POLYAMP

- A secure part of your system

DC/DC Converters
PSC600-series
300 - 600 W

INPUT / OUTPUT

- Optimized inputs 24 to 440 VDC
- Single outputs 5 to 220 V
- Zero inrush current limit > 75 Vin
- Reverse input voltage protection

FEATURES

- L-mechanics for 6HE Euro format 10 to 14TE
- N-mechanics for wall, chassis, DIN mount
- N-M6 same as N with M6 studs for input/output connection
- Conformally coated
- Alarm circuit with relay

Accessible on front:

- Output OK status LED
- Output voltage adjustment
- Output voltage measurement

OPERATION

- Convection cooled
- Operating temperature range -25 to +55°C optional –40°, +70°C (+85°C 10 min)
- Fully encapsulated IP30, conformally coated
- High efficiency > 88%

EMC

- EN IEC 61000-6-3, Emission.
- EN IEC 61000-6-2, Immunity.
- EN IEC 61000-4-3, 10 V/m (option 20V/m)
- EN IEC 61000-4-4, ±4 kV.
- EN IEC 61000-4-5 level 2 & 3.
- EN 50121-3-2 train

INPUTS			
Nominal inputs	Input range	Stop level	Code
24 Vd.c.	18 - 32 V	<16.8 V	24
48 Vd.c.	38 - 60 V	<33.6 V	48
110, 127 Vd.c	90 - 150 V	<77 V	110
220, 250 Vd.c.	180 - 300 V	<154 V	220
440 Vd.c.	350– 550 V	<330 V	440

Optional inputs:

- Railway EN 50155 input voltage ranges
- MIL-STD 1275-G 24 V input voltage range

OUTPUTS		
Voltage	Current	Power
5 - 8 V	60 A	300 - 480 W
12 - 14 V	30 - 50 A	400 - 600 W
15 - 18 V	22 - 40 A	400 - 600 W
24 - 28 V	14 - 25 A	400 - 600 W
36 V	11 - 17 A	400 - 600 W
48 - 53 V	8 - 12.5 A	400 - 600 W
110/125 V	4.8 - 5.5 A	600 W
220 V	2.7 A	600 W

Any output voltage between 5 - 220 Vd.c. can be supplied

Input and Output ratings on standard PSC400 - PSC600 models

24 V INPUTS / OUTPUT RATING & TYPE CODE

DC OUTPUT			DC INPUT
V	A	P	16 - 34 V
13.2 V	30 A	400 W	PSC400 24T/13.2
15 V	27 A	400 W	PSC400 24T/15
24 V	21 A	500 W	PSC500 24T/24
24 V	25 A	600 W	PSC600 24T/24
48 V	13 A	600 W	PSC600 24T/48

The above voltage and currents are rated at -25 to +55°C, continuous operation.
For higher ambient temperature, see option T3.
See below for Railway ranges 24T-input

DC OUTPUT			DC INPUT
V	A	P	18 - 32 V
13.2 V	38 A	500 W	PSC500 24/13.2
15 V	33 A	500 W	PSC500 24/15
28 V	21 A	600 W	PSC600 24/28
53 V	11 A	600 W	PSC600 24/53
110 V	5.5 A	600 W	PSC600 24/110
125 V	4.8 A	600 W	PSC600 24/125

How to read our product code:
Example **PSC600 24/48**
PSC600 = Family code and power
24 = Input voltage code 24
48 = Output voltage 48 V

48 to 400 V OPTIMIZED INPUTS / OUTPUT RATING & TYPE CODE

DC OUTPUT			DC INPUT			
V	A	P	38 - 60 V	88- 150 V	175 - 300 V	350 - 550 V
12 V	17.5 A	400 W	PSC400 48/12	PSC400 110/12	PSC400 220//12	—
13.2 V	12.5 A	400 W	PSC400 48/13.2	PSC400 110/13.2	PSC400 220/13.2	PSC400 440/13.2
15 V	14 A	400 W	PSC400 48/15	PSC400 110/15	PSC400 220/15	—
24 V	25 A	600 W	PSC600 48/24	PSC600 110/24	PSC600 220/24	PSC600 440/24
48 V	12.5 A	600 W	PSC600 48/48	PSC600 110/48	PSC600 220/48	PSC600 440/48
110 V	5.5 A	600 W	PSC600 48/110	PSC600 110/110	PSC600 220/110	PSC600 440/110
220 V	2.7 A	600 W	- - -	PSC600 110/220	PSC600 220/220	PSC600 440/220

The above voltage and currents are rated at -25 to +55°C, continuous operation.
For higher ambient temperature see option T3.
Other input like 36, 60, 72, 96 on demand.
Outputs up to 220 Vdc.
Outputs can be series connected.

