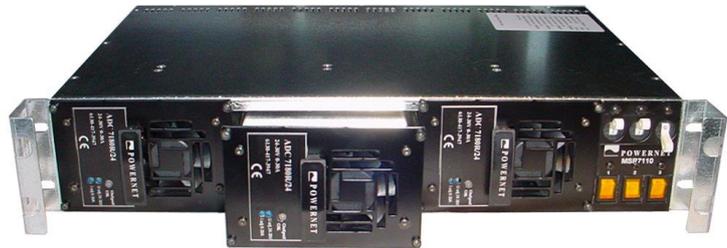


MSR 2400R

Rugged Power System for Military and Heavy Duty Applications



2400 W modular power system

Power supply or battery charging systems
 Parallel n+1 connection, up to 90A
 Series connection, up to 360VDC
 Multi outputs, \pm outputs
 Hot-swap plug-in modules
 Module fail and mains alarms
 Operating temperature $-40^{\circ}\text{C} \dots +55^{\circ}\text{C}$

Approved for heavy environment

Vibration, sin, IEC60068-2-6, $20-50\text{m/s}^2$ ($2-5 g_n$)
 Vibration, broad-band random, IEC60068-2-64
 Bump, IEC60068-2-29, 250m/s^2 ($25 g_n$)
 Shock, IEC60068-2-27, 400m/s^2 ($40 g_n$)
 Cold test, IEC60068-2-1
 Damp heat, cyclic, IEC60068-2-30
 Dry heat, IEC60068-2-2

19" SUB-RACK UNITS

Type	Voltage versions	Modules per rack	Power	Mechanics (w x h x d)
MSR7110R/48	24V, 36V, 48V	1...3 pcs	800W...2400W	19" (482mm) / 2U (88mm) / 360mm
MSR7110R/96	72V, 96V	1...3 pcs	800W...1800W	19" (482mm) / 2U (88mm) / 360mm
8171178A	Cover plate for empty module place			25TE / 2U

RECTIFIER MODULES

Type	Input voltage *)	Nominal Output Voltage	Voltage Setting Range	Max Output Current	Current Limit Setting	Max Power	Mechanics (w x h x d)
ADC7180R/12	50...260 VAC	12 VDC	12-15VDC	30 A	0-30A	800W	25TE / 2U / 230mm
ADC7180R/24	50...260 VAC	24 VDC	24-30VDC	30 A	0-30A	800W	25TE / 2U / 230mm
ADC7180R/36	50...260 VAC	36 VDC	36-54VDC	20 A	0-20A	800W	25TE / 2U / 230mm
ADC7180R/48	50...260 VAC	48 VDC	48-60VDC	15 A	0-15A	800W	25TE / 2U / 230mm
ADC7180R/72	50...260 VAC	72 VDC	72-108VDC	10 A	0-10A	800W	25TE / 2U / 230mm
ADC7180R/96	50...260 VAC	96 VDC	90-144VDC	7.5A	0-7.5A	800W	25TE / 2U / 230mm

*) Max power 600W at DC input, reduced power 55...200VAC or 78...200VDC

INPUT

Input voltage	55...264 VAC 78...360 VDC / max 600W	55...200VAC reduced power, see module datasheet 78...200VDC reduced power, see module datasheet
Frequency		45...65Hz
Safety		According to EN60950, Class I
Input current		Max 4.5A per module
Inrush current	Soft start	max 7A 10ms peak, otherwise less than 4.5A
Isolation	Input / ground Input / outputs Output / ground	1500VAC 3750VAC 500VDC
Mains switch	Front panel with light	12, 24, 48VDC One per PSU 72, 96VDC One per sub-rack, max 10A current
Mains input connector	Common input for each rectifier	IEC320 C14 male connector

OUTPUT

Voltage	Nominal voltages	12...120VDC / max 800W per module
Current	Nominal current per module	0...30A / max 800W per module
Short circuit protection	Rectifier modules	Short circuit protected, electronic current limit
MCBs on front panel	ADC7110R/48 sub-rack ADC7110R/96 sub-rack	3 x 30A MCB in negative output 3 x 10A MCB in negative output
Output connector	3 terminal groups on rear panel	3-pole 10mm ² screw terminal for each rectifier (+, -, PE)
Hot swap	Series diode in each rectifier	Hot-swap allowed, Input and output switch at OFF position
Series/parallel operations	All modules can be connected in series or in parallel	

