

操作说明书
Instruction Manual

EA-PSI 800 R
320W / 640W



EA-PSI 816-20R :	21 540 401
EA-PSI 832-10R :	21 540 402
EA-PSI 865-05R :	21 540 403
EA-PSI 832-20R :	21 540 404
EA-PSI 865-10R :	21 540 405
EA-PSI 8160-04R :	21 540 406

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！
- 必须由专业技术人员执行市电连接。
- 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。

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1. 一般信息

1.1 简介

PSI 800 R系列微处理器控制电源, 专门设计成壁挂式结构, 以对流冷却器冷却。

其功能主要集中于工业用途。意即, 本产品在断电后仍可按最后设定继续工作。

本系列所有型号有固定的电压范围, 以及全电压范围。可在一定限定范围内配置固定的电压范围, 全范围电压不受限, 供应100%的额定电压。

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)。一旦出现过温(OT), 电源输出关闭, 直至温度冷却, 才自动打开。

本产品还配有一模拟接口和默认外置插卡槽, 它能够通过像USB, RS232或CAN的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 更换内部保险丝

电源保险丝位于产品内部。打开产品前, 需将它完全与市电断开。

必须是接受过危险知识和安全规则训练的技术人员才可打开产品。

要替换保险丝, 需先松开前盖螺丝, 小心地取下盖。保险丝就在主板上, 位于左手边。

1.4 供应清单

- 1 x 电源供应器
- 1 x 印刷版使用说明书
- 1 x 电源连接器

2. 安装

2.1 安装

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

2.2 与市电的连接

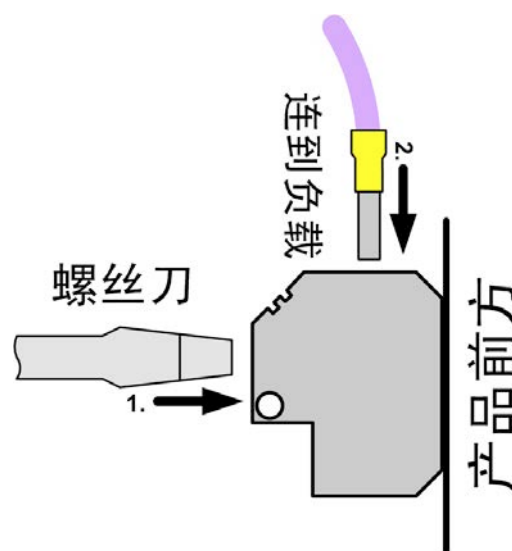
本系列所有型号都具有正向PFC(功率因素校正)和宽范围输入电压。可在90V至264VAC输入电压, 以及45Hz至65Hz频率下工作。

按照前板丝印将电源线连到3位端子上(型号为: Phoenix Combicon GMSTB 2,5/3-ST-7,62)。仅受训技术人员方可执行。必须使用适当直径的电源线, 因为本产品无电源开关。电源输入端由一标准的5x20mm保险丝保护, 它装于产品内部。

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(28AWG)至4mm²(12AWG)的连接线。如果可以, 线尾请套上线套。

连线夹紧步骤:

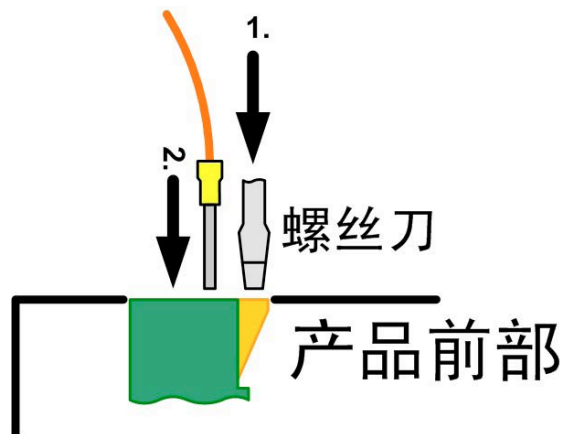


2.4 模拟接口的连接

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

本电源可被预先配置成输出一定的电压和电流。

3.2 远程感测

为补偿负载线上的压降，产品前板还具有—远程感测输入端。按正确极性连线到此，可感测负载的电压。远程感测端可补偿多达2V的电压。

不用该感测输入端时，就让它空闲着，不用连跳线到输出端。

感测连接线的直径非重要条件。

3.3 过压保护 (OVP)

本系列所有型号都有过压保护电路，过压保护值设为额定输出电压的110%。如遇过压错误，不论是内部故障或外部原因引起，电源输出关闭，且以“OVP”LED灯和模拟接口“ERROR”脚指示出来。直至用 按钮确认OV错误方从显示屏上消失。

OV错误消失后，输出再次打开。

3.4 过温 (OT)

本系列所有型号都有内温监控功能。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**”状态文本指示在OT错误消失后输出将打开。也可用“**OT disappear = OFF**”参数阻止此动作。OT错误直至用 按钮确认才从显示屏上消失。