How to read our product code:
Example **PSC600 110/24**
PSC600 = Family code and power
110 = Input voltage code 110
24 = Output voltage 24 V

RAILWAY T-INPUT RANGES

INPUT			
Input	Uin range S1	Uin 0.1s S2	Code
24 V	16.8 - 32 V	14.4 - 33.6 V	24T
36 V	25.2 - 45 V	21.6 - 50.4 V	36T
48 V	33 - 60 V	28.8 - 69 V	48T
72 V	50.4 - 90 V	43 - 101 V	72T
110 V	77 - 138 V	66 - 154 V	110T

Railway EN 50155 input voltage options

S1 level - Standard

S2 - 10 ms hold-up time - Option S2

C1 - 60 % input 100 ms - Option C1

C2 - 30 ms hold-up time - is not available, needs external capacitor bank and diode.

INTRODUCTION

The PSC-series has continuously been improved and now revised the control system.
Using a small CPU for status signaling, controlling LED and alarm relay and also permits an optional temperature controlled current limit.

Mechanical Design

The PSC600 has three basic mechanical stiles;

- L-mechanics for 6HE Euro format 10 to 14TE
- N-mechanics for wall, chassis, DIN mount
- N-M6 same as N with M6 studs for input/ output connection

Additional coolers (T3) can be added for higher operating ambient temperatures or accommodate built in series diode and other options.

The PSC case is based on a convection cooled extruded aluminum with thick material for best heat distribution and EMC performance. The IP rating is IP30. Extruded aluminum consist in large part of recycled aluminum.

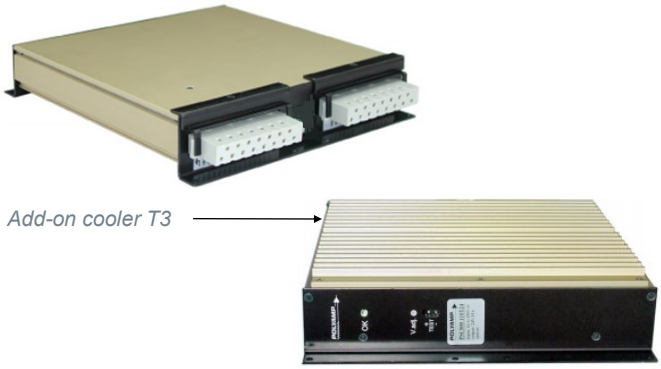

Figure 1. N-Mechanics, from connector side and an unit with extra cooler showing the front panel with LED, output measurement point and voltage adjustment potentiometer.

FEATURES

Adjustment & measurement

Output voltage measurement points and adjustment potentiometer **V.adj**. are accessible on the front panel.

Output Over voltage limit OVL

The OVL circuit limits the output voltage to +25% above **Vnom,** see figure 3.

Rectangular current limit

The current regulation has a rectangular current limit characteristic, see figure 4.

Temperature controlled current limit

Optionally for temperature sensitive application, the circuit can decrease the maximum available current, which basically lower the maximum current rating limit, that results in figure 5 current limit characteristic.
In the case the load reach this, by temperature set current limit level, then the alarm and LED switch over to alarm state.

Figure 2. Paralleled system with large redundant load

Output voltage status with LED and Alarm relay

The alarm relay and status green LED shows normal operation if the output voltage is within ±5% of the **adjusted V.adj**. output voltage with fixed green LED. See figure 3.

- If the output voltage is >105% of the **adjusted voltage** the LED blinks fast green.
- If the output voltage is below -95% the LED blinks slower green till the output is not operating.
- If the LED is red, then this indicate a general fault or temporally during the Power-up/Power-down process.

