Elektro-Automatik GmbH

操作说明书

Instruction Manual

PSI 800 R

5000W

PSI 880-170R :	21 540 411
PSI 8200-70R :	21 540 413
PSI 8500-30R :	21 540 412

关于

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安全说明

- 负载线的直径必须符合产品的额定输出电流。
- 请避免给产品带来任何损坏，请勿将金属元件插入通风槽，请勿阻挡通风槽！
- 只有专业技术人员方可执行市电连接。
- 只能选用合适的连线，按照通用安全措施连到市电。
- 请避免直接接触太阳光和湿气。
- 如果未装接口卡，必需盖上插槽盖，以免有人触摸产品内部。

页码

1. 一般信息

1.1 简介

由微处理器控制的PSI 800 R系列电源被设计成墙挂式结构，且用风扇制冷。
其功能主要应用于工业区域。意即，本产品在断电后仍可按最后设定继续工作。

本系列所有型号都有多组固定的电压范围，以及一组全电压范围。可在一限定范围内配置这些固定电压范围，而全范围电压不受限，供应100%的额定值。

电源输出端有短路保护和过载保护。为保护负载，本产品还具有过压保护（OVP），它将关闭电源输出。过温（OT）保护与过压保护（OVP）一样。

本产品还配有一模拟接口和默认外置插卡槽，它能通过像USB，RS232或CAN数字接口进行远程控制和监控。

1.2 目检

收到本产品后，请检查是否有外观受损痕迹。如有，请不要操作本产品，应立即联系您的供应商。

1.3 供应清单

1 x 电源供应器

1 x 印刷版使用说明书

1 x Sense插头，4个引脚

1 x Share bus插头，2个引脚

2. 安装

2.1 安装

本产品设计成直挂式结构。安装时需按空气顺着通风槽流出的方式安装。注意，产品上方与下方应保留一定空间（至少15cm），以保证足够的冷却。

上盖和底板上的凹槽（也可见第9页的产品结构图）用于安放5mm以下的螺丝，从而固定产品。本产品经输入连接端接地。

2.2 输入端的连接

本型可在340V至460V范围内的AC输入电压，以及50Hz或60Hz频率下工作。

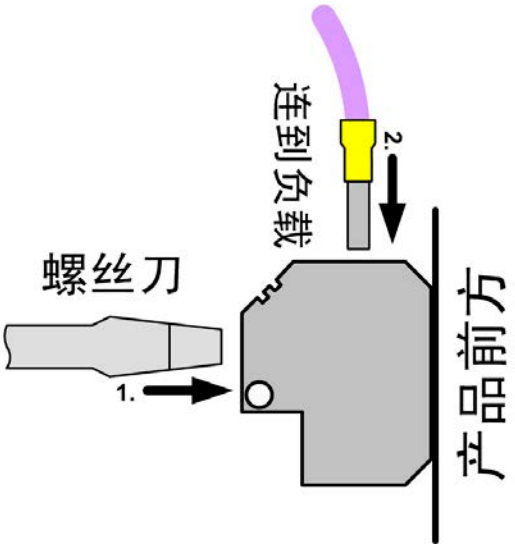
输入连接端为底板上的3位WAGO夹线端子，丝印为“Power Input”。**输入端要求接一两相电网，带L1, L2, PE，相相之间的电压为400V，相位旋转度为120°**。

必须由受训技术人员执行输入端的连线。原因主要在于要选择合适横截面的电源引线（见各型号技术规格对应的典型输入电流），以及本产品无电源开关。输入端有两个T16 5x20mm的标准保险丝，装于靠近输入连接器的两个保险座上。

2.3 直流输出端和感测端的连接

直流输出和远程感测输入端位于产品前面，且相邻，为同类型端子（卡紧型），适合安装直径为0.08mm² (28 AWG)至4mm² (12 AWG)的连接线。如果可以，线尾请套上线套。

连线夹紧步骤：

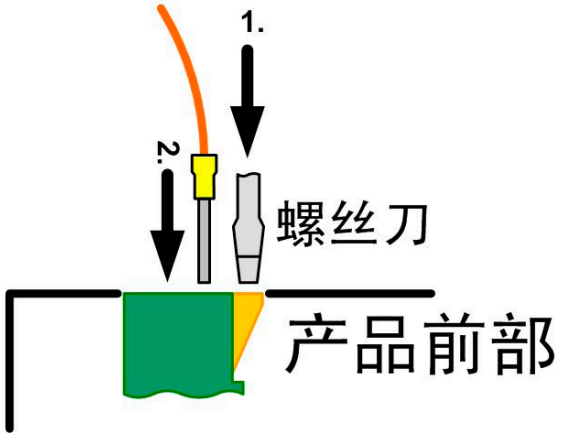


2.4 模拟接口的连接

产品顶部的12针模拟接口也采用按压夹紧型端子。适合安装0.1mm² (26 AWG)至0.5mm² (20 AWG)直径的连接线。如果可以，线尾请套上线套。

注意！千万不要将模拟接口的地接到外部控制应用（例如PLC）的负极输出端，若连接，控制应用会与电源输出端的负极连通（形成接地回路）。于是负载电流会经过控制引线，然后损坏产品！为了避免此情况发生，需在此“弱”地线上安装一保险丝。

连线夹紧步骤：



3. 功能描述

3.1 一般信息

本电源预先配置为0V输出电压与100%的输出电流。5000W功率不可调，但受限定。意即，它有一限功率器，它优先于限流器。

输出电压通过可调过压与限压极限来监控。

控制面板用于手动调节输出值和设定。通过模拟接口或者一数字接口卡可远程控制。

3.2 远程感测过压保护（Remote sense）

为补偿负载线上的压降，产品前板还具有一远程感测输入端。按正确极性连线到此，可感测负载电压。远程感测端可补偿一定的电压，详细值请见技术规格。

不用该感测输入端时，就让它空着，不用连跳线到输出端。

感测连接线的直径不是很重要。

3.3 过压保护（OVP）

本产品还有一重要特征：过压保护，该保护值可在设置菜单下从0...110%输出电压进行调节。如遇过压错误，不论是内部故障或外部原因引起，电源输出将被关闭，且在显示屏上出现“OVP”状态文本，或者通过模拟接口的“ERROR”脚指示出来。直至用 ⚠ 按钮确认，该错误方从显示屏上消失。

OV错误消失后，输出再次被打开。

3.4 过温保护（OT）

本系列产品还有一内温监控功能。如遇过热，电源输出暂时关闭，直至冷却后，又自动打开。

可在设置菜单下配置OT错误出现后的输出状态。OT错误出现过程中，“*auto ON*”状态文本指示OT错误消失后输出将被打开。也可用“*OT disappear = OFF*”参数阻止此动作。OT错误直至用 ⚠ 按钮确认方从显示屏上消失。

该错误状态还可通过模拟接口的“ERROR”引脚指示出来。

3.5 断电后输出的恢复

电源断电被认为与用手关闭输入电压一样，产品会恢复输出状态和设定值，从而重现最后输出条件。

设置菜单下用“*Power ON = OFF*”参数可阻止输出状态的恢复，而“*Power ON = restore*”参数则将输出设置成断电前的最后条件。

3.6 欠压监控

可在两个阀值范围内监控欠压状态。打开输出过250ms以及1s的反应时间后，就激活该功能，这是为了避免短时间电压下降期间关闭输出。

如果输出打开后电压低于第一个欠压阀值“*UV warning*”，显示器将以警告显示。直到用按钮确认方消失。这可防止用户未发现该错误。如果不再有错误出现，且出现的错误已被确认，警告才消除。

如果电压降至第二个欠压阀值“*UV shutdown*”以下，并关闭了输出，则会产生一报警。这通过和模拟接口的“ERROR”引脚指示。

3.7 可配置的电压配置文档

本产品还配有数个电压配置文档，可预先配置，供一般应用。第一个配置文档可在全额范围内，即0...100%内，设置电压和电流。其它配置文档也可配置，但须在一限定范围内配置。所有配置文档内还有一OVP阀值设定值和两个欠压监控阀值。这些配置文档根据产品的额定输出电压而定。

详见下表。

3.8 控制位置

控制位置指访问产品的地方。本系列产品有多个控制位置，并通过显示屏上的状态文本指示：

- ***local*** - 用户通过按钮手动激活。在此种状态下，不可对产品远程控制。在永久远程控制过程中可用来拦截和调节产品的某些设定。使用EXT按钮离开*local*状态进入远程控制，远程控制不会自动被激活。
- ***remote*** - 经其中一数字接口卡可远程控制本产品，且不可再手动访问它。按下按钮将转换至*local*状态，并终止*remote*。
- ***extern*** - 经模拟接口也可远程控制本产品，且不能再手动访问它。按下按钮将转换至*local*，并终止*extern*。

PSI 880-170 R	电压范围				
Profile	1	2	3	4	5
Name	0…80V	12V	24V	36V	48V
U adj max	80.0V	14.4V	28.8V	43.2V	57.6V
U adj min	0.0V	9.6V	19.2V	28.8V	38.4V
U output	0.0V	12.0V	24.0V	36.0V	48.0V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	88.0V	13.2V	26.4V	39.6V	52.8V
UV warning	0.0V	0.0V	0.0V	0.0V	0.0V
UV alarm	0.0V	0.0V	0.0V	0.0V	0.0V

PSI 8200-70 R	电压范围				
Profile	1	2	3	4	5
Name	0..200V	24	48V	60V	160V
U adj max	240.0V	28.8V	57.6V	72.0V	192.0V
U adj min	160.0V	19.2V	38.4V	48.0V	128.0V
U output	0.0V	24.0V	48.0V	60.0V	160.0V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	220.0V	13.2V	52.8V	66.0V	176.0V
UV warning	0.0V	0.0V	0.0V	0.0V	0.0V
UV alarm	0.0V	0.0V	0.0V	0.0V	0.0V

PSI 8500-30 R	电压范围					
Profile	1	2	3	4	5	6
Name	0..500V	48V	60V	110V	220V	360V
U adj max	500.0V	57.6V	72.0V	132.0V	264.0V	432.0V
U adj min	0.0V	38.4V	48.0V	88.0V	176.0V	288.0V
U output	0.0V	48.0V	60.0V	110.0V	220.0V	360.0V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	550.0V	52.8V	66.0V	121.0V	242.0V	396.0V
UV warning	0.0V	0.0V	0.0V	0.0V	0.0V	0.0V
UV alarm	0.0V	0.0V	0.0V	0.0V	0.0V	0.0V

不可编辑

3.9 技术规格

	PSI 880-170 R	PSI 8200-70 R	PSI 8500-30 R
电源输入			
输入电压	340…460V	340…460V	340…460V
要求相数	L1, L2, PE	L1, L2, PE	L1, L2, PE
输入频率	50/60Hz	50/60Hz	50/60Hz
输入保险丝	2x T16A	2x T16A	2x T16A
输入电流	最大16A	最大16A	最大16A
功率因数值	> 0.99	> 0.99	> 0.99
输出 - 电压			
额定电压U_{Nom}	80V	200V	500V
可调范围	0V…U_{Nom}	0V…U_{Nom}	0V…U_{Nom}
市电波动范围在±10% ΔU_{IN}时的稳定度	< 0.02%	< 0.02%	< 0.02%
带载0…100%时的稳定度	< 0.05%	< 0.05%	< 0.05%
带载100%时电压从R10至90%的上升时间	最大30ms	最大30ms	最大30ms
纹波 @ BWL 20MHz	< 100mVpp < 10mVrms	< 200mVpp < 25mVrms	< 250mVpp < 70mVrms
精确度*	≤ 0.2%	≤ 0.2%	≤ 0.2%
显示器分辨率	10mV	100mV	100mV
远程感测补偿	最大2.5V	最大6V	最大10V
过压保护门限 (可调)	0…88V	0…220V	0….550V
输出 - 电流			
额定电流I_{Nom}	170A	70A	30A
可调范围	0…I_{Nom}	0…I_{Nom}	0…I_{Nom}
市电波动范围在±10% ΔU_{IN}时的稳定度	< 0.05%	< 0.05%	< 0.05%
带载0…100% ΔU_{OUT}时的稳定度	< 0.15%	< 0.15%	< 0.15%
纹波 @ BWL 20MHz	< 300mApp < 40mArms	< 44mApp < 11mArms	< 14mApp < 8mArms
精确度*	≤ 0.2%	≤ 0.2%	≤ 0.2%
显示器分辨率	100mA	10mA	10mA
负载从10…90%瞬态恢复时间	< 2ms	< 2ms	< 2ms
输出 - 功率			
额定功率P_{Nom}	5000W	5000W	5000W
显示器分辨率	0.001kW	0.001kW	0.001kW
调节分辨率	93%	95,20%	95,50%
其它			
环境温度	0….50° C	0….50° C	0….50° C
储存温度	-20….70° C	-20….70° C	-20….70° C
相对湿度	< 80%	< 80%	< 80%
外壳尺寸 (WxHxD)	180 x 530 x 171 mm	180 x 530 x 171 mm	180 x 530 x 171 mm
安装后最小尺寸 (WxHxD)	180 x 595 x 175mm	180 x 595 x 175mm	180 x 630 x 175mm
重量	12kg	12kg	12kg
冗 餘	不	不	不
绝缘耐压输出对外壳	500V DC	500V DC	1000V DC
绝缘耐压输入对输出	4200V DC		
制冷	风扇制冷，前板为入风口，后板为排风口		
安全标准	EN 60950		
EMC标准	EN 61326, EN 55022 等级 B		
过压等级	2		
保护等级	1		
污染程度	2		
工作高度	<2000m		
并联操作			
最大并联电压	500V		
主-从操作	有，经共享总线连接器		
模拟编程			
输入范围	0…5V 或 0…10V，可选		
精确度*	≤ 0.2%		
输入阻抗	53kOhm		
产品编号	21540411	21540413	21540413