CONTROLS

Input	On the front panel	Power switch with ON/OFF light
Output	On the front panel	MCB ON/OFF safety switch

ALARMS

Input failure	$U_{in\ nom} < \text{appr. } 150\text{VAC}$	Normally open and closed relay contacts
Output failure	Module failure or output switch off	Relay contact and MCB auxiliary relay
Alarm connector	Rear panel Pin configurations	Removable 12-pole 2.5mm ² screw terminal
	1	Mains alarm COMMON
	2	Mains alarm NO
	3	Mains alarm NC
	4	Parallel output alarm COMMON
	5	Parallel output alarm NO *)
	6	Series output alarm PSU1 COMMON
	7	Series output alarm PSU1 NC *)
	8	Series output alarm PSU2 COMMON
	9	Series output alarm PSU2 NC *)
	10	Series output alarm PSU3 COMMON
	11	Series output alarm PSU3 NC *)
	12	Not in use

*) Normally = Mains / PSU OK

ENVIRONMENTAL

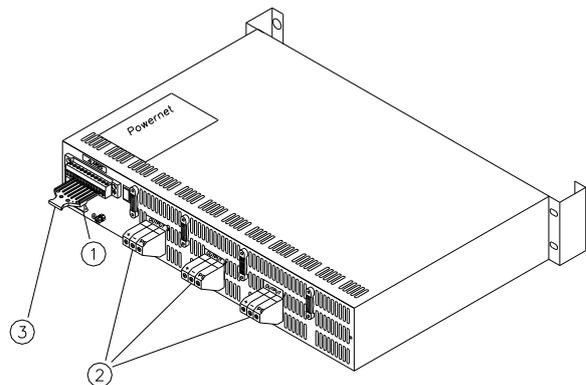
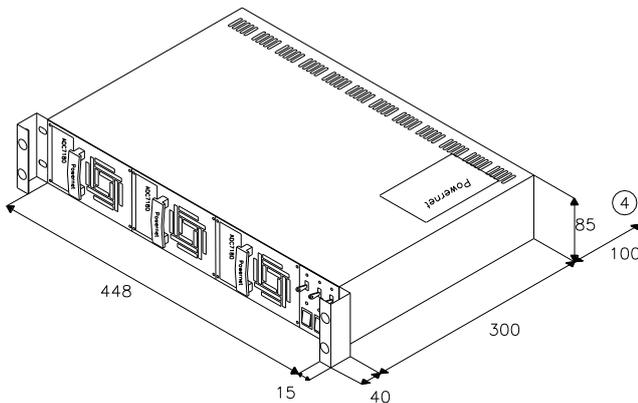
Temperature range	Operating Storage	-40°C...+70 °C, de-rating at +50°C...+70 °C -40°C...+85 °C
Cooling	ADC7180R modules	Temperature controlled fan in front panel
Shock and vibration	IEC60068-2	See approvals below

STANDARDS / APPROVALS

Safety	EN60950	Class I
EMC emissions	EN50081-1	Main standard
	EN55022 class B	Conducted emissions 150 kHz ... 30 MHz Radiated emissions 30 MHz ... 1000 MHz
EMC immunity	EN50082-2	Main standard
	EN61000-4-2	Electrostatic Discharge
	EN61000-4-3, ENV50204	Electromagnetic field immunity
	EN61000-4-4	Fast Transients
	EN61000-4-5	Surge
	EN61000-4-6	Conductive Immunity
	EN61000-4-8 EN61000-4-11	Power Frequency Magnetic Field Power Line Quality
Product Family Standard	EN61000-3-2	Harmonic Currents Emissions
	EN61000-3-3	Voltage Fluctuation and Flicker Sensation
Environmental	IEC60068-2	Main Standard
Vibration sinusoidal	IEC60068-2-6, Test Fc	20m/s ² (2g _n) 9-200Hz, 50m/s ² (5g _n) 200-500Hz
Vibr. broad-band random	IEC60068-2-64, Test Fh	Spectral acceleration 3.57g _{n,rms} 5-500Hz
Bump	IEC60068-2-29, Test Eb	250m/s ² (25g _n) 6ms
Shock	IEC60068-2-27, Test Ea	400m/s ² (40g _n) 6ms
Cold test	IEC60068-2-1, Test Ab	-40°C ± 3 °C, transportation and operation
Damp Heat, Cyclic	IEC60068-2-30, Test Db	+55°C ± 2 °C, transportation and operation
Dry Heat	IEC60068-2-2, Test Bb	+70°C ± 2 °C, transportation and storage