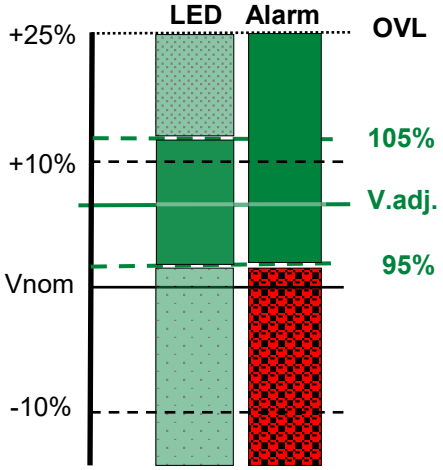

Figure 3. LED and alarm relay signaling

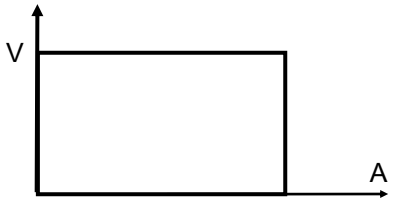

Figure 4. Rectangular current limit

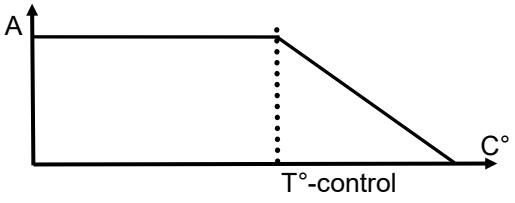

Figure 5. Temperature current control

Standard H15 connectors pin-out
H15 Input | Output connector pinout

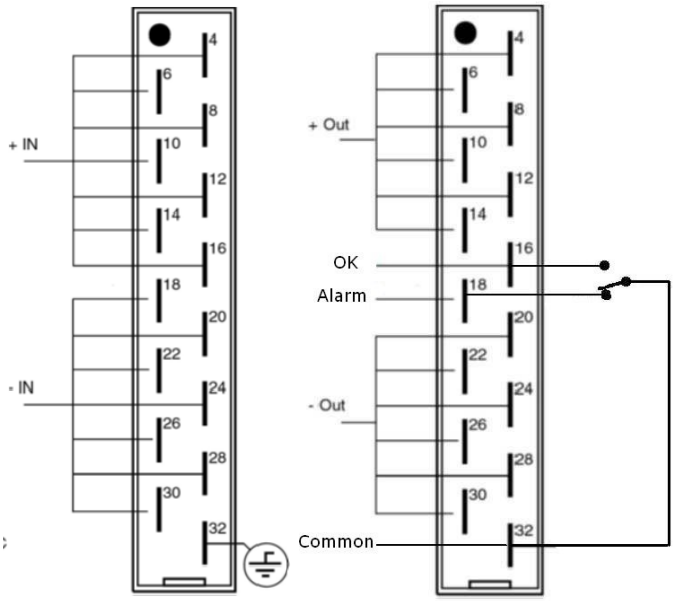

Figure 6. Input pinout Output pinout

Standard H15 Alarm Output connector	Pin 16 connected to	Pin 18 connected to
Output voltage OK	Pin 32	
Alarm state		Pin 32

Optional H15 connector pin-out
H15 Output connector sense pinout

Remote sense -S
The voltage sensing is connected at the load too compensate for voltage drop in feeder cables on the output. Is a standard feature on 5 V output.

The sense cable must be twisted and connected to a load distribution point as illustrated.

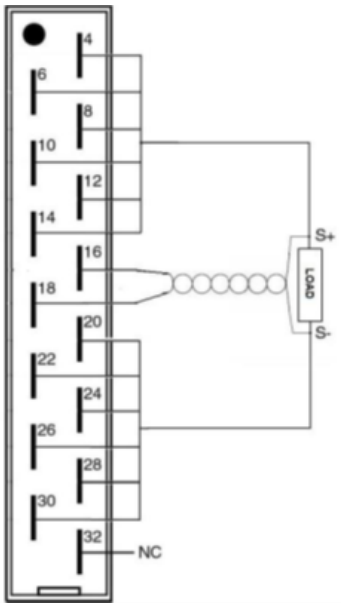

Figure 7. Twisted S+ and S- to be connected at the load.

Sense -S Output connector	Pin 16 connected to	Pin 18 connected to
At the load /distribution	Out +	Out -

OPTIONAL FEATURES

Virtual Resistance - VR

Using the VR function, paralleled units share the load by adjusting the current due to the load change, illustrated by the below figure.
In a system like figure 2 page 3, a number of units can supply a common load distribution.

