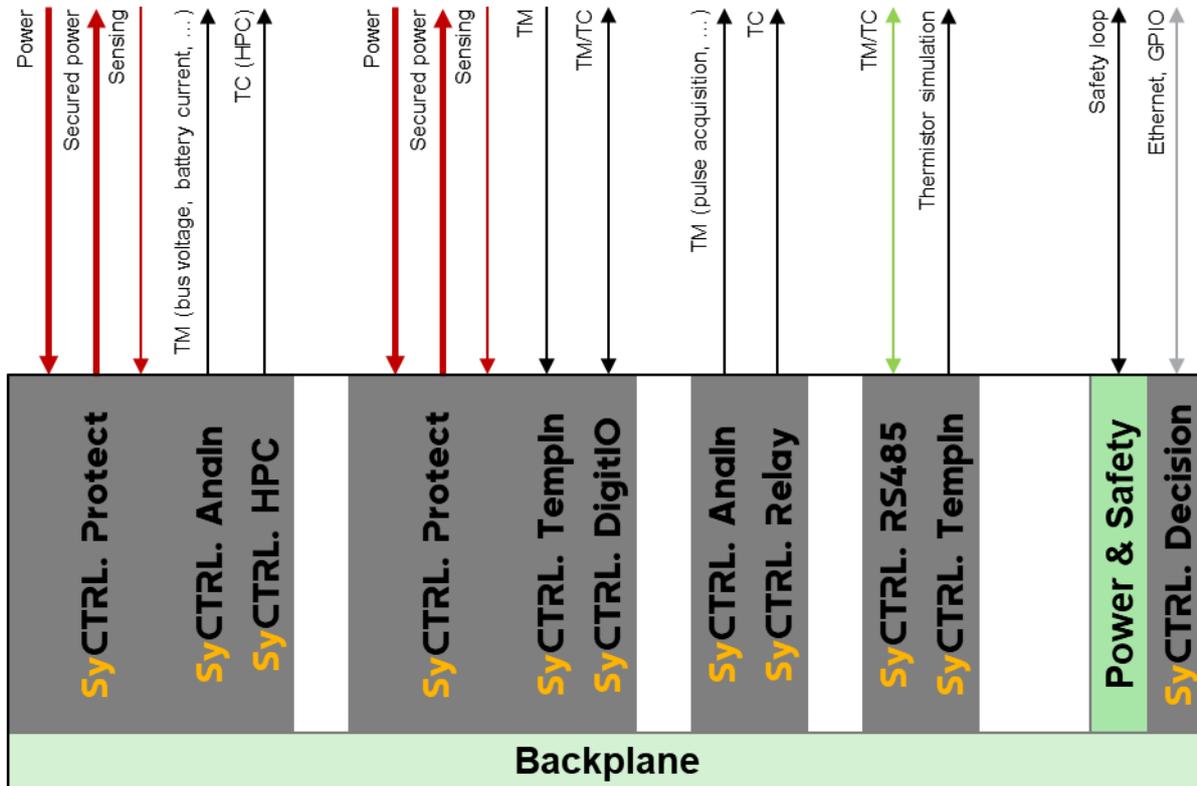


Figure 1 : SyCTRL Modularity Concept Scheme

SyCTRL -PROTECT (SLP)

The **SyCTRL. Protect** board provides a secured electrical protection function for any DC power line. It is designed to be inserted between a COTS DC power supply output and the power feeding input of a Product Under Test.

It encompasses the power ON/OFF switch via MOSFETs, the voltage and current conditioning features, the eventual impedance adaptation, the power supply fault output & remote inhibit line routing, the basic output protection (fuse, the crowbar circuit and the physical separation relays).

It is interfaced with the **SyCTRL. Decision** board for which it acts as an information provider / adaptation / transmitter.

In order to have a wide range of power, the protection function exists following various alternative implementations:

- For power less than 1,5kW, it is implemented on a unique 3U 2 slots board, the **SyCTRL. Protect M50-150** board. This board is designed to be located on the rear side of a **SyCTRL. Chassis**, coupled with a **SyCTRL. Decision** module and embeds all the functions listed here above. Due to its optimised width (2U), the **SyCTRL. Protect M50-150** can eventually be coupled with a standard **SyCTRL. IO** board (see hereunder) behind a unique **SyCTRL. Decision** board.