MECHANICAL

Power Rack	19" sub-rack	Positions for 3 pcs of ADC7180 modules
Dimensions	Height	2U
	Width	19"
	Depth	300mm, excluding handles and connectors
Weight	Rack without rectifiers	5.5 kg
	Rectifier	1.35kg
Enclosure	Steel	IP20



↓ Installation space for wires

Operating and connecting the sub-rack and modules

General

MSR7110R sub-racks have been developed and can be used to supply several output voltages from 0V up to 400VDC in series connection. MSR7110R sub-racks can be used to supply several output voltages from 0V up to 400VDC in series connection. Modules can be connected in parallel, series or to have multi output voltages from the same sub-rack. Units are hot swappable, but the sub-rack also has both input and output switch to make the change without power. 1...3 pcs of modules can be installed in the sub-rack. Empty module places are covered by the cover plate.

Mounting the sub-rack

Sub-rack is installed in 19" cabinet and mounted by 4 pcs of M6 screws from the front panel.

Mounting the plug-in module

The plug-in module is installed by pushing it to the bottom of sub-rack as long as the connector in the rear panel has the contact with the mating connector in sub-rack. Mounting screws in modules front panel are fastened. Removing the module is made in opposite order.

Mains connection

The mains is supplied by IEC320 C14 male connector. Use 1-phase power cords cross-section 3 x 1,5mm². The minimum mains fuse is 16A. Make sure that both input and output are switched off in the front panel of sub-rack before connecting the mains. Turn the mains switch to up position. The switch light indicates that mains is connected. The unit is starting about 4 seconds. The unit's output led in front panel is lightning green.

Output connection

Use minimum 4mm² output cable, 6mm² preferred. Connect cables to the screw terminal in the sub-rack's rear panel via the cable clamp. Output MCBs can be turned to the ON position after module's output led in front panel is green.

Outputs can be in stand-alone, parallel or series use.

1. Stand-alone use

Connect minimum 4mm² cables from modules + and - screw terminal to load.

2. Parallel use

Connect each module to the load by minimum 4mm² cables. To ensure proper load sharing the length and cross section of each output cable need to be the same and the output adjustment at each module should be equal.

3. Series use

The series connection is made by connecting the positive output of module 1 to the negative output of module 2 and connecting the load between the positive output of module 2 and negative output of module 1. Use minimum 4mm² cables.

Output voltage adjustment

The factory setting for the output is the nominal voltage (for example 48VDC). Output of each module can be adjusted by turning **Uadj** trimmer. The adjustment is made by small screw driver.

Output current limit adjustment

The factory setting for the current limit is the nominal output current. Output current limit (max current) can be adjusted from the **Iadj** trimmer.

Alarms

Potential free change over relay contacts (NO, NC, COM) are included in system.