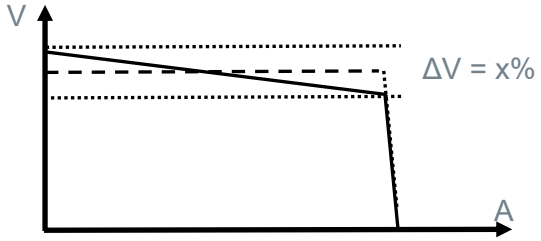

Figure 4. Share feed with virtual series resistance

The voltage slope is dependent on the voltage level and the accuracy needed in the system. The potential fault conditions in such system do not require series diode on the output. Only in the case another voltage source is present on the load side. The cause is conflicting safety earth systems. Also not possible to mix with a series diode system.

Built in output series diode -C
A series diode is provided inside the unit.
It requires an extra cooler, see option T3.
Used for parallel connection with AC/DC system.

Input series diode for reverse voltage protection - K
Parallel diode reverse protection is a standard feature.
K1. Reverse protection with a series diode on the input. The input voltage range is affected with 1 V higher start/stop voltage. On <70 V inputs this option decrease the output power by the increased heat losses produced by such diode.
Contact factory for details.

2.5 kVd.c. isolation Input/case -E1
On 24 and 48 inputs.

2.5 kVd.c. isolation Output/case -E2

Extra cooler, option T3
The PSC case can accommodate 2 extra coolers, see figure 1 or page 6 & 7.

The basic models are rated at -25 to +55°C, continuous operation. If +70°C or EN50155/IEC60571 T3 +85°C during 10 min classification is specified, an extra cooler T3 is needed.
Some options e.g. series diode on output will require T3 cooler in order to avoid derating 10-20%

Mounting against external case/cooler, option N-Sp
The N-Mechanics, use spacers to mount the unit. In same time fix the H15 connector. 8x spacers are supplied. Also possible to add one T3 cooler.

N-M6 studs connectors for input and output
The H15 connectors are relaced by M6 studs.
See figure 14.

GENERAL DATA | INPUT DATA

LABEL	VALUE
Design topology	Full bridge
Switching frequency	50 kHz
Emission / Immunity	See page 8
Safety EN IEC 61204-7:2018	See page 8
Humidity	20-90% non condensing
Ingression Protection IP	IP30
Max. accepted input ripple[1] 50 - 400 Hz	1 % of nominal voltage
Input power at no load	3 to 5 W
Reverse input voltage protection	Parallel diode[2]
Inrush current limit	
<70 Vdc input	Optional ICL
60, 90 Vdc input code	Optional ICL
> 110 Vdc input code	Yes with ICL NTC optional
Fire protection EN 45545-2 HL3 level 4.3.2 rule 1, fig 1	"Non listed product" <100 g
Dimensions	See page 6 & 7
Weight	See page 7

1. Higher ripple affects the input, contact factory
2. The input fuse will disconnect

OUTPUT DATA

LABEL	VALUE
Source regulation	0.2%
Load regulation (0 to 100% load) with sense connected	0.2%
Load regulation (0-100% load)	0.5%
Transient recovery time for 10 to 90% load step to within 3% of nominal output voltage.	<2 ms
Output ripple (50 kHz) RMS[3]	20 mV
Input ripple attenuation to output (50 to 400 Hz)	150:1
Emission / Immunity	See page 8
Temperature coefficient	0.02%/°C
Min output adjustment range adjustable with 15 turn potentiometer	90 - 110%
Current limit, rectangular	105%
Remote sense	Option S
Softs start	Yes
Alarm relay rating (a.c. & d.c.)	30 V 300 mA[4]
Start up time	< 1 s
Hold up time, contact factory	2 - 25 ms
Efficiency[5] < 10 V > 10 V	78 - 85% 89 - 93%
Operating temperature range at 100% load. (Convection cooling) With derating[6]	-25 to +55°C -25 to +70°C
Storage temperature range	-40 to + 85°C

3. The output ripple might increase to 0.5% RMS of Vout, when EN IEC 61000-4-3, 20 V/m test is applied
4. Relay is also rated 300 Vdc 20 mA, the switch current depends on the voltage
5. Lowest efficiency measured within the whole input voltage range at 100% load
6. Contact factory for derating as depends on model. The alarm relay can not be used at +70°C.