Figure 2: *SyCTRL. Protect M50-150 SLP*

- For power between 1kW and 3kW, it is implemented on a unique 3U 6 slots module, the **SyCTRL. Protect3K**, designed to be accommodated on the rear side of a standard **SyCTRL. Chassis**.

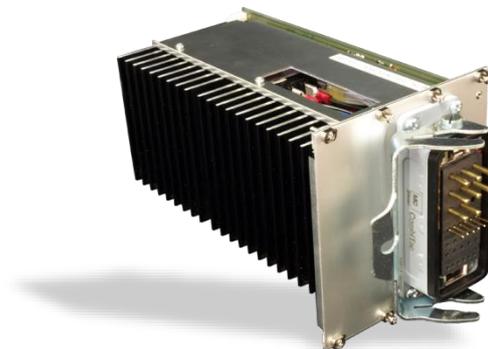


Figure 3: *SyCTRL. Protect3K SLP*

Accuracies/Performance

SLP parameters		Protect M50-200	Protect M14-200D
Nb of input lines per board		1	2
Nb of output lines per board		1	2
Output ratings	Voltage	0 .. 200 V	0 .. 200 V
	Current	0 .. 50 A	0 .. 14 A
ADC resolution		14 bit	16 bit
Measurement range	Voltage	± 210 V	± 210 V
	Current	± 50 A	± 20 A
Read back accuracy	Voltage	<20 mV	<20 mV
	Current	<50 mA	<50 mA
Protection features		OVP, UVP, OCP, OTP	OVP, UVP, OCP, OTP
Safety loop registration		IN OUT	IN OUT
Protection reaction time	OVP / UVP	< 30 µs	< 10 µs
	(From 100% to 0%) OCP	< 60 µs	< 30 µs
	Safety Loop	< 100 µs	< 100 µs
Physical characteristics	Size	4/21 SyCTRL Chassis slots	2/21 SyCTRL Chassis slots
	Weight	370 g	190 g

Table 1: SyCTRL M50-200 SLP accuracy and performance

- Should the power need exceed 3kW, a specific interface board (**SyCTRL. ProtectIF**) mounted in the **SyCTRL Chassis** allows the routing of the useful signals to an external specific **High Power rack** embedding the specific power components performing the requested functions.



Figure 4: SyCTRL. ProtectIF



Figure 5: SyCTRL. HighPowerRack

SyCTRL-LCL+



The SyCTRL-LCL+ board performs a Latch Current Limiting for up to 4 output power lines.

It encompasses power limitation features, the power ON/OFF switch via MOSFETs, the voltage and current conditioning features, the eventual impedance adaptation, the basic output protection (fuse), the power ON/OFF switch and the physical separation relays.

Figure 6: SyCTRL-LCL+

The SyCTRL-LCL+ module is able to :

- receive one power line ($V_{max} = 100V$, $I_{max}=20A$)
- distribute this power on up to 4 power outputs ($I_{max}=5A$ per line, assuming that the lines can be parallelized)
- each of them being individually overvoltage, overcurrent, under voltage protected.

In case of discrepancy on an output line, the current is limited for a max duration of 20ms and then if the discrepancy remains, the line (and only this one) is switched off via MOSFET.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-Analn



The SyCTRL-Analn module embeds the specific features of the electrical conditioning of 8 voltage independent measurement lines.

The SyCTRL-Analn module provides a high impedance input and a physical separation via relay for each line.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

Figure 7: SyCTRL-Analn

SyCTRL-ANAOUT



Figure 8: SyCTRL-AnaOut

The SyCTRL-AnaOut module embeds the specific features for the electrical conditioning of 8 independent isolated analog output channels.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-DIGITALIN



Figure 9: SyCTRL-DigitIn

The SyCTRL-DigitIn module embeds the specific features for the electrical conditioning of 24 independent isolated digital input lines.