* 与相应的额定值有关

所有参数都为典型值

3. 10 产品结构图

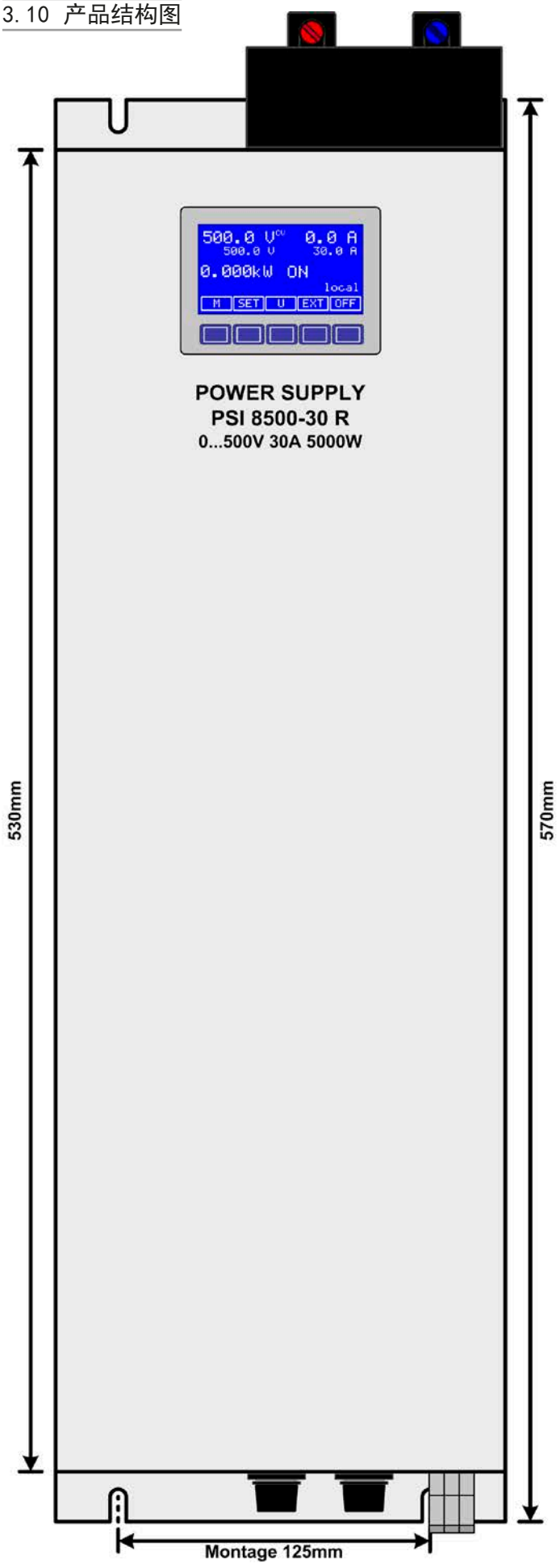


图 1. 前视图

图 1显示500V型号产品图和其直流输出盖。其它型号的直流输出以及上盖稍有不同。这使得产品安装尺寸会有不同。关于各型号的最小安装尺寸详情请见章节„3.9 技术规格“。

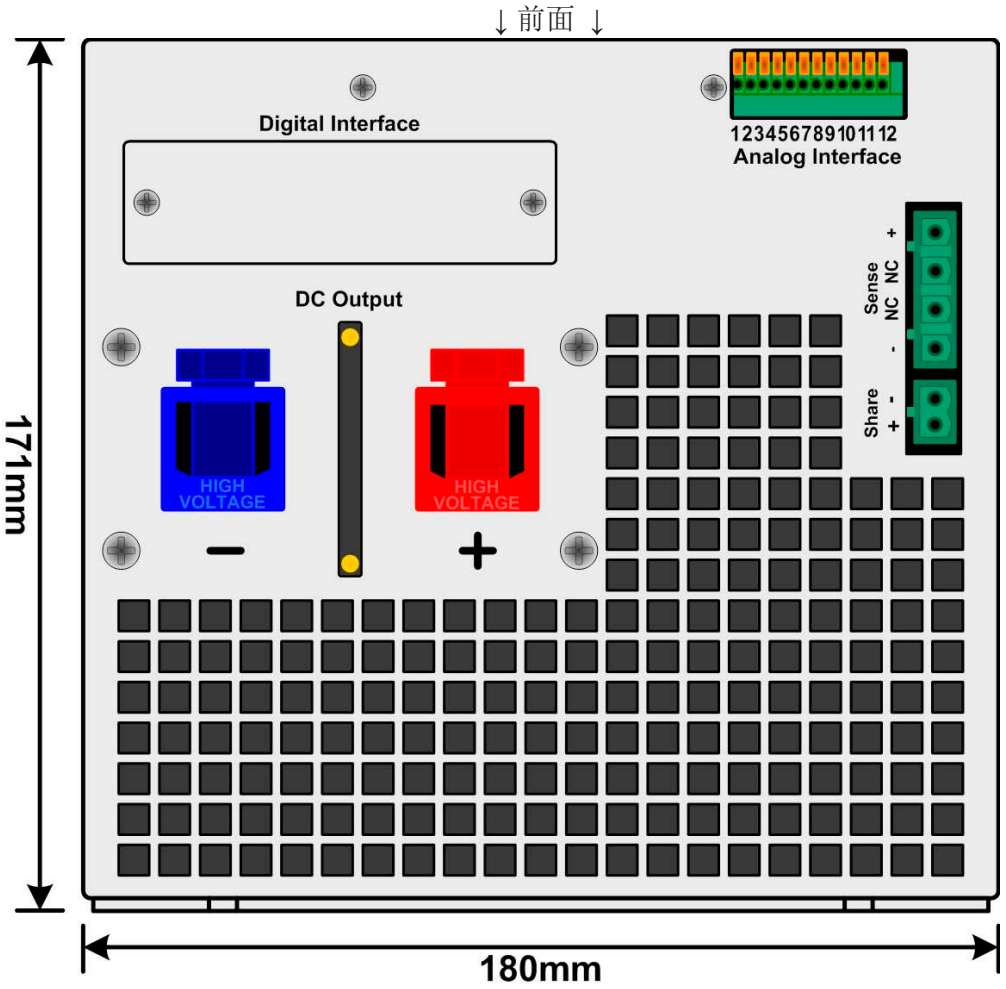

↓ 前面 ↓
Digital Interface
123456789101112
Analog Interface
DC Output
Sense NC NC -
Share - +
HIGH VOLTAGE
HIGH VOLTAGE
171mm
180mm

图 2. 顶部

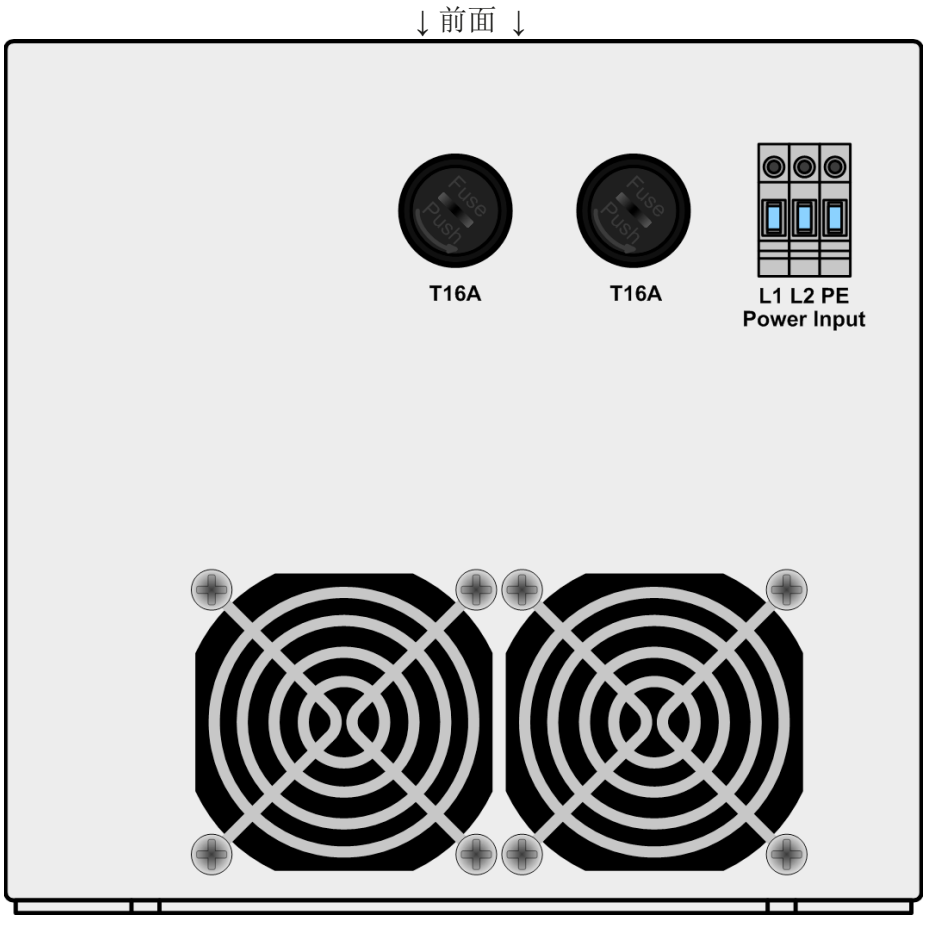
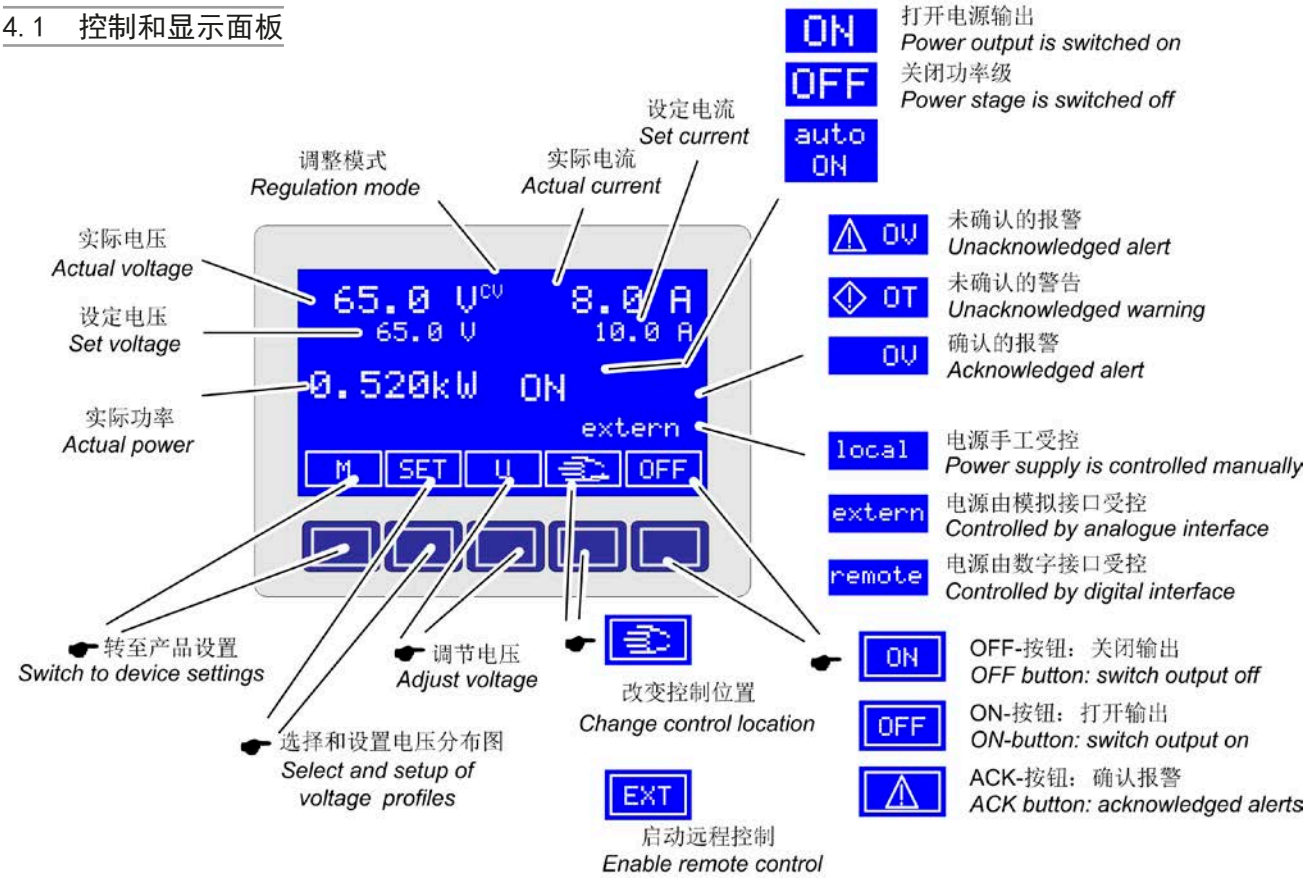