How to code the unit?

First, you have to select mechanics between either
N - Case or DIN mount
L - Euro format

Use type PSC600 110/48

PSC 600 110 / 48 A,B L-10TE K1

.

300 W 400 W 500 W 600 W	24 48 60 110 220 440	5 13.2 15 24 28 48 72 110 125 220	VR C S E2	L-10TE L-12TE L-14TE N-H15T N-sp N-M6 T3 2xT3	K1 E1
		V	Options	Options	Options
Output power	Input voltage	Output voltage		Mechanic	Input

H15 Female connector models

Standard
H15 Cage Clamp type female - **H15-CC**

The cable rating is AWG16 or <1.5 mm^2 10 A 70°C
Figure 8.

Optional
H15 FastOn 6.3 mm female - N-**H15T**
The TABS are rated 12 A 70°C or 15 A 55°C thus 2.5 mm^2 or AWG13
Figure 9.

N-MECHANICS: WALL & CHASSIS MOUNTING WITH H15 & M6 CONNECTORS

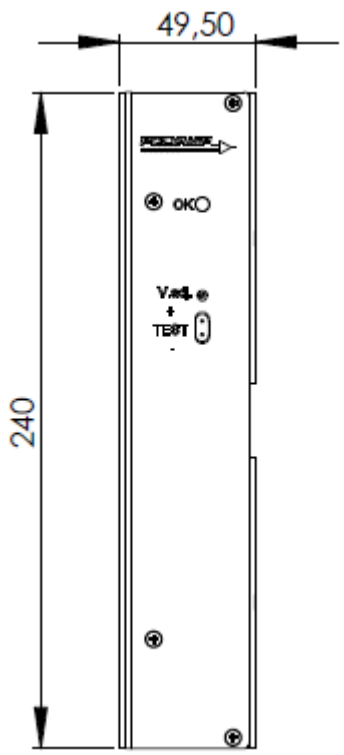

Figure 10. Front view on N-Mechanics

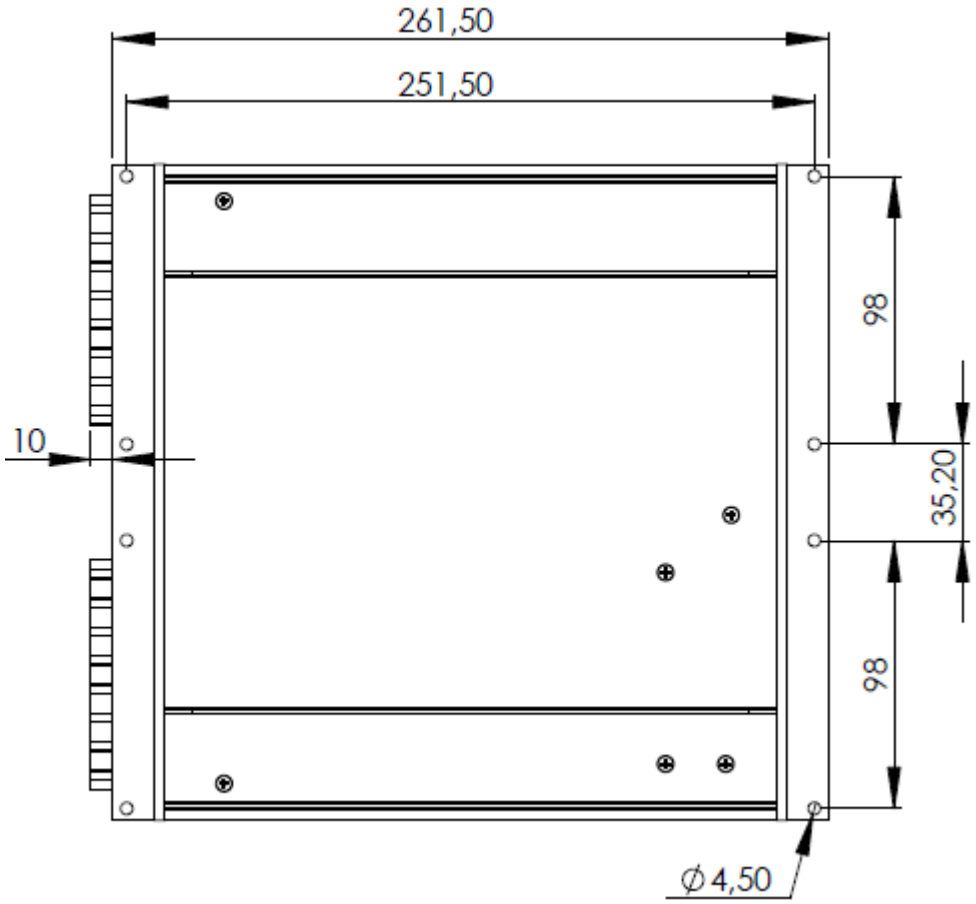

Figure 11. Mounting dimension of N-Mechanics, bottom view. Includes connector holder. Female H15 connector is optional.

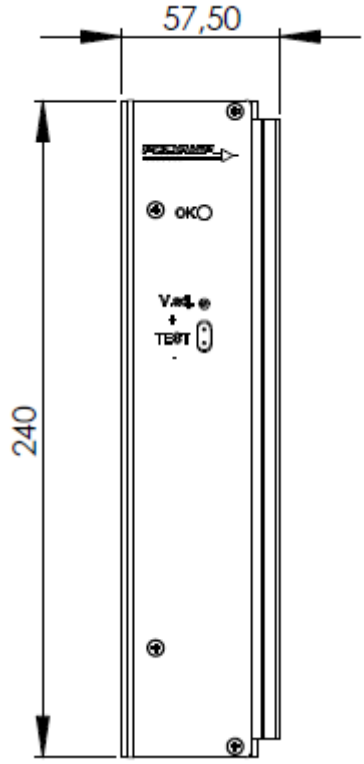

Figure 12.
Front view on N-Mechanics with one or two extra coolers

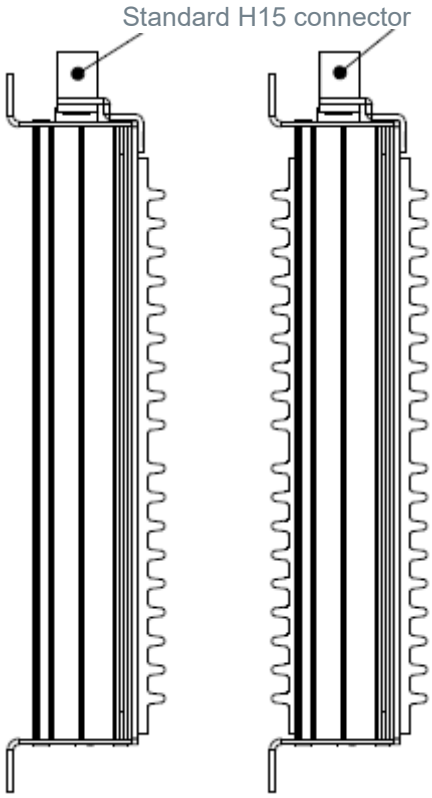

Figure 13.
N-Mechanics with one or two extra coolers

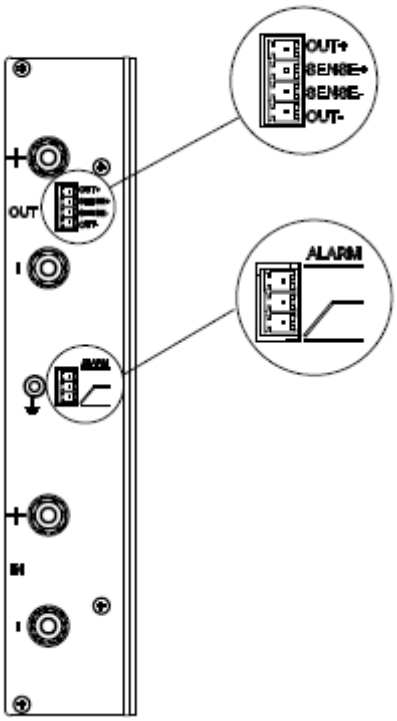

Figure 14.
N-M6 connection view, with M6 studs for input / output connection and Combicon for sense and alarm