The SyCTRL-DigitalIO module provides a physical separation via relay for each line.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-DIGITALOUT



Figure 10: SyCTRL-DigitalOut

The SyCTRL-DigitalOut module embeds the specific features for the electrical conditioning of 24 independent isolated digital output lines.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-TEMPIN



Figure 11: SyCTRL-TempIn

The SyCTRL-TempIn module embeds the specific features of the electrical conditioning for 8 independent thermistor measurement lines.

The SyCTRL-TempIn module provides a high impedance input and a physical separation via relay for each line.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-TEMPOUT



Figure 12: SyCTRL-TempOut

The SyCTRL-TempOut module is a multi-channel isolated output board designed for temperature simulation of any resistor based sensor such as NTC, PT100, PT1000, ...

The board implements a configurable number of temperature output channels (up to 24 channels per board), each channel simulating a discrete number of temperature steps (the more channels, fewer steps).

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-HPC



Figure 13: SyCTRL-HPC

The SyCTRL-HPC module embeds the specific features of 4 independent bi-polar voltage pulse command lines.

With its hardware configurable output voltage and over current protection, the SyCTRL-HPC board prevents any damage on the unit under test.

The SyCTRL-HPC module provides a physical separation via relay for each line.

The HPC pulse width and authorization management is performed by the SyCTRL-Decision secured circuit (see SyCTRL-Decision module description). The output voltage, overvoltage protection and overcurrent protection are performed by the SyCTRL-HPC module.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-HPC+

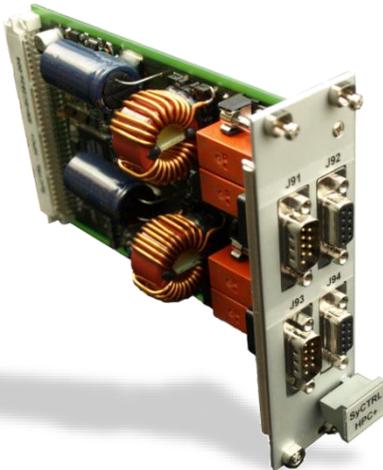


Figure 14: SyCTRL-HPC+

The SyCTRL-HPC+ module embeds the specific features of 2 independent current pulse command lines.

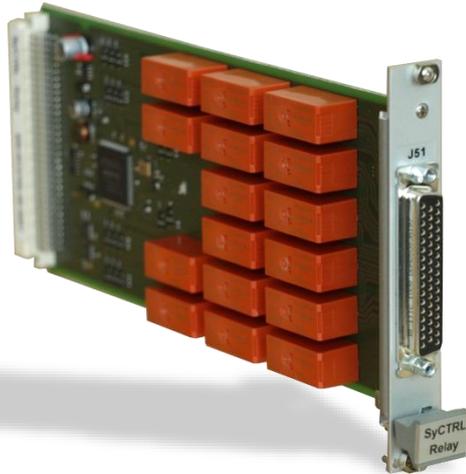
With its hardware configurable output current and programmable over voltage protection, the SyCTRL-HPC+ board prevents any damage on the unit under test.

The SyCTRL-HPC+ module provides a physical separation via relay for each line.

The HPC+ pulse width and authorization management is performed by the SyCTRL-Decision secured circuit (see SyCTRL-Decision module description). The output current, overcurrent protection and overvoltage protection are performed by the SyCTRL-HPC+ module itself.

The module is a 3U 2 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-RELAYOUT



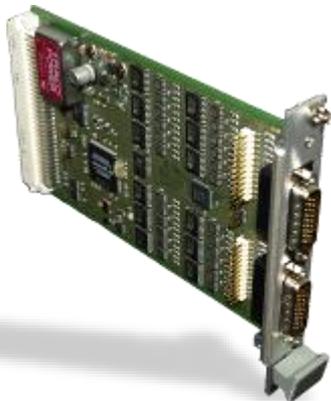
The SyCTRL-RelayOut module embeds the specific features of 16 NO/NC relay commands.