↓ 前面 ↓
Fuse Push
Fuse Push
T16A
T16A
L1 L2 PE
Power Input

图 3. 底部

4. 操作

4.1 控制和显示面板



4.1.1. 显示器布局

显示器分为设定值、实际值、输出状态、产品状态、当前按钮分配区域。

按钮分配区可根据用户选择交互变换，并通过按钮下方的指定文本或符号指示出来。

显示器的左上半区域显示大写的输出电压相关值，刚好在相关设定值的正下方。当输出打开时，实际电压旁边的“*CV*”文本指示恒压操作。

显示器的右上半区域显示大写的输出电流相关值，刚好在相关设定值的正下方。当输出打开时，实际电流旁边的“*CC*”指示恒流操作。

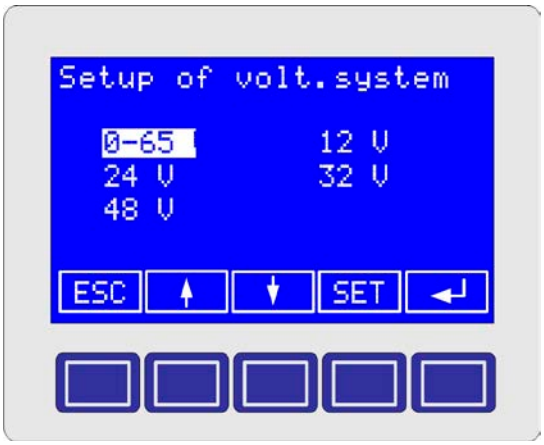
电压值区域的下方是实际功率。本产品具有一不可调的5000W功率限定值。若达到该值，“*CP*”将会出现。功率限定器可以影响输出电压，如果产品之前已处于*CV*状态；或者影响输出电流，如果产品之前已处于*CC*状态。

输出状态、其它状态（报警，警告）和控制位置（见章节3.8）都显示于显示器右下区。

4.2 电压配置文档的选择

提示：仅当输出=关闭时方可转换电压配置文档。

通过主屏上的 SET 按钮可进入电压配置文档选择菜单。



只有第一个电压配置文档（上图为*0-65V*）才可在全额输出范围内调节。

其它配置文档只能在某特定范围内（见第7页表格）调节电压。用 ↑ ↓ 按钮选择需要的配置文档，然后用 ↵ 按钮提交。显示器将返回正常界面，而输出值变为配置文档下调节的数值。

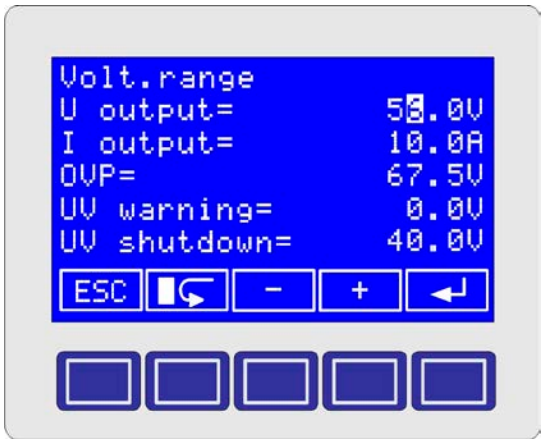
若按下 SET 按钮，则打开所选配置文档，可进行调节。

4.3 编辑电压分布图

用 ↑ ↓ 按钮选定即将调节的参数。按下 SET 按钮，选定的参数变为可调，按下 ↵ 按钮可提交参数或用 ESC 按钮终止操作。

更改参数

按下 SET 按钮，选定参数在其限定范围内可调。



选定了要调节的参数后，用 + 和 - 按钮增加或减少当前标记的小数位（光标所在位），用 ↔ 可移动光标位置。

ESC 按钮终止调节，并回到前菜单。

要提交已调节值，必须用 ↵ 按钮。

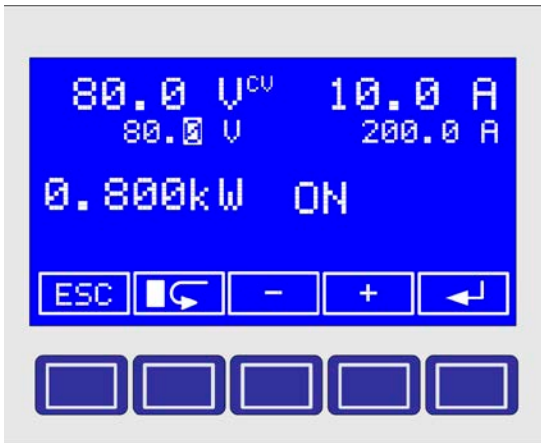
4.4 调节设定电流

输出电流的设定值不可在主屏上直接调整，而是在每个电压配置文档下调节。详情请见章节„4.3 编辑电压分布图“。

4.5 电压的直接调节

在主屏下通过 U 按钮也可对输出电压直接调节。它会选择要调节的设定电压。

参数的调节与提交或取消方式跟前面描述的一样。



4.6 设置菜单

用 M 按钮进入设置菜单。菜单结构和默认设置在下页图中有详述。

注意：只有当输出=关闭时方可修改设定。

4.6.1. “General settings”菜单项

„*General settings*“项配置电源恢复后电源输出状态，，过温时电源输出状态，以及LCD背光设置。

电源打开后的输出状态

Power ON (默认：*restore*)

如果*Power ON*设置为*restore*，输出将恢复到产品最后一次关闭前的状态。另一选项，*Power ON = OFF* 设置表示每一次启动后输出为关闭状态。

OT-过温关闭后的输出状态

OT disappear (默认：*auto ON*)

如果设为*auto ON*，过温出现又消除后输出将自动打开。设为*OFF*时，输出保持关闭状态，且只可手动打开。

注意：因过温而关闭输出为一报警状态，用户需用 ⚠ 按钮承认该报警状态。

显示器背光

Backlight (默认：*Delay 60s*)

如果设置为*Backlight = Delay 60s*，背光一般为关闭状态，每次按下一按钮过60s后方打开。要背光永久亮，则选择*Backlight = ON*。

4.6.2. “Analogue interface“菜单项

该菜单项设置内置模拟接口。模拟输入脚和输出脚可与普通的0..5V和0..10V控制电压范围一起操作。在0..5V范围内，分辨率和精确度被减半。

Analogue in/out (默认：*0...10V*)

如果选择了*Analogue voltage = 0...10V*，模拟输入脚和输出脚会接受0...10V，对应0...100%额定值。在0...10V选项下，>10V的电压会被限制到100%。

注意：模拟远程控制仅在电压配置文档1被选择后方可执行。否则，会产生一EXT报警信息。

Digital inputs (默认：*LOW*)

数字输入脚可为低态动作或高态动作。

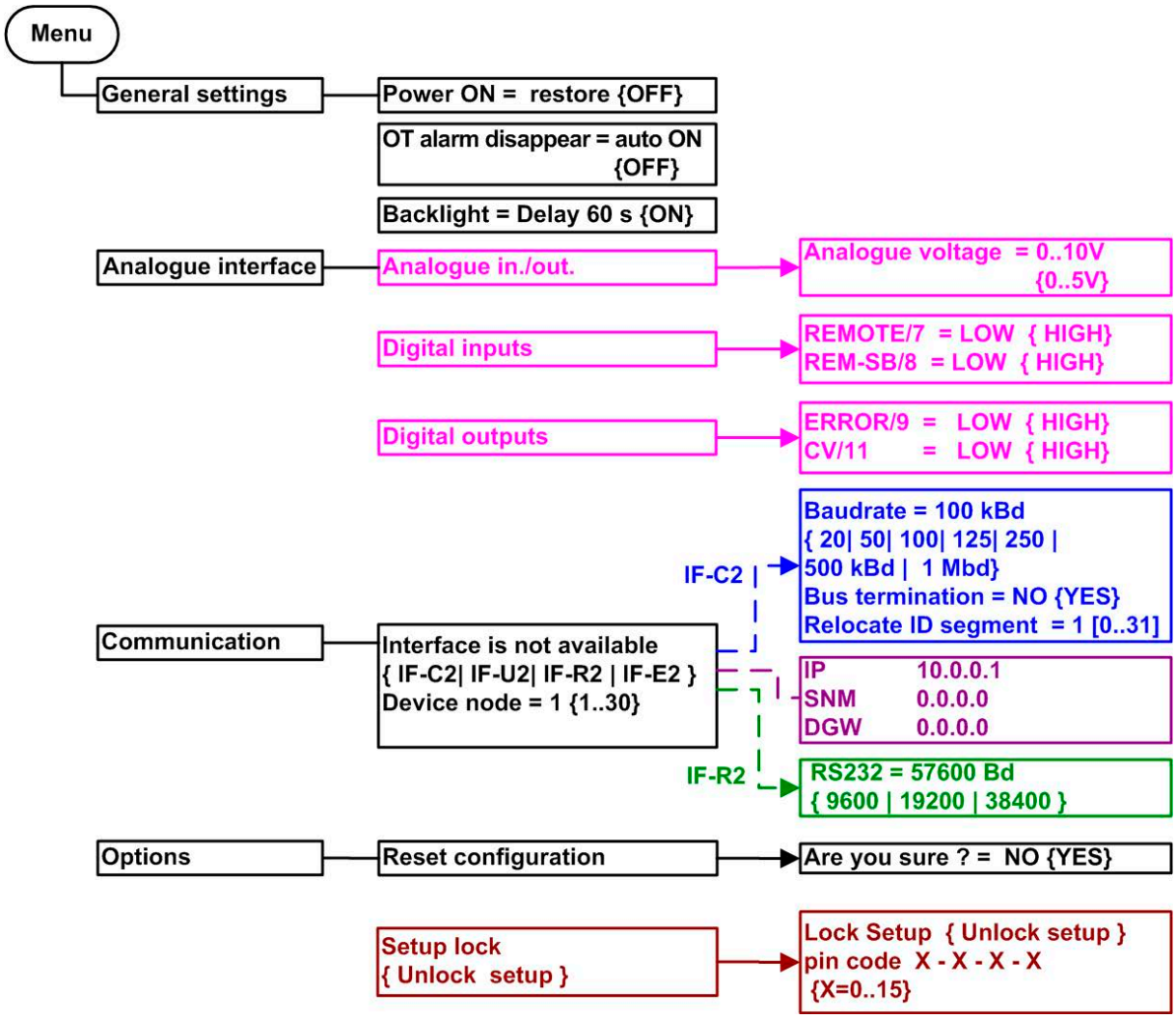
若为*LOW*，输入脚将在低输入水平下执行定义的功能。详见模拟接口的技术规格。

若为*HIGH*，输入将对高输入水平作出反应。

Digital outputs (默认：*LOW*)