L-MECHANICS: 6HE FOR 10 -14TE PLUGIN MODULES

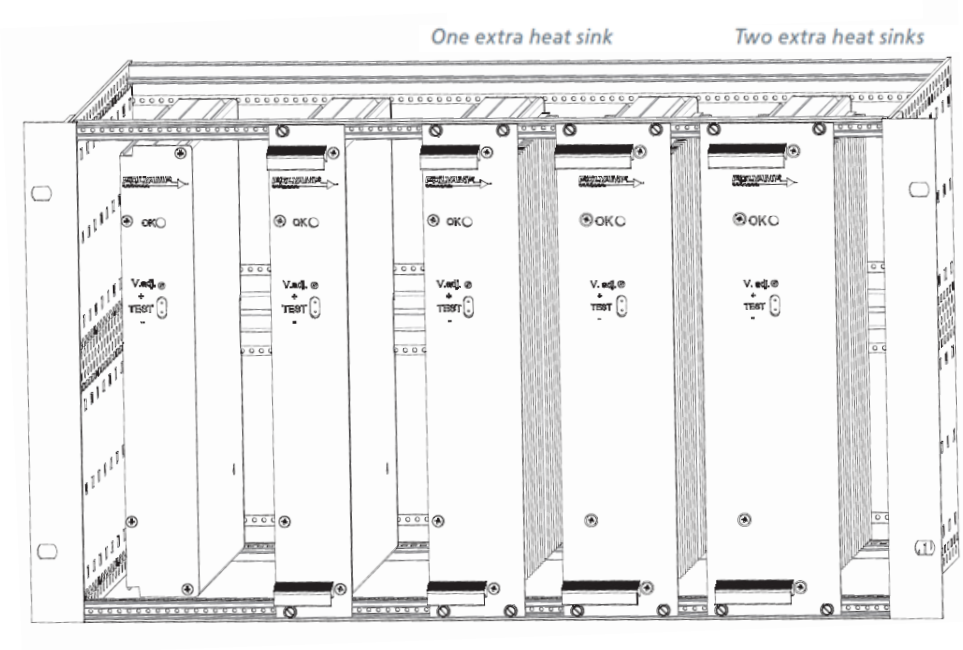

Figure 15.
PSC without L-panel, then L-mechanics 10TE, 12TE, with T3 cooler and 14TE with 2xT3 cooler

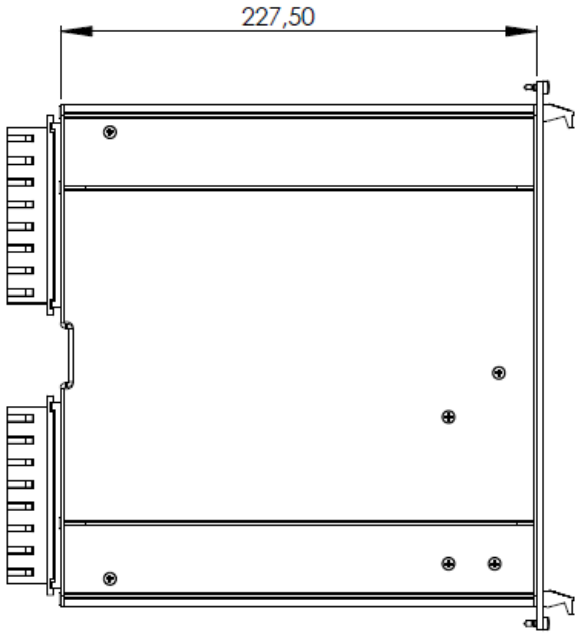

Figure 16.
6U-sub rack L-mechanic case depth, mounted in a Euro format 19" cabinet as displayed in figure 15.

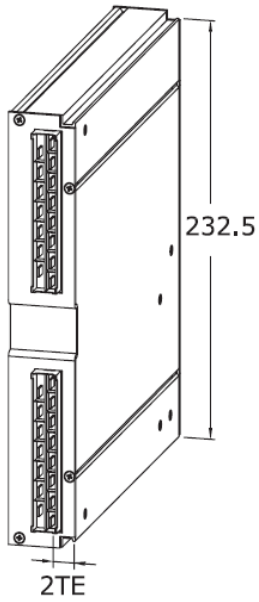

Figure 17.
Connector side and connectors position

L-Mechanics PSC 6U		Option 1xT3	Option 2xT3	Option 2xT3
Case width [mm]	38.2	48.2	57	57
Width in TE	8 TE	10 TE	12 TE	14 TE
Weight ex, connectors	3.3 kg	4.0 kg	4.7 kg	4.7 kg
N-Mechanics PSC 6U			**Option 2xT3**	**Option 2xT3**
Case width [mm]	49.5	57.5	57.5	57.5
Weight ex, connectors	3.3 kg	4.0 kg	4.7 kg	4.7 kg

CE MARK

PSC600-series meets the requirements defined by CE mark as an apparatus.