该错误状态通过显示屏上的“**OT**”状态文本，以及模拟接口的“**ERROR**”引脚指示出来。也可用设置菜单下的“**OT disappear = OFF**”参数阻止输出状态的恢复。

3.5 电源断电后的输出恢复

电源断电（像用手关闭输入电压一样）后，产品重建最后输出条件，包括恢复输出状态和设定值。

当“**Power ON = restore**”参数设置了断电前输出的最后条件时，设置菜单下的“**Power ON = OFF**”参数则可阻止输出状态的恢复。

3.6 欠压监控

可在两个阈值范围内监控欠压状态。每次打开输出且过250ms后就激活该功能。

如果输出已打开，输出电压位于第一个欠压阈值（“**UV warning**”）以下，显示器出现一个警告 。直到用 按钮确认后方消失。这可防止未发现的错误。如果不再有错误出现，且出现的错误已被确认，警告才消除。

如果输出电压降至第二个欠压阈值（“**UV shutdown**”）以下，并关闭了输出，则会产生一警告。此时以 和模拟接口的“**ERROR**”引脚指示出来。

确认报警后输出方可再次打开。

3.7 控制位置

控制位置是指可访问产品的地方。本系列产品有多个控制位置，通过显示屏上的状态文本可显示：

- **local** - 指用户通过 按钮手动激活产品。在该状态下，产品不能远程控制。这用于切断永久远程控制，并在产品上调节一些设定。用 **EXT** 按钮退出 **local**可再次进入远程控制。
- **remote** - 产品经其中一数字接口卡远程控制，且不可进行手动访问。按下 按钮可转换到 **local**，终止 **remote**。
- **extern** - 通过内置模拟接口远程控制产品，且不可执行手动访问。按下 按钮可转换到 **local**，终止 **extern**。

3.8 可配置的电压分布图

本产品还配有数个电压分布图，可预先进行配置，以适用一般应用。最上面的分布图可在全额范围内，即0...100%，设置电压和电流。其它分布图也可配置，但须在一定电压范围内配置。见下表。所有分布图内还有一个OVP阈值设定值和两个欠压阈值。分布图根据产品的额定输出电压而定。

PSI816-20				
	电压范围			
分布图	1	2	3	4
Name	0...16V	5V	6V	12V
U adj max	16.00V	6.00V	7.20V	14.40V
U adj min	0.00V	4.00V	4.80V	9.60V
U output	0.00V	5.00V	6.00V	12.00V
I output	0...Inom	0...Inom	0...Inom	0...Inom
OVP	17.60V	5.50V	6.60V	13.20V
UV warning	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V

PSI832-10R / PSI832-20R				
	电压范围			
分布图	1	2	3	4
Name	0...32V	6V	12V	24V
U adj max	32.00V	7.20V	14.40V	28.80V
U adj min	0.00V	4.80V	9.60V	19.20V
U output	0.00V	6.00V	12.00V	24.00V
I output	0...Inom	0...Inom	0...Inom	0...Inom
OVP	35.20V	6.60V	13.20V	26.40V
UV warning	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V

PSI865-05R / PSI865-10R					
	电压范围				
分布图	1	2	3	4	5
Name	0...65V	12V	24V	36V	48V
U adj max	65.00V	14.40V	28.80V	43.20V	57.60V
U adj min	0.00V	9.60V	19.20V	28.80V	38.40V
U output	0.00V	12.00V	24.00V	36.00V	48.00V
I output	0...Inom	0...Inom	0...Inom	0...Inom	0...Inom
OVP	71.50V	13.20V	26.40V	39.60V	52.80V
UV warning	0.00V	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V	0.00V

PSI8160-04R					
	电压范围				
分布图	1	2	3	4	5
Name	0...160V	24V	48V	60V	110V
U adj max	160.00V	28.80V	57.60V	72.00V	132.00V
U adj min	0.00V	19.20V	38.40V	48.00V	88.00V
U output	0.00V	24.00V	48.00V	60.00V	110.00V
I output	0...Inom	0...Inom	0...Inom	0...Inom	0...Inom
OVP	176.00V	26.40V	52.80V	66.00V	121.00V
UV warning	0.00V	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V	0.00V