数字输入脚可为低态动作或高态动作。

输出脚针对所选的输出水平用信号通知定义的功能，即：当设置为*LOW*时，转至GND，*HIGH*时转至高电位。详见模拟接口的技术规格。



4. 6. 3. “Communication “菜单项

若产品配有一数字接口卡，用该菜单项可配置通讯设定。关于这些设定的详细描述，可见另外的接口卡操作说明。

4. 6. 4. “Options “菜单项

该菜单页可将产品重设为默认设置，并用一密码锁定控制面板。

Reset configuration

如果对„*Are you sure?*“确认提示选择*YES*，所有可编辑参数将被重设为其默认值。如果为*NO*，所有设置保持不变。

配置重设后，选定的电压配置文档„*U output*“值需再提交一次。

Lock setup

用箭头按钮输入一个四位数字密码后，控制面板被锁定，除非用解锁按钮解开。这四位数字可为0 - 15。从而有65536个选择。解锁控制面板方法相同，再次输入这个密码即可。如果该密码丢失，仅能通过„*Reset configuration*“解除锁定，见上面描述。

4. 7 报警

本产品会用⚠符号和缩写在显示屏、以及模拟接口上的输出脚上显示不同的报警信息。

这些报警信息必须由用户使用⚠按钮确认，有些报警信息(*OT*, *OVP*)会关闭输出，但是一旦确认信息后又可再次打开输出。

有一例外，就是OT报警，产品冷却后输出会被自动打开，如果在„*General settings*“菜单设置下„*OT disappear*“选项被设为„*auto ON*“时。

4. 7. 1. 报警类型

OT - 过热引起的过温关断

OVP - 内部或外部原因引起的过压关断

EXT - 远程控制错误

提示：

- 若出现*OT*或*OVP*，输出被关闭，不管是处于手动还是远程控制操作。
- *EXT*报警显示当电压配置文档2-5中的一个被选定时，表示尝试通过模拟接口转至远程控制。要转至模拟远程控制，先要用SET按钮选择电压配置文档1。也可见章节4.2。

5. 远程控制

5. 1 利用数字接口

利用可选数字接口卡(USB, RS232, Ethernet或CAN)，本产品可完全远程控制和监控。具体功能和技术参数请见接口卡的操作说明。利用CAN可将多台电源联网。

5. 2 利用模拟接口

根据选定的电压控制范围（将章节„4.6 设置菜单“），利用0...10V或0...5V控制电压，可将控制输出电压和电流的设定值赋予设定值输入脚VSEL和CSEL。

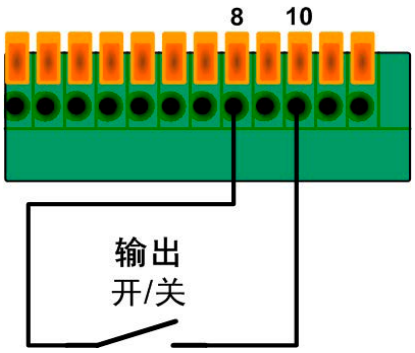
根据选定的电压控制范围（将章节„4.6 设置菜单“），利用0...10V或0...5V控制电压，可将控制输出电压和电流的实际输出值赋予输出脚VMON和CMON。

远程控制产品前，需将引脚7 „Remote“拉到GND将产品转至远程控制。并提供两个设定值。如果其中一个数值需要调节，可将另外一个值连到VREF，设置为100%。*注意：数字输入脚与CMOS脚不兼容。要将这些引脚下拉到GND，需用一如继电器或三极管上的低阻触片或开关。PLC或类似设备的数字输出脚在这儿可能不能满足要求。可参考您控制硬件的技术文件。*

5. 2. 1. 模拟接口应用举例

注意：连接模拟接口的引脚时，建议使用如下直径的连线：0,1mm² (AWG26) 至 0,5mm² (AWG20).

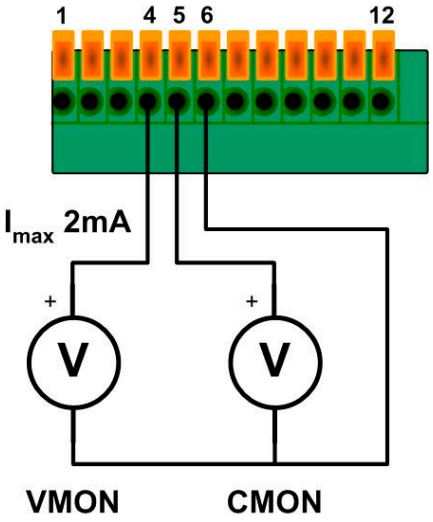
远程打开/关闭输出



即使远程控制未激活，该输入脚也可关闭电源输出，除非控制位置被设为*local*（也见章节3.8）。如果输入脚配为（见章节4.6.2），只有打开触片或放开继电器方能再次打开电源输出。

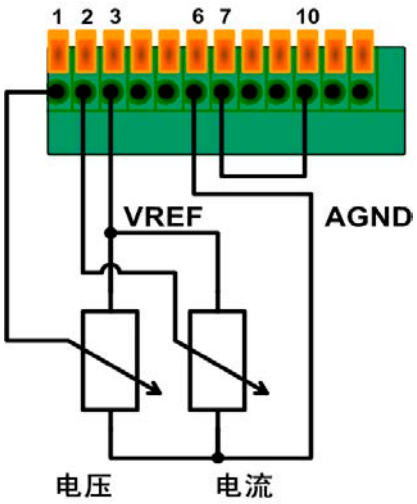
引脚8上的接触片/开关要优先于„ON“按钮的作用。于 „ON“.

监控电压和电流



根据设置菜单下电压范围的选择，模拟监控输出脚VMON和CMON为额定值输出0....5V或0....10V电压。参考脚为模拟接地脚（AGND）。

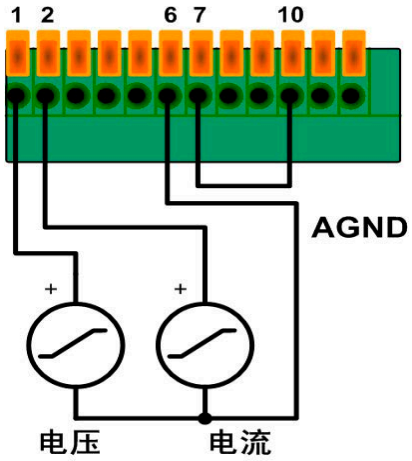
设定值 1



此范例显示如何用参考电压（VREF）和设定值输入脚上的电位器来控制设定值。

电位器阻值应为10kOhm或更高。

设定值 2



此范例显示如何通过外部电压源控制电压和电流。

注意！严禁将>12V的电压连接至这些输入脚！

根据设置下的电压范围选项，>10V或>5V的设定值会被限定为100%额定值。

5. 2. 2. 模拟接口各引脚分布和技术规格

引脚	名称	类型[1]	描述	电平	电器参数
1	**VSEL**	AI	设定值：电压	0…. 10V对应0…. 100%的U_{nom}	精确度 <0. 5%，U_{Max} = 12V，输入阻抗 >100k
2	**CSEL**	AI	设定值：电流	0…. 10V对应0…. 100%的I_{nom}	
3	**VREF**	AO	参考电压	10V / 5V	I_{Max} = 10mA时，精确度<0. 1%，对AGND有短路保护
4	**VMON**	AO	实际值：电流	0…. 10V对应0…. 100%的U_{nom}	I_{Max} = +2mA时精确度为0. 2%，对AGND有短路保护
5	**CMON**	AO	实际值：电压	0…. 10V对应0…. 100%的I_{nom}	
6	**AGND**		模拟信号地		VSEL，CSEL，CMON，VMON，VREF 用
7	**Remote**	DI	激活外部控制	外部 = Low （U_{Low}<1V） 内部 = High （U_{High}>4V）	U_{Max} = 0…15V；I_{Max} = −3mA，5V时
8	**Rem_SB**	DI	功率输出开/关	关 = Low （U_{Low}<1V）， 开 = High （U_{High}>4V）	
9	**Error**	DO	UV 警告 UV 关断 过压-OVP	Low = 无错误 （U_{Low}<1V）， High = 出错 （U_{High}>4V）	U_{Max} = 15V，I_{Max} = −10mA； 准集电极上拉至Vcc [2]
10	**DGND**		数字信号地		作控制和消息信号
11	**CV**	DO	电压控制操作 电流控制操作	Low = 电压受控 （U_{Low}<1V） High = 电流受控 （U_{High}>4V）	U_{Max} = 15V，I_{Max} = −10mA； 准集电极上拉至 Vcc [2]
12	**+VCC**	AO	辅助电压	12…. 16V	I_{Max} 24mA，对AGND有短路保护

1) AI = 模拟输入脚，AO = 模拟输出脚，DO = 数字输出脚

2) 12V...15V

6. 其它应用

6.1 串联

可将多台同型号产品串联在一起，但要遵守下列规则：

- 不可进行主-从操作
- 模拟接口的地不准相互连接。这也适用于模拟接口的所有其它信号。如果需要远程控制，可使用隔离放大器，并联控制所有产品。
- 任何承受负载电流的导体直径必须符合该产品最大额定输出电流。任何产品的直流输出负极对地（PE）电压不能>300V。

6.2 并联（Share bus）

输出电压和电流相同的产可以多台并联在一起，从而增加总输出电流。要建立电流均衡分配的并联系统，要用到产品上的Share bus连接器。

重点：在该操作模式下，带最高输出电压之产品控制并决定整个并联连接的输出电压。意思是，系统中的任何一台产品都有可能担当此责任。故建议先选择控制整个系统的产品，同时将剩余产品的设定电压设为所需最小值。设定电压和功率可设为100%，如果不要该值，可将每台产品的值设为相同值，从而获得所需总值。

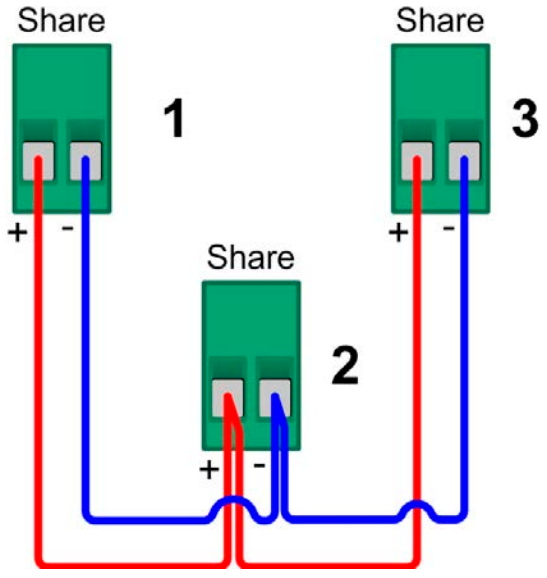
假如有一台产品坏掉，将完全关闭，但并联连接继续工作，不收影响。这叫冗余操作。

像过温（OT）或过压（OVP）这样的错误出现，输出电压会上升或下降到任何一台剩余产品上调节的最高值。

Share bus操作中要求„Share“端的连线非常简单。见下图。连接线的横截面不是非常重要。为使连线影响做到最小，应将两条线扭在一起。

注意：若需使用远程感测，建议连到决定整个系统电压的主机输入端。

注意！此为纯粹的模拟连接。不会在任何产品上形成总实际值！



7. 附件

7.1 附件和其它选项

本系列产品还有下列附件可选：

a) 数字接口卡

可结合USB，RS232或CAN使用的多款可插拔式数字接口卡可选。每款产品型号都有一接口卡插槽。

还有下面选项：

a) 水冷式

内置水冷模块。水冷式模块用于防止电源输出因过热而过早关断。

7.2 固件更新

只有当产品出现错误行为或者应用新功能时才需进行产品固件更新。

要更新一台产品固件，需用到其中一款数字接口卡，新的固件文档，以及被称作“更新工具”的Windows软件。

下列这些接口卡才能用于固件更新：

- IF-U2 (USB)
- IF-R2 (RS232)

如果手上没有一张上述接口卡，则不可更新。请立即联系您的产品销售方寻求解决方案。产品对应的更新工具和特定产品的固件文档可从产品制造商网站获取，或者发邮件索取。更新工具将指导用户执行整个半自动更新过程。

About

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Safety instructions

- The cross section of the load leads has to match the nominal current of the device!
- Avoid any damage to the device, do not insert metal parts through the slots, do not obstruct the slots!
- Mains connection must only be done by trained technical personnel!
- Mains connection only with appropriate leads and under adherence of common safety measures!
- Avoid direct sunlight and humidity!
- Always attach the slot cover if the interface card is NOT equipped, in order to prevent someone to reach into the device!