PSC-series meets requirements of EMC directive and low voltage directive (LVD) as well as 2015/863 (RoHS 3) directive.

PSC-series family is in respect to EMC, as stand alone unit. Can also be installed in any other environment by a professional installer.

Please note that product standards can demand different levels or other basic standard tests.
We test according to levels below. For higher levels or other tests, contact factory.

The PSC-series use the electric safety standard EN IEC 61204-7:2018. On EMC it meets the requirements of EN IEC 61204-3:2018, and the generic EMC standards:

EN IEC 61000-6-2 (Immunity)
EN IEC 61000-6-3 (Emission)

SAFETY STANDARD

NETWORK	INSTALLATION	INPUT CODE
Primary circuit	Class II (1)	110, 220, 440
Primary circuit	Class I (2)	110, 220, 440
Secondary circuit	Class I (2)	all
SELV circuit	Class I (2)	24, 48

1. Pollution degree 2 2. Pollution degree 3

ISOLATION TESTABLE LEVELS		TEST VOLTAGE
Input/Output	Input code 24, 48, 72 In code 110, 220, 440	2.5 kVd.c. 3 kVa.c.| 4.3 kVd.c.
Input/Alarm	Input code 24, 48, 72 In code 110, 220,440	2.5 kVd.c. 3 kVa.c.| 4.3 kVd.c.
Input/Case	Input code 24, 48, 72 In code 110, 220, 440	2.5 kVd.c. 3 kVa.c.| 4.3 kVd.c.
Alarm/Case	Input code 24, 48, 72 In code 110, 220, 440	2.5 kVd.c. 3 kVa.c.| 4.3 kVd.c.
Output/Case	On <75 Vd.c. output	2.5 kVd.c.
Output/Alarm		2.5 kVd.c.

EMC

EMC STANDARDS	TEST VOLTAGE		NOTES
Emission standards	**EN IEC 61000-6-3**		**Commercial and light-industrial environments**
	Input	**Output**	
EN 55016 CISPR16 (0.15 - 30 MHz)	OK	OK	Optional EN 55022 level B
EN 55016 CISPR16 (30 - 1000 MHz)	OK		Enclosure test
Immunity standards	**EN IEC 61000-6-2**		**Industrial environments**
EN IEC 61000-4-2	8 kV | 15 kV		Connectors | Air, Enclosure test
EN IEC 61000-4-3, see note 3	10 V/m AM-modulated		Output ripple can increase to 0.5% of Vout. Enclosure test
EN IEC 61000-4-4	±4 kV	±4 kV	
EN IEC 61000-4-5 Input code 24,48, 72 Input code 110, 220	±0.5 kV | ±1 kV ±1 kV | ±2 kV	±0.5 kV | ±1 kV ±0.5 kV | ±1 kV	Line-line 2 Ω | Line-case 12 Ω See note 4
EN 50121-3-2 train	±1 kV | ±2 kV	±0.5 kV | ±1 kV	Line-line 42 Ω | Line-case 42 Ω
EN IEC 61000-4-6	10 V_{RMS}	10 V_{RMS}	AM-modulated
EN IEC 61000-4-8	20 A/m		Enclosure test
EN IEC 61000-4-10	Not sensitive		Enclosure test

3. 20 V/m do not show any influence.
4. Higher level 2 kV / 4 kV with external filters, contact factory.
We use the EMC product standard "Low voltage power supplies DC output" EN 61204-3 as base for measurement principles. The Immunity EMC levels are elevated in order to comply to EN 50121-3-2 (IEC 62236-3-2) Railway application: Rolling stock – Apparatus, and EN 50121-4 (IEC 62236-4) , Railway application: Signaling and telecommunication apparatus. Also to meet relevant parts of IEC 61000-6-5 Generic Standards – Immunity for power stations and substation environments.

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POLYAMP
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