Input alarm

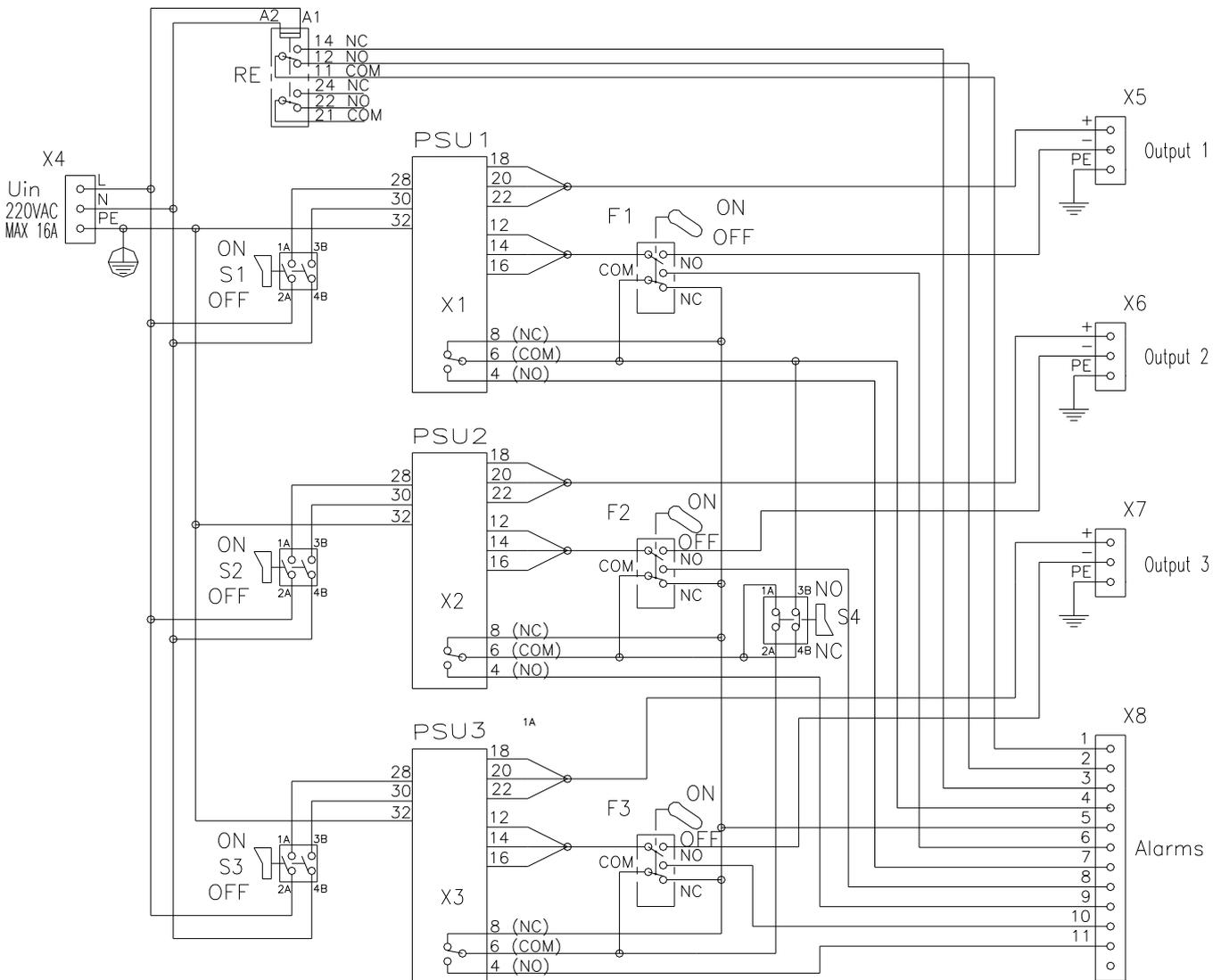
Input alarm is indicated when mains reduce below 150V. Both normally open contact between pins 1-2 and normally closed contact between pins 1-3 are available.