1. General

1.1 Introduction

The microprocessor controlled power supply of the PSI 800 R series are designed for wall mount and work with fan cooling.

The functionality focuses industrial power supply. It means, the device will continue its work with the last settings after a blackout.

All models feature fixed voltage ranges, as well a full voltage range. The fixed voltage ranges are configurable within certain limits, the full voltage range is not limited and offers 100% of all nominal values.

The power output is short-circuit-proof and overload-proof. For protection of the loads, the devices also feature an overvoltage protection (OVP), which will switch the power output off. The same happens at an overtemperature (OT) event.

The devices are equipped with an analogue interface and an extension card slot by default. This makes remote control and monitoring by digital interfaces like USB, RS232 or CAN possible.

1.2 Visual check

After receipt, the unit has to be checked for signs of physical damage. If any damage is found, the unit may not be operated. Also contact your dealer immediately.

1.3 Scope of delivery

1 x Power supply unit

1 x Printed user manual

1 x Plug „Sense“, 4pole

1 x Plug „Share bus“, 2pole

2. Installation

2.1 Mounting

The device is designed for vertical wall mount. It is required to mount it in a way that allows unimpeded air flow through the ventilation slots. Take care for plenty of space (at least 15cm) below and above the device in order to ensure proper cooling.

The notches on the top and bottom (also see mechanical drawing on page 25) are used to mount the device with screws of up to 5mm. The unit is grounded via the input connection.

2.2 Input connection

The device can be operated at AC input voltages from 340V to 460V and input frequencies of 50Hz or 60Hz.

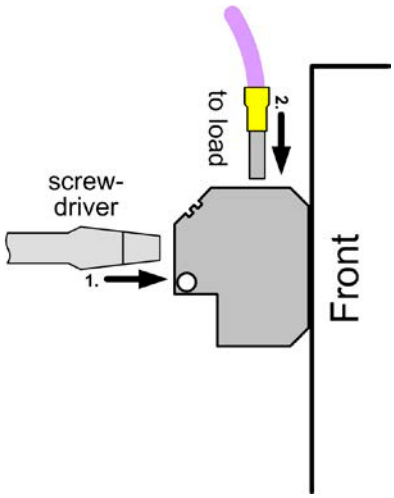
The input connection is done at the 3pole WAGO clamp terminal „Power Input“ at the bottom side and according the print. **The input requires a two-phase grid with L1, L2, PE, 120° phase rotation and 400V between the phases**.

The input wiring must only be done by trained technical personnel. Main focus lies on an appropriate cross section of the mains lead (see technical specifications for typical input current), as well as the fact that the device does not feature a power switch. The input is fused by two standard 5x20mm T16A fuses, which are located in the two fuseholders next to the input connector.

2.3 DC output connection

The DC output and the remote sense inputs are located on the front of the device next to each other and are of same type (press & clamp). Cable cross section goes from 0.08mm² (28 AWG) to 4mm² (12 AWG). If possible, use cable end sleeves.

Clamping procedure:

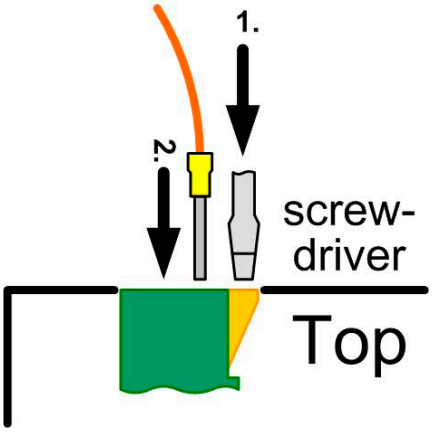


2.4 Analog interface connection

The 12 pole analog interface on the top side is of type press & clamp. It is eligible for cable cross sections of 0.1mm² (26 AWG) to 0.5mm² (20 AWG). If possible, use cable end sleeves.

Attention! Never connect grounds of the analogue interface to minus (negative) output of an external control application (PLC, for example), if that control application is already connected to the negative power supply output (ground loop). Load current might flow over the control leads and damage the device! In order to avoid this a fuse can be integrated in the „weak" ground line.

Clamping procedure:



3. Functional description

3.1 General

The power supply is pre-configured to 0V output and 100% output current. The power of 5000W is not adjustable, but it is limited. It means that there is a power limiter which has priority over the current limiter.

The output voltage is supervised regarding adjustable over- and undervoltage thresholds.

The control panel is used to manually adjust output values and settings. Remote control is either done with the analogue interface or a digital interface card.

3.2 Remote sense

In order to compensate voltage drops along the load leads, the device features remote sense inputs. Here the sensed voltage from the load is connected with correct polarity. Remote sense can compensate up to a certain level, see technical specifications for value.

When not using the sense inputs, they just remain open. It is not required to bridge them to the output.

The cross section of the sense leads is non-critical.

3.3 Overvoltage protection (OVP)

An important feature is the overvoltage protection which can be adjusted in the setup from 0...110% output voltage. In case of an overvoltage condition, whether caused by an internal defect or by external reasons, the power output is switched off and the error is indicated by the a status text „OVP" in the display and also by pin „ERROR" of the analogue interface. The error indication remains in the display until acknowledged by button ⚠.

After the OV condition is gone and acknowledged, the output can be switched on again.

3.4 Overtemperature (OT)

The device also features an internal temperature supervision. In case of overheating, the power output will be temporarily switched off until the device has cooled down, and then automatically switch on again.

The state of the output after an OT error can be configured in the setup. During an OT condition a status text „*auto ON*" indicates that the output will be on after the OT condition has gone. This can be deactivated by the parameter „*OT disappear = OFF*". The error indication remains in the display until it is acknowledged by the button ⚠.

The condition is additionally indicated by pin „ERROR" of the analogue interface.

3.5 Output restoration after mains blackout

After a mains blackout, which is considered the same as switching the input voltage off by hand, the device will reconstruct the last condition by restoring output state and set values.

The output state restoration can be deactivated in the setup menu by the parameter „*Power ON = OFF*", while „*Power ON = restore*" will set the output to the last condition before the blackout.

3.6 Undervoltage supervision

The supervision of an undervoltage condition is done with two thresholds. It will be activated 250ms after the output is switched on and has a response time of 1s, in order to avoid switching the output off during short-time voltage drops.

In case the output voltage is below the 1st undervoltage threshold „*UV warning*“ after the output has been switched on, the display will indicate a warning. The warning remains in the display until acknowledged by the button. This prevents errors from being unnoticed by the user. The warning is removed if no error is persistent anymore and after it has been acknowledged.

The 2nd undervoltage threshold („*UV shutdown*“) will generate an alarm if the output voltage falls below and switch off the output. This is indicated by and at the „ERROR“ pin of the analogue interface.

The output can be switched on again, after the alarm has been acknowledged.

3.7 Configurable voltage profiles

The device features several voltage profiles that are pre-configured for common applications. The first profile allows to set voltage and current within the full nominal values, i.e. from 0...100% voltage and current. The other profiles are configurable, but within a limited voltage range. In all profiles there is also a set value for the OVP threshold and two undervoltage supervision thresholds. The profiles depend on the nominal output voltage of the device.

See table below.

3.8 Control locations

Control locations are places from where the device is accessed. With this series, there are several control locations which are indicated by status texts in the display:

- ***local*** - is manually activated by the user with button. In this situation the device can not be controlled remotely. This can be useful to intercept during a permanent remote control and adjust some settings on the device. After enabling remote control again by leaving *local* with button EXT, remote control is not activated automatically.
- ***remote*** - the unit is remotely controlled by one of the digital interface cards and manual access is not possible. Pressing button changes to *local* and aborts *remote*.
- ***extern*** - the unit is remotely controlled by the internal analogue interface and manual access is not possible. Pressing button changes to *local* and aborts *extern*.

PSI 880-170 R	Voltage ranges				
Profile	1	2	3	4	5
Name	0…80V	12V	24V	36V	48V
U adj max	80.0V	14.4V	28.8V	43.2V	57.6V
U adj min	0.0V	9.6V	19.2V	28.8V	38.4V
U output	0.0V	12.0V	24.0V	36.0V	48.0V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	88.0V	13.2V	26.4V	39.6V	52.8V
UV warning	0.0V	0.0V	0.0V	0.0V	0.0V
UV alarm	0.0V	0.0V	0.0V	0.0V	0.0V

PSI 8200-70 R	Voltage ranges				
Profile	1	2	3	4	5
Name	0..200V	24	48V	60V	160V
U adj max	240.0V	28.8V	57.6V	72.0V	192.0V
U adj min	160.0V	19.2V	38.4V	48.0V	128.0V
U output	0.0V	24.0V	48.0V	60.0V	160.0V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	220.0V	13.2V	52.8V	66.0V	176.0V
UV warning	0.0V	0.0V	0.0V	0.0V	0.0V
UV alarm	0.0V	0.0V	0.0V	0.0V	0.0V

PSI 8500-30 R	Voltage ranges					
Profile	1	2	3	4	5	6
Name	0..500V	48V	60V	110V	220V	360V
U adj max	500.0V	57.6V	72.0V	132.0V	264.0V	432.0V
U adj min	0.0V	38.4V	48.0V	88.0V	176.0V	288.0V
U output	0.0V	48.0V	60.0V	110.0V	220.0V	360.0V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	550.0V	52.8V	66.0V	121.0V	242.0V	396.0V
UV warning	0.0V	0.0V	0.0V	0.0V	0.0V	0.0V
UV alarm	0.0V	0.0V	0.0V	0.0V	0.0V	0.0V

not editable

3.9 Technical specifications

	PSI 880-170 R	PSI 8200-70 R	PSI 8500-30 R
Mains input			
Input voltage range	340…460V	340…460V	340…460V
Required phases	L1, L2, PE	L1, L2, PE	L1, L2, PE
Input frequency	50/60Hz	50/60Hz	50/60Hz
Input fuse	2x T16A	2x T16A	2x T16A
Input current	max. 16A	max. 16A	max. 16A
Power factor	> 0.99	> 0.99	> 0.99
Output - Voltage			
Nominal voltage U_{Nom}	80V	200V	500V
Adjustable range	0V…U_{Nom}	0V…U_{Nom}	0V…U_{Nom}
Stability at mains fluctuation ±10% ΔU_{IN}	< 0.02%	< 0.02%	< 0.02%
Stability at 0…100% load	< 0.05%	< 0.05%	< 0.05%
Ramp-up time 10...90% at 100% load	max. 30ms	max. 30ms	max. 30ms
Ripple @ BWL 20MHz	< 100mVpp < 10mVrms	< 200mVpp < 25mVrms	< 250mVpp < 70mVrms
Resolution of display	10mV	100mV	100mV
Remote sense compensation	max. 2.5V	max. 6V	max. 10V
Overvoltage protection threshold (adjustable)	0…88V	0…220V	0….550V
Output - Current			
Nominal current I_{Nom}	170A	70A	30A
Adjustable range	0…I_{Nom}	0…I_{Nom}	0…I_{Nom}
Stability at mains fluctuation ±10% ΔU_{IN}	< 0.05%	< 0.05%	< 0.05%
Stability at 0…100% ΔU_{OUT}	< 0.15%	< 0.15%	< 0.15%
Ripple @ BWL 20MHz	< 300mApp < 40mArms	< 44mApp < 11mArms	< 14mApp < 8mArms
Accuracy*	≤ 0.2%	≤ 0.2%	≤ 0.2%
Resolution of display	100mA	10mA	10mA
Transient recovery time 10….90% load	< 2ms	< 2ms	< 2ms
Output - Power			
Nominal power P_{Nom}	5000W	5000W	5000W
Accuracy*	≤ 0.2%	≤ 0.2%	≤ 0.2%
Resolution of display	0.001kW	0.001kW	0.001kW
Efficiency	93%	95,20%	95,50%
Miscellaneous			
Ambient temperature	0….50°C	0….50°C	0….50°C
Storage temperature	-20….70°C	-20….70°C	-20….70°C
Humidity rel.	< 80%	< 80%	< 80%
Dimensions of enclosure (WxHxD)	180 x 530 x 171 mm	180 x 530 x 171 mm	180 x 530 x 171 mm
Dimensions of installation (WxHxD), min.	180 x 595 x 175mm	180 x 595 x 175mm	180 x 630 x 175mm
Weight	12kg	12kg	12kg
Redundancy	no	no	no
Isolation output to enclosure	500V DC	500V DC	1000V DC
Isolation input to output	4200V DC		
Cooling	by fans, air inlet on the front, air exhaust on the rear		
Safety	EN 60950		
EMC standards	EN 61326, EN 55022 Class B		
Overvoltage class	2		
Protection class	1		
Pollution degree	2		
Operational altitude	<2000m		
Parallel operation			
Max. parallel connection voltage	500V		
Master-Slave	yes, via Share bus		
Analogue programming			
Input range	0…5V or 0…10V, selectable		
Accuracy	≤ 0.2%		
Input impedance	53kOhm		
Article number	21540411	21540413	21540413