The relays are mechanical relays with 2 NO/NC contacts, one dedicated to the read back status for the SyCTRL-Decision module and one dedicated to the user application.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

Figure 15: SyCTRL-RelayOut

SyCTRL-RS485



The SyCTRL-RS485 module provides 24 dedicated bi-directional RS422 / RS485 lines.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

Figure 16: SyCTRL-RS485

SyCTRL-PWM



The SyCTRL-PWM board performs a Pulse Width Modulation on up to 4 output power lines.

.It encompasses power ON/OFF switch via MOSFETs (one per channel), the voltage and current conditioning features, the eventual impedance adaptation, the basic output protection (fuse), the power ON/OFF switch and the physical separation relays.

Figure 17: SyCTRL-PWM

The SyCTRL-PWM module is able to :

- receive one power line ($V_{max} = 100V$, $I_{max}=8A$)
- distribute this power on up to 4 power outputs ($I_{max}=2A$ per line).
- each of them being individually overvoltage, overcurrent, under voltage protected.

In case of discrepancy on an output line, the current of this output line is switched off via MOSFET.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

SyCTRL-IRIG-SYNCH



The SyCTRL-IRIG-Synch module is aimed to synchronize any SyCTRL modules accommodated in a SyCTRL chassis by a standard IRIG-B input line.

The module is a 3U 1 slot board, designed to be located at the rear side of a SyCTRL-Chassis, coupled with a SyCTRL-Decision module.

Figure 18: SyCTRL-IRIG-Synch

SAFETY LOOP FEATURES

The eventual interaction between protection channels (intra and inter chassis) is performed via a Safety Loop. The safety loop allows for a trip to occur on a channel when specific events on other channels happen. In particular, it is possible to trip protection channels when a trip occurs on another protection channel, or to trip protection on user request, by a physical switch or software (Core EGSE for example) activation.

The implementation of this function is performed by a dedicated electrical daisy chain on which a channel can subscribed or not: A channel can trip (or not) the safety loop and be tripped (or not) by external safety loop tripping.

The daisy chain is performed on electrical level by a SyCTRL-SafetyLoop module.

The SyCTRL-SafetyLoop is interfaced with the SyCTRL-Decision module for which it provides an eventual Safety Loop triggering command when coming from another SyCTRL-Chassis and acts as the local Safety Loop transmitter to the other SyCTRL-Chassis. Each SyCTRL module can independently be subscribed to the Safety loop feature via a hardware strap located on the bus backplane of the SyCTRL-Chassis.

The SyCTRL-SafetyLoop module does not participate in the local safety triggering which is managed directly by both the SyCTRL-Decision and SyCTRL-Protect (rsp. SyCTRL-LCL) modules.

FUNCTION ACCOMMODATION

The 21 rear slots accommodate all the various slave modules described here above and all the boards are managed by a unique SyCTRL-Decision module.

The rear side accommodation is depending on the required function:

- Voltage (rsp. Current) protection function :
 - One power In, One power Out protected line: the rear slots are partially used for the relevant SyCTRL-Protect board (depending on the power level).
 - One power In, multi power Out protected lines: the rear slots will be fitted with several SyCTRL-LCL modules, each module being able to manage up to 4 output lines.
- Acquisition: the rear slots are available for acquisition board (SyCTRL-AnaIn, SyCTRL-DigitIn, SyCTRL-DigitalOut or SyCTRL-TempIn) and communication boards (SyCTRL-RS485).
- Command: the rear slots are available for command boards (SyCTRL-RelayOut, SyCTRL-DigitalOut, SyCTRL-TempOut, SyCTRL-AnaOut, SyCTRL-HPC or SyCTRL-HPC+) and communication boards (SyCTRL-RS485).
- Time Synchronisation: One SyCTRL-IRIG-Synch is used to synchronize all the chassis following IRIG-B accuracy.
- Any other combination of electrical protection and / or TMTc features.

LET'S BUILD YOUR NEXT GROUND SYSTEM TOGETHER.

Contact us for any inquiry or technical discussion about SyCTRL or our EGSE expertise.

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