Module fail or output MCB fail

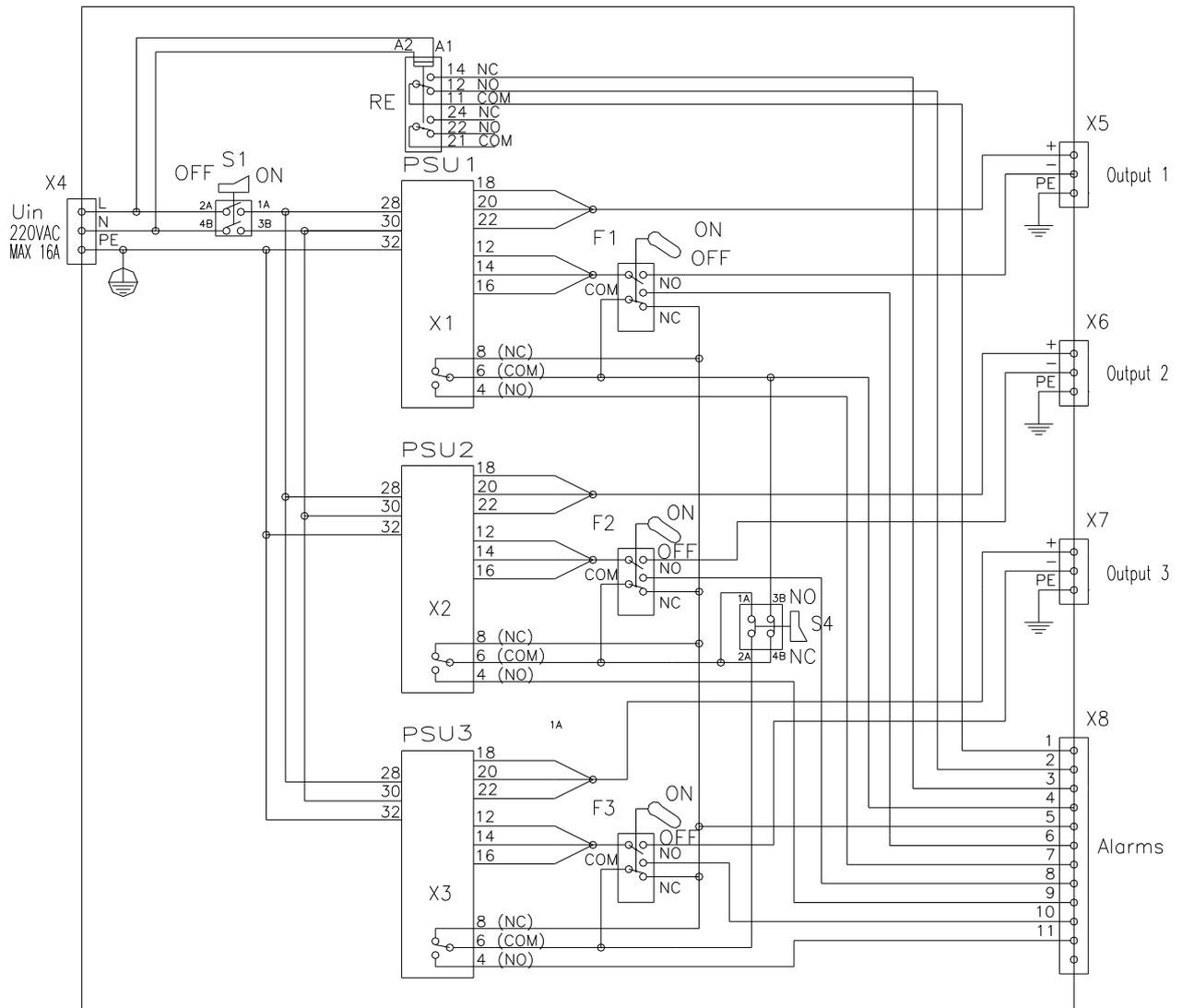
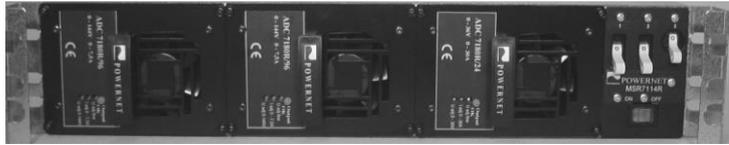
Each rectifier have module fail relay alarm NO and NC contact. Standard sub-rack includes NC contacts from each rectifier and parallel connected common alarm from whole system with NO contacts. Parallel connected NO contacts are in use when switch S4 is in NO position. Common alarm can be now connected between pins 4-5. If the switch S4 is in NC-position (serial alarm), output alarms of each PSU can be used individually from pins 6-7, 8-9 and 10-11 or to these individual alarms can be connected in series and the common NC output can be taken out between pins 6 – 11. The status normal means the normal operating condition for the power supply. The cross section of alarm cable can be 0,22 ... 0,75mm².

Electrical connections in the sub-rack

Voltage versions 12VDC, 24VDC and 48VDC



Electrical connections in the sub-rack
Voltage versions 72VDC and 96VDC



Pin Configuration in rear panel

Lead through position for analog control cable