* Related to the corresponding nominal value

All values are typical values

3.10 Mechanical Drawings

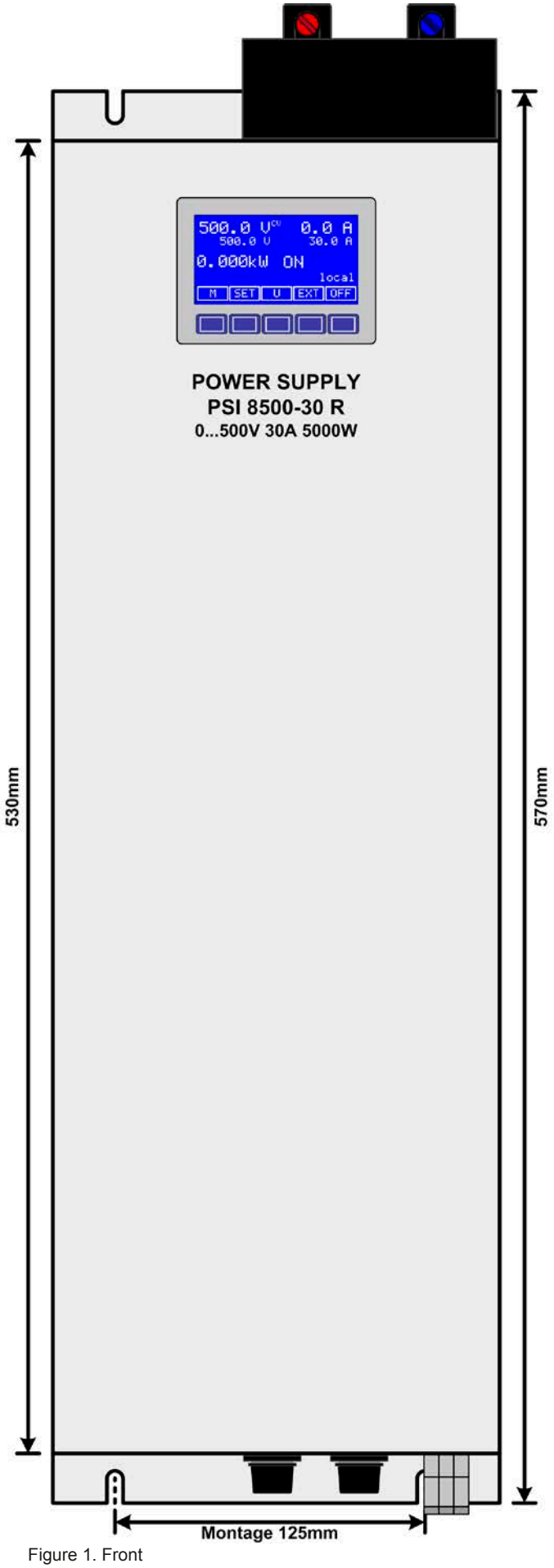


Figure 1. Front

Figure 1 shows the 500V model with its DC output cover. Other models will slightly differ regarding the DC output and the cover. This effects the installation dimensions. See section „3.9 Technical specifications“ for details about the minimum installation dimensions.

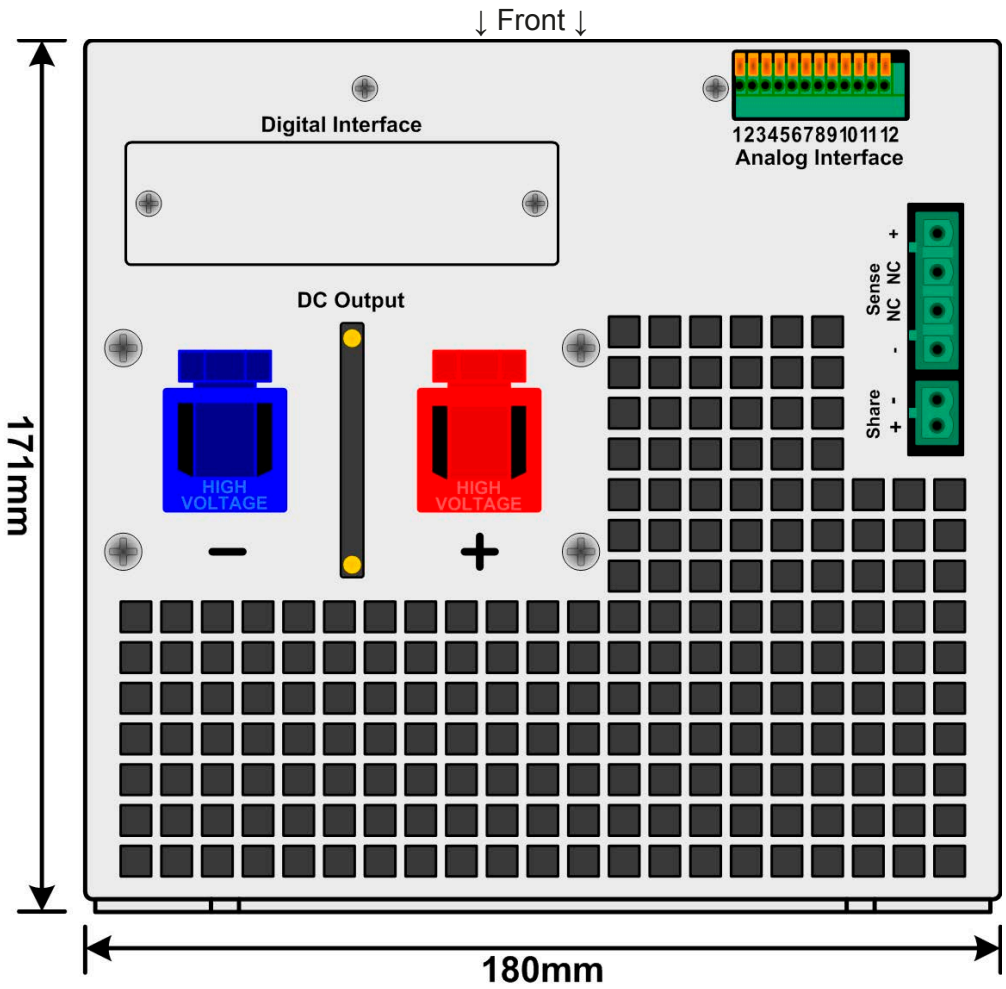


Figure 2. Top side

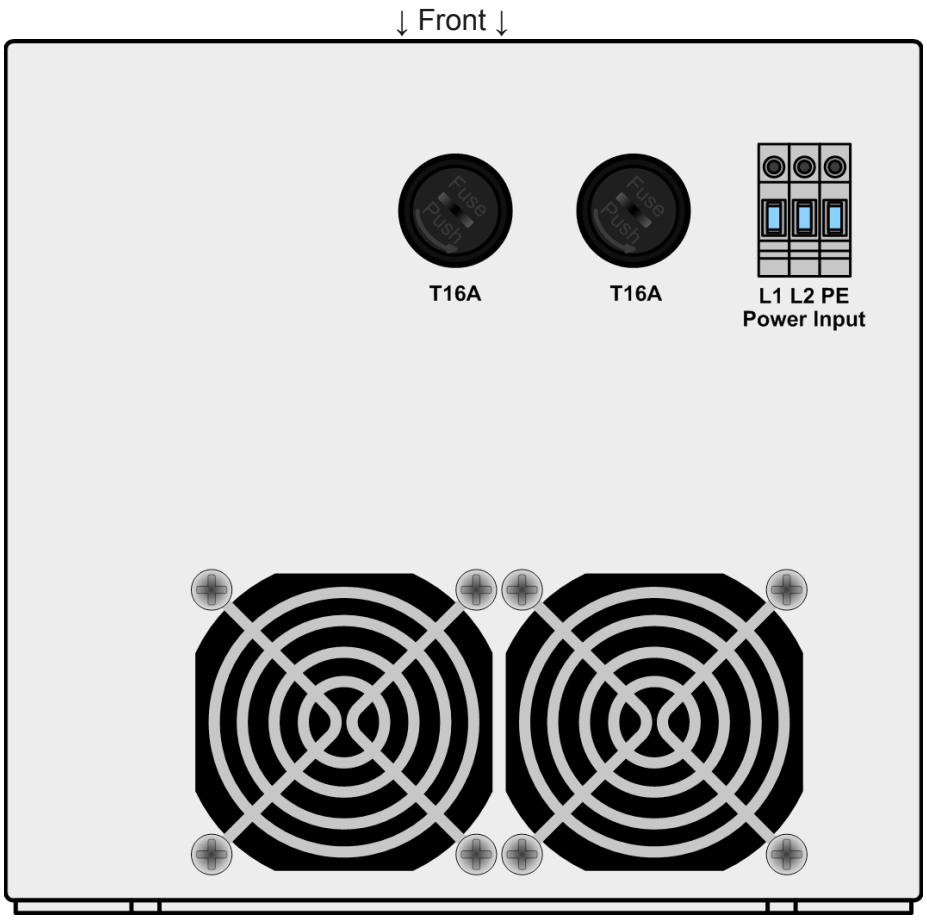
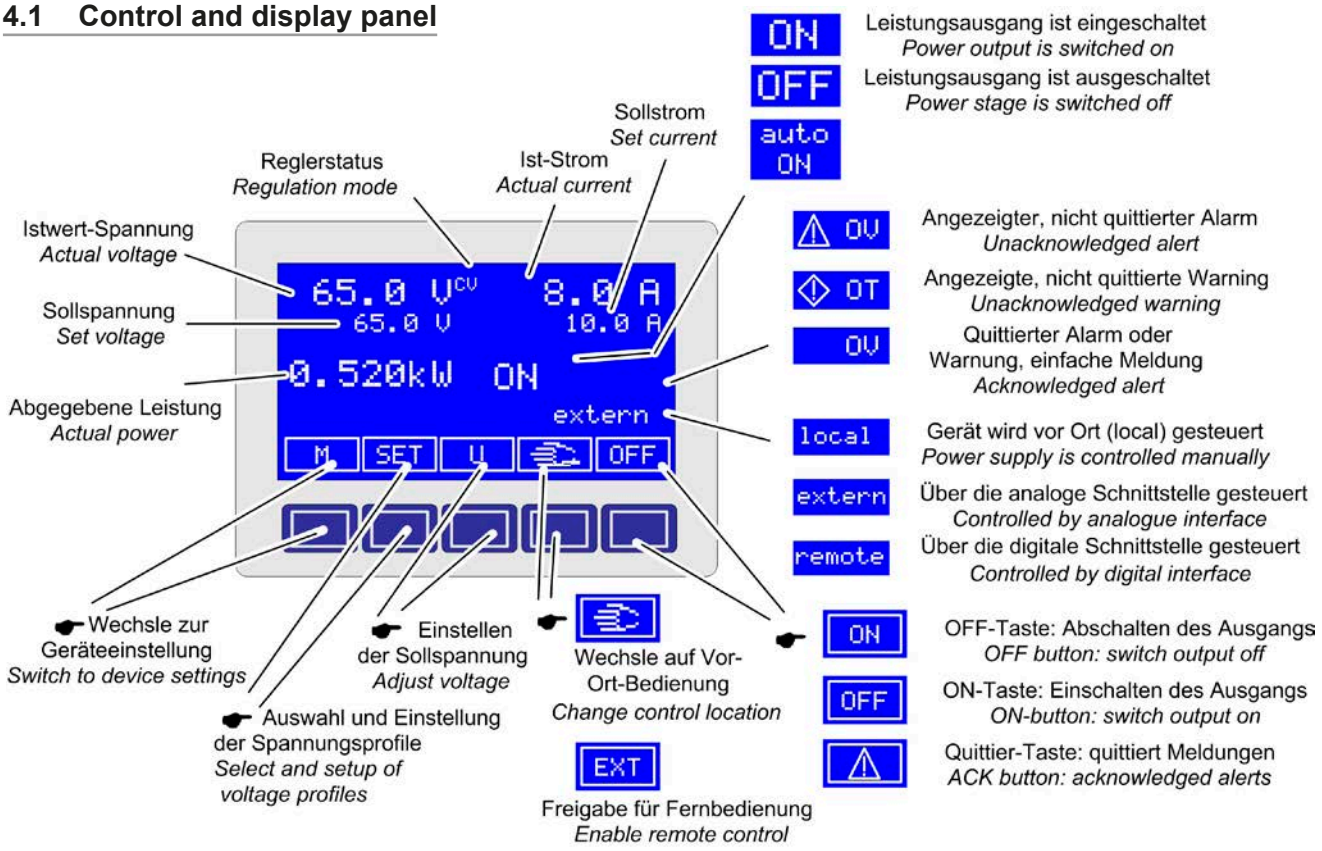


Figure 3. Bottom side

4. Operation

4.1 Control and display panel



4.1.1. Layout of the display

The display is seperated into areas for set values, actual values, the output state, device status and the current button assignments.

