

	<b>Rack parallel card for AC/DC FFE converter</b>	Document Nr	Rev. 01
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## PRODUCT DESCRIPTION

The parallel card CU-P is a product for interface several power rack used in the AC/DC regenerative (FFE type) to a control module CU-DR01. The maximum number of power rack than can be managed is equal to 8, the order code of the parallel card is CU-P-S0x with x equal to the number of slot mounted inside the parallel rack.

Each power module has a 25-pin connector with the signals necessary for interfacing to the control system. When the power module is single, the 25-pin connector of the power module has to be connected directly to the 25-pin connector X1 of the control rack .

When several power modules are present, the 25-pin connector of each power module has to be connected to a different 25-pin connector slot on the rack parallel.

The parallel rack consists of a motherboard (called CSP128 ) that has to be connected to the control rack and it can accept up to 8 cards slots (called CSP127 ). Each card slot has to be connected to the power rack FF by a 25 pole cable. Slots are numbered 1 to 8. The first power module (equipped with the precharge circuit) must be connected to the slot # 1 ( located in the top of the parallel card ) .

If a power module is not present, then the slot of the rack parallel card will be closed , or absent.

On each card slot signaling LEDs and fault alarm are present, with this is possible to read the information of the fault or alarm occurred. Once a fault or an alarm has occurred it has to be reset or from the control or pushing the reset button on the parallel board.

The cumulative faults of power modules is sent to the control by the 25-pin interface connector X1 of the parallel rack.

All the power module input currents of phase U are mediated and sent to the control board by the connector X1, the same operation is performed for the current of phase V and W.

The parallel cards performs the following functions:

- 1) Reception of six optical fibers of command from the control card and sending optical signals to the different slot of parallel card, this optical signal has to be connected to the power modules. This signals are enabled only when the slot is present and connected to the power modules, and the electronic power supply coming from power modules is present.
- 2) Reception of the short circuit fault from the different power modules , execution of the AND function of such signals and the transmission of that information to the FFE control.
- 3) Average phases current U, V, W of power modules and sending of this signals to the control board.
- 4) Receiving of the DC link signal voltage from the first power module and sending to the control board.
- 5) Receiving overvoltage fault DC link from the first power module and sending the fault to the control board.
- 6) Verification of power modules presence. Coding the number of power modules present and sending the information to the control board by means of bits BIT1 , BIT2 , BIT3, in the connector X1.
- 7) Coding size of the first power module and sending information to the control board by means of bits BIT4 , BIT5, in the connector X1.
- 8) Verify the consistency of bits BIT4 and BIT5 from all power modules and sending the information of SIZE\_OK signal to the control board by the connector X1.
- 9) AND function of all failures of fuses from different power modules and sending of the fuse fault information signal to the control board by the connector X1.
- 10) AND function of all over temperature faults from power modules and sending of over temperature fault information to the control board by the connector X1.
- 11) AND function of all supply inconsistency alarm (integrity alarm) from different power modules and sending the alarm information to the control board by the connector X1.
- 12) AND function of all Stack healthy alarm from different power modules and sending alarm information to the control board by the connector X1.
- 13) Connection of the external 24V power supply through the connector M2 (or M22 ) , connection of 24V from the power modules through the connector M1 (3,4) and the creation of redundant power supply voltage 24V\_PAR for optical fibers transmission .

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Each slot reads faults from the power modules. It shifts the level by 0/5V to 0/15V, then performs a filtering and a buffer of these signals so that they can be acquired and stored from the parallel card with greater noise immunity.

Within each slot there is a relay that detaches the power of the optical fibers when there is no connection between the power module and the slot, or when one of the two power supplies +-15V is not present from the power module.

Each slot also performs the function of unbalance of currents of the relative power module:

When the difference of the current of a power module exceeds 20% in value compared to the average of the currents of the same phase then the relative alarm is generated. Such alarm is activated only when the current flowing in the power module exceeds 100 Arms.

It is shown the front view of the parallel rack.



Fig. 1 external layout of parallel card

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## TECHNICAL FEATURES

The following technical features are valid for the parallel card CU-P-S08.

Input supply voltage M2	24Vdc (range 18Vdc ÷ 30Vdc), max 4 A (for 8 slot)
Output supply voltage M1	24Vdc (range 18Vdc ÷ 30Vdc), max 0,4 A
Number of slots of FFE rack	8
Number of digital inputs from each FFE slot	7 (fuses, thermal, Stack healthy, MV, Bit1, Bit4, Bit5)
Voltage range digital inputs from FFE slot	Range 0 / 5V
Number of analog inputs from each FFE slot	4 (Iu, Iv, Iw, TV)
Range analog inputs current	+ - 4Vpk (corresponding a 1,5 * Inom)
Range analog input Vdc voltage	0 .. 5.5V= (corresponding a 1250 V=)
Number of digital outputs toward the control	12 (fuses, thermal, Stack healthy, MV, Bit1, Bit2, Bit3, Bit4, Bit5, size, integrity, Unbalance)
Voltage range digital outputs toward FFE control	Range 0 / 5V
Maximum current digital inputs FFE slot	1,5 mA
Maximum current digital inputs FFE control	3,3 mA
Interfacing optical fibers with control board and rack FFE	Through optical fibers R-2521Z (reception) and T-1521Z (transmitters)
Optical fiber Receiver control pulses from control	6
Optical fiber transmission of short circuit toward control	1
Optical fiber transmission control pulses to each power rack	6
Optical fiber Receiver of short circuit from each power rack	1
Maximum length of fiber optic plastic cables	10 meters
Parallel rack dimension	width 76,5mm – height 335 mm – depth 320 mm
weight parallel rack	3 Kg
temperature of installation:	
Storage	from -20°C to 80°C
Operation	from -10°C to 60°C