The button assigment field changes interactively according to the user's selection and is indicated by text or symbols which are dedicated to the buttons beneath.

The upper left half of the display shows output voltage relevant values in big font. Directly beneath is the related set value. While the output is on, the text „*CV*" right next to the voltage actual value indicates constant voltage operation.

The upper right half of the display shows output current relevant values in big font. Directly beneath is the related set value. While the output is on, the text „*CC*" right next to the current actual value indicates constant current operation.

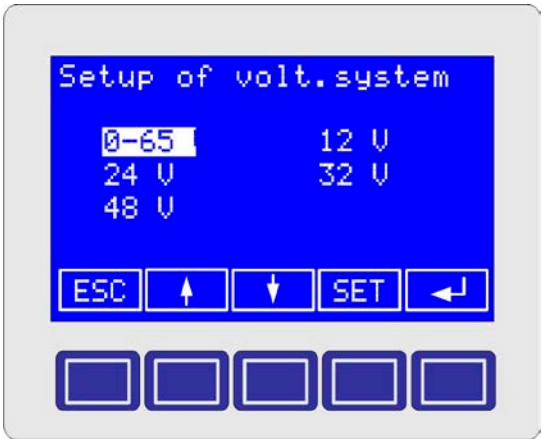
Beneath the voltage value area the actual output power is indicated. The device has a power limit of 5000W which is not adjustable. In case this limit is reached, „*CP*" will be indicated. The power limiter either effects the output voltage, if the device was in *CV* before, or the output current, if it was in *CC*.

The output state, status (alarms, warnings) and the control location (see section 3.8) are indicated in the lower right area of the display.

4.2 Selecting a voltage profile

Note: Switching voltage profiles is only possible during output = off.

The voltage profile selection menu is accessed by the button SET in the main display.



Only the first voltage profile (here: 0..65V) offers full output value adjustment.

The other profiles allow adjustment, but for the voltage only within certain limits (see tables on page 23). The ↑ ↓ buttons are used to select the desired profile, which is then submitted with the ↵ button. The display will return to normal and the output values are changed to the ones as adjusted in the profile.

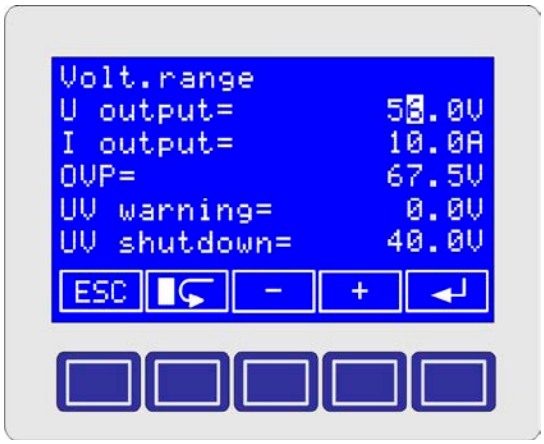
If button SET is pushed instead, the selected profile is opened for adjustment.

4.3 Editing a voltage profile

The parameter that is going to be adjusted is selected by the ↑ ↓ buttons. By pushing SET the selected parameter becomes adjustable and is submitted with the ↵ button or discarded with ESC.

Changing parameters

After using the SET button, the selected parameter can be adjusted within its limits.



If a parameter is selected for adjustment, the buttons + and - are used to increase or decrease the currently marked decimal place (cursor), while the ⇆ button moves the cursor position.

The ESC button aborts the adjustment and returns to the previous menu.

In order to submit the values in the menu, the ↵ button has to be used.

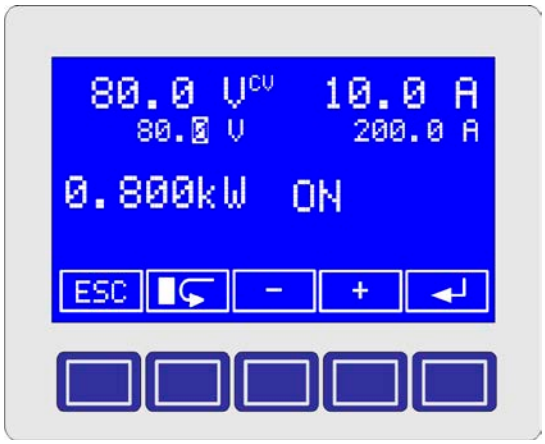
4.4 Adjusting the set value for current

The set value for the output current can not be adjusted directly in the main screen, but in every voltage profile. See section „4.3 Editing a voltage profile“.

4.5 Direct voltage adjustment

In the main screen the output voltage can also be directly accessed for adjustment by the U button. It selects the voltage set value for adjustment.

Adjustment and submission or cancellation of the adjustment is done the same way as described above.



4.6 The setup menu

The setup menu is accessed with the button M. The menu structure and default settings are depicted in the figure on the next page.

Note: modification of settings only possible during output = off.

4.6.1. Menu item „General settings“

The item „*General Settings*“ configures the power output state after mains returns, the behaviour of the power output at overtemperature and the LCD backlight.

Output state after mains switch-on

Power ON (Default: *restore*)

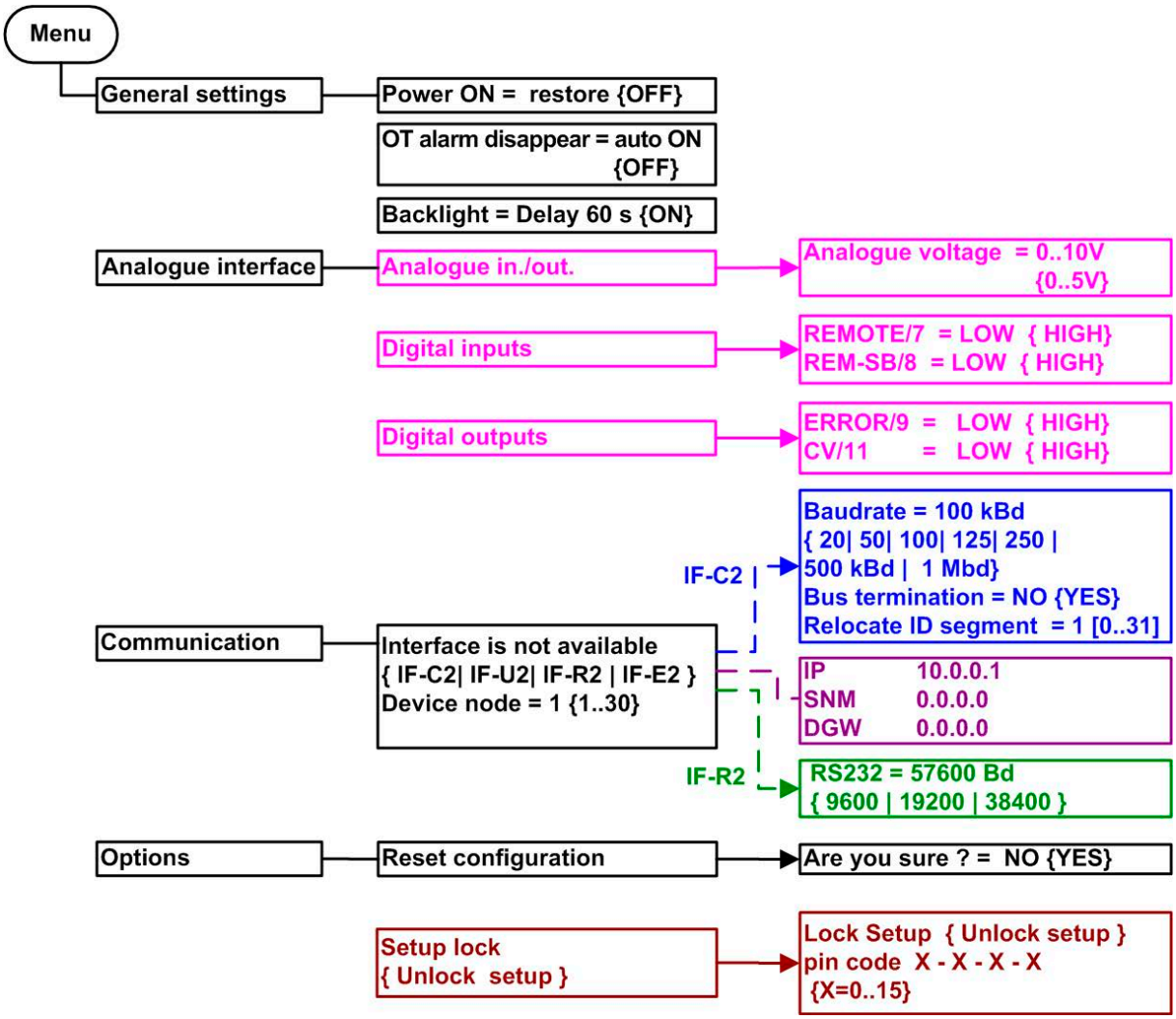
The output is restored to the condition it had the last time the device was switched off, if *Power ON* is set to *restore*. The other option, *Power ON = OFF* leaves the output off after every start.

Output state after OT shut-off

OT disappear (Default: *auto ON*)

If set to *auto ON*, the output will automatically switch on again after an overtemperature condition has occured and is gone again. With setting *OFF,* the output will remain off and has to be switched on manually.

Note: overtemperature shutdown of the output is an alarm condition and the alarm has to be acknowledged by the user by pressing the ⚠ button.



Display illumination

Backlight (Default: *Delay 60s*)

If *Backlight = Delay 60s* is set, the backlight is generally off and will be switched on for 60s after every push of a button. For permanent backlight select option *Backlight = ON*.

4.6.2. Menu item „Analogue interface“

This configures the built-in analogue interface. The analogue inputs and outputs can work with the common 0...5V and 0...10V control voltage ranges. In the range 0...5V the resolution and accuracy are halved.

Analogue in./out. (Default: *0...10V*)

If *Analogue voltage = 0...10V* is selected, the analogue inputs and outputs will accept 0...10V for 0...100% nominal values. With 0...10V range selected, voltages >10V are clipped to 100%.

The selection *Analogue voltage = 0...5V* will work accordingly. With 0...5V range selected, voltages >5V are clipped to 100%.

Note: analogue remote control is only possible with voltage profile 1 selected. Otherwise, an alarm EXT is generated.

Digital inputs (Default: *LOW*)

The digital inputs can be selected to be low-active or high-active.

If set to *LOW* the input will execute its defined function at low input level. See the technical specs table of the analogue interface for details.

If set to *HIGH*, the input will react to input level high.

Digital outputs (Default: *LOW*)

The digital outputs can be selected to be low-active or high-active.

The outputs will signalise their defined function with the selected output level, i.e. by switching to GND at *LOW* or to high potential at *HIGH*. See the technical specs table of the analogue interface for details.

4.6.3. Menu item „Communication“

If the device is equipped with a digital interface card, this menu entry is used to configure communication settings. A detailed description of those settings can be found in the external user guide of the interface card.

4.6.4. Menu item „Options“

This menu page provides a possibility to reset the device to default settings and to lock the control panel with a pin code.

Reset configuration

If *YES* is selected at the confirmation prompt „*Are you sure?*“, all editable parameters are reset to their default values. With *NO*, all settings remain unaltered.

After a configuration reset, the value „*U output*“ of the selected voltage profiles has to be submitted once again.

Lock setup

After entering a 4 digit PIN code with the arrow buttons, the control panel is locked, except the unlock button. The four numbers can be 0 - 15, which results in 65536 combinations. Unlocking is done the same way, by entering the PIN code again. If the PIN code is lost, the lock can only be removed by doing a „*Reset configuration*“. See above.

4.7 Alarms

The device will indicate different alarms in the display using the symbol ⚠ and an abbreviation, as well as the output pin ERROR on the analogue interface.

Those alarms have to be acknowledged by the user with button ⚠. Some alarms (*OT*, *OVP*) will switch off the output, which can be switched on again after acknowledgement.

The only exception is the OT alarm, where the output can automatically switch on again after the device has cooled down, if in menu „*General settings*“ the option „*OT disappear*“ was set to „*auto ON*“.

4.7.1. Alarm types

OT - Overtemperature shutdown due to overheating

OVP - Overvoltage shutdown due to internal or external cause

EXT - Remote control error

Notes:

- If *OT* or *OVP* occurs, the output is switched off, no matter if manual or remote control was active
- The alarm *EXT* shows that an attempt was made to switch to remote control by analogue interface while one of the voltage profiles 2-5 resp. 2-6 was selected. In order to switch to analogue remote control, first select voltage profile 1 via SET button. Also see section 4.2.

5. Remote control

5.1 By digital interface

With the optionally available, digital interface cards (USB, RS232 or CAN) the device can be completely remotely controlled and monitored. For details of features and technical specs see the user manual of the interface cards. With CAN, multiple power supplies can be networked.

5.2 By analogue interface

Set values that control output voltage and current can be given to set value inputs VSEL and CSEL with control voltages of 0...10V or 0...5V, depending on the selected control voltage range (see section „4.6 The setup menu“).

The actual output values of voltage and current are put out as monitoring voltages to outputs VMON and CMON with 0...10V or 0....5V, depending on the selected control voltage range (see section „4.6 The setup menu“).

Before controlling the device remotely is has to be switched to remote control with pin 7 „Remote“ pulled to GND. Both set values have to be given. If only one of both is going to be adjusted, the other one can be tied to VREF in order to be 100%.

Note: the digital inputs are not CMOS compatible. In order to pull those down to GND, a low-resistive contact or switch like from a relay or transistor etc. is required. Digital outputs of a PLC or similar may not suffice here. Consult the technical documentation of your controlling hardware.

5.2.1. Pin assignment and technical specs of the analogue interface

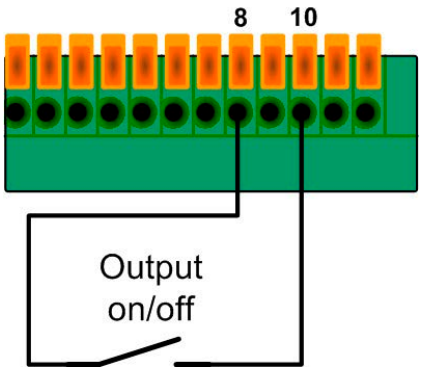
Pin	Name	Typ[1]	Description	Level	Electrical specifications
1	**VSEL**	AI	Set value: voltage	0….10V correspond to 0….100% U_{Nom}	Accuracy 0.2%, U_{Max} = 12V
2	**CSEL**	AI	Set value: current	0….10V correspond to 0….100% I_{Nom}	Input impendance >100k
3	**VREF**	AO	Reference voltage	10V / 5V	Accuracy < 0.1% bei I_{Max} = 10mA Short-circuit-proof against AGND
4	**VMON**	AO	Actual value: voltage	0….10V correspond to 0….100% von U_{Nom}	Accuracy < 0.2% bei I_{Max} = +2mA Short-circuit-proof against AGND
5	**CMON**	AO	Actual value: current	0….10V correspond to 0….100% von I_{Nom}	
6	**AGND**		Reference for analogue signals		For VSEL, CSEL, CMON, VMON, VREF
7	**Remote**	DI	Activate external controls	External = Low (U_{Low}<1V), Internal = High (U_{High}>4V)	U_{Max} = 0…15V I_{Max} = -3mA bei 15V
8	**Rem_SB**	DI	Power output on/off	Off = Low (U_{Low}<1V) On = High (U_{High}>4V)	
9	**Error**	DO	Various errors like OVP, OT	Low = No error (U_{Low}<1V) High = Error (U_{High}>4V)	U_{Max} = 15V, I_{Max} = -10mA Quasi open collector with pull-up to Vcc [2]
10	**DGND**		Reference for digital signals		For control and condition signals
11	**CV**	DO	Regulation mode	Low = Voltage controlled (U_{Low}<1V) High = Current controlled (U_{High}>4V)	U_{Max} = 15V, I_{Max} = -10mA Quasi open collector with pull-up to Vcc [2]
12	**+VCC**	AO	Auxiliary voltage	12….16V	I_{Max} = 24mA Short-circuit-proof against DGND

1) AI = Analogue input, AO = Analogue output, DO = digital output
2) 12V...15V

5.2.2. Application Examples

Note: recommended cross section when wiring the clamp pins of the analogue interface: 0,1mm² (AWG26) to 0,5mm² (AWG20).

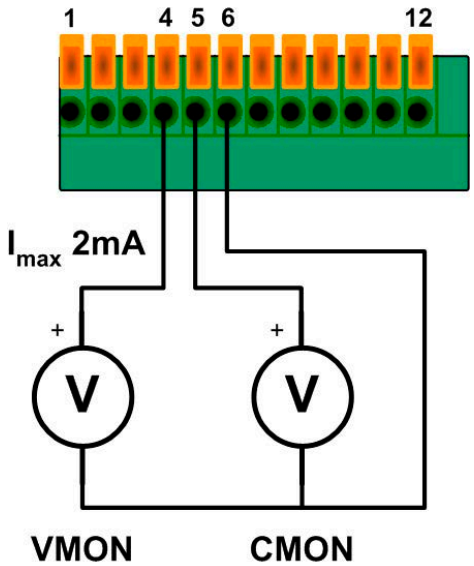
Remotely switching output on / off



This input can be used to switch off the power output even without activated remote control, except the control location was set to *local* (also see section 3.8). If the input is configured to *LOW* (see section 4.6.2), then the power output can only be switched on again by opening the contact or releasing the switch.

The contact/switch on pin 8 overrides button „ON“.

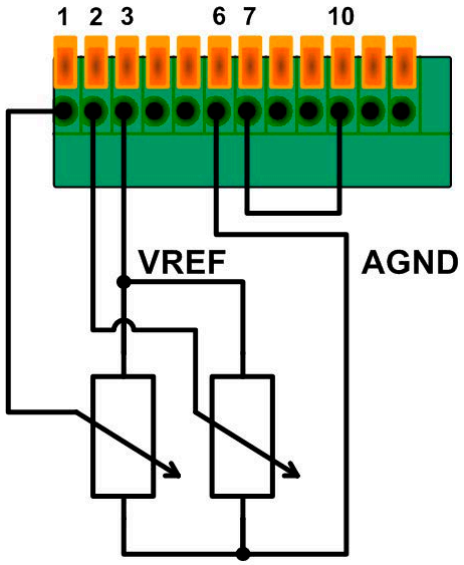
Monitoring voltage and current



The analogue monitoring outputs VMON and CMON put out 0...5V or 0...10V for 0...100% nominal value, depending on the voltage range selection in the setup.

Reference is analogue ground (AGND).

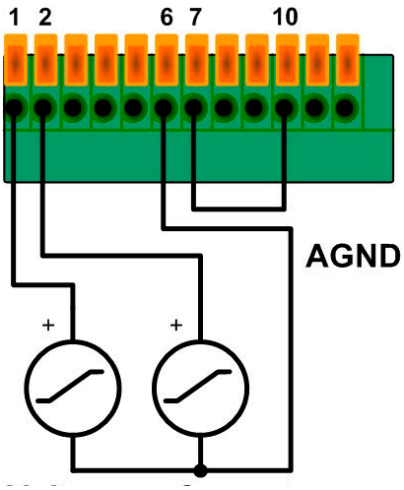
Set values 1



The example shows how the set values can be controlled using the reference voltage (VREF) and potentiometers on the set value inputs.

The potentiometer should be 10kOhm each or higher.

Set values 2



The example shows how to control voltage and current by means of external voltage sources.

Attention! *Never connect voltages >12V to these inputs!*

Set values >10V or >5V, depending on the voltage range selection in the setup, are clipped to 100% nominal value.

6. Other applications

6.1 Series connection

It is possible to connect multiple units of the same type to a series connection if these rules are followed:

- No master-slave operation
- The grounds of the analogue interfaces MUST NOT be connected to each other. This also applies for any other signal on the analogue interfaces. If remote control is required, it can be done using galvanic isolation amplifiers and by controlling all units in parallel.
- Any load current leading conductor must be dimensioned for the maximum output current of the unit with the highest nominal output current.
- No negative DC output pole of any device may have a potential >300V against earth (PE).

6.2 Parallel connection (Share bus)

Multiple units with identical output voltage and identical output current can be used in parallel connection in order to increase the total output current. To build a parallel system with symmectrical current distribution, the device features a Share bus connector.

Important: in this operation mode, the unit with the highest output voltage controls and defines the output voltage of the whole parallel connection. It means, any unit of the system could be in charge. Thus it recommended to pick a unit that is used to control the whole system, while the set value of voltage for the remaining units is set to the required minimum. Voltage and power set value could be set to 100% or, if not desired, set to equal values on every unit so that the total results in what‘s required.

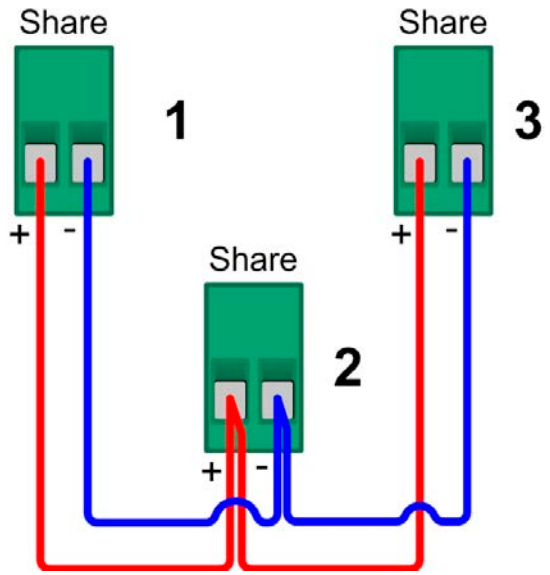
In case a unit is broken and will completely shut off, the parallel connection will continue to work without interruption. This is called redundancy.

For a device error like overtemperature (OT) or overvoltage, the output voltage will rise or fall to the highest value that was adjusted on any of the remaining units.

The wiring of the terminal „Share“, which is required for Share bus operation, is very simple. See figure below. The cross section of the Share bus connection is non-critical. In order to have low susceptibility, the two wires should be twisted.

Note: if remote sense is going to be used, it is recommended only to connect the „Sense“ input of the main unit that determines the system voltage.

Attention! This is a purely analogue connection. No totals formation of actual values on any of the units.



7. Miscellaneous

7.1 Accessories and options

Following accessories are optionally available:

a) Digital interface cards

Pluggable and retrofitable, digital interface cards for USB, RS23 or CAN are available. There is one interface card slot available with every model.

Following options are available:

a) Watercooling

Internally integrated water cooling block. The water-cooling is used prevent premature shutdown of the power output because of overheating.

7.2 Firmware update

A firmware update of the device should only be done if the device shows erroneous behaviour or if new features have been implemented.

In order to update a device, it requires a certain digital interface card, a new firmware file and a Windows software called „Update tool“.

These interfaces are qualified to be used for a firmware update:

- IF-U2 (USB)
- IF-R2 (RS232)

In case none of the above interface types is at hand, the device can not be updated. Please contact your dealer for a solution. The update tool and the particular firmware file for your device are obtainable from the website of the device manufacturer, or are mailed upon request. The update tool will guide the user through the semi-automatic update process.

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