不可编辑

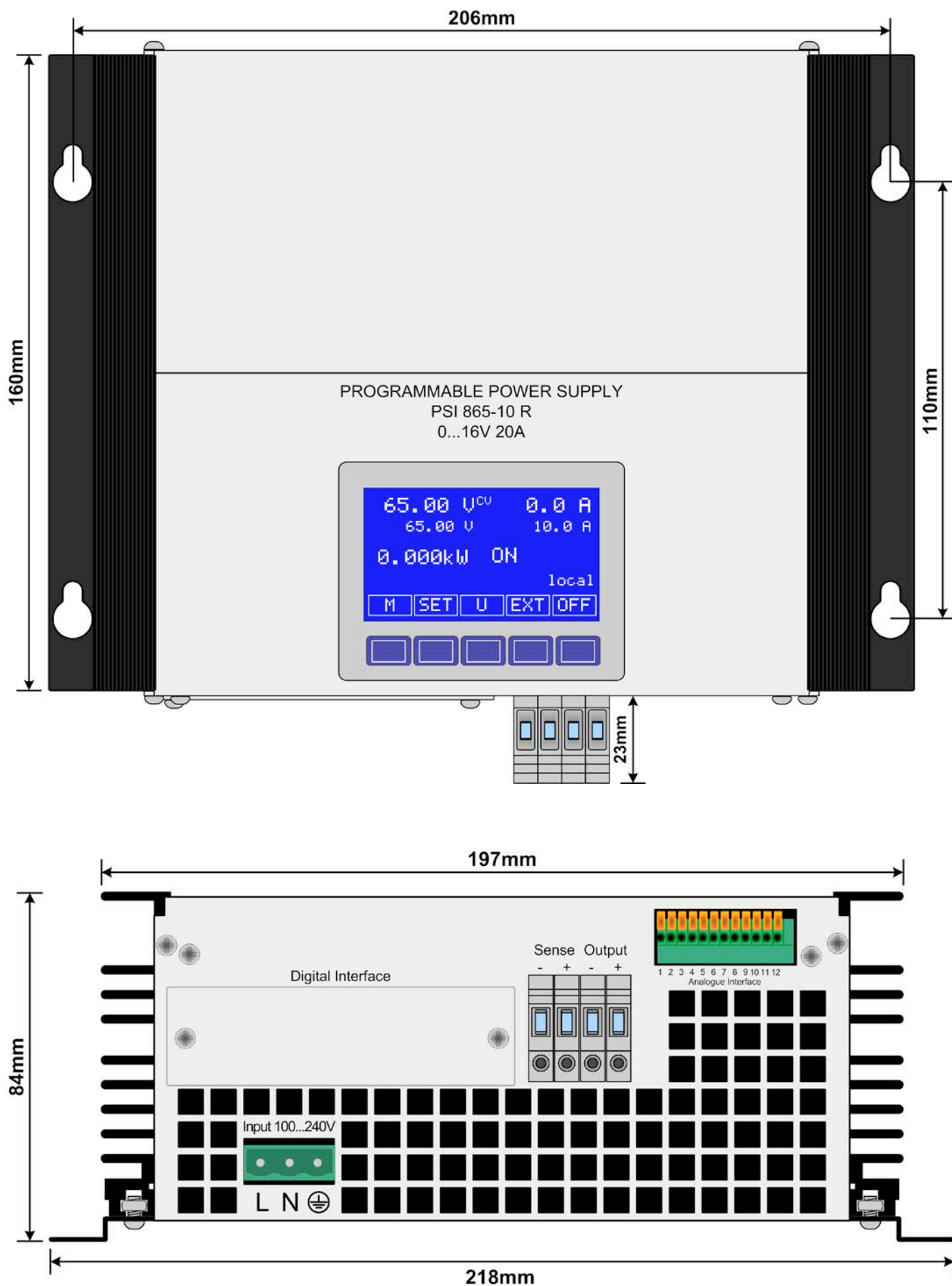
3.9 技术规格

	PSI 816-20 R	PSI 832-10 R	PSI 865-05 R	PSI 832-20 R	PSI 865-10 R	PSI 8160-04 R
电源输入						
输入电压	90...264V	90...264V	90...264V	90...264V	90...264V	90...264V
输入频率	45...65Hz	45...65Hz	45...65Hz	45...65Hz	45...65Hz	45...65Hz
功率因数	>0.99	>0.99	>0.99	>0.99	>0.99	>0.99
230V时输入电流	1.6A	1.6A	1.6A	3.2A	3.3A	3.2A
输入保险丝	M6. 3A	M6. 3A	M6. 3A	T10A	T10A	T10A
输出 - 电压						
额定电压 U_{Nnom}	0...16V	0...32V	0...65V	0...32V	0...65V	0...160V
数值精确度	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
设定值精确度	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
电压调节分辨率	10mV	10mV	10mV	10mV	10mV	100mV
固定电压范围	3	3	4	3	4	4
带载10...90%时的稳定度	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%
$\pm 10\% \Delta U_{IN}$ 时的稳定度	<0.02%	<0.02%	<0.02%	<0.02%	<0.02%	<0.02%
纹波	<40mV _{pp} <4mV _{RMS}	<100mV _{pp} <10mV _{RMS}	<150mV _{pp} <20mV _{RMS}	<100mV _{pp} <8mV _{RMS}	<150mV _{pp} <10mV _{RMS}	<120mV _{pp} <20mV _{RMS}
带载10-100%的调整	<2ms	<2ms	<2ms	<2ms	<2ms	<2ms
输出 - 电流						
额定电流	0...20A	0...10A	0...5A	0...20A	0...10A	0...4A
数值精确度	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
设定值精确度	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
电流调节分辨率	10mA	10mA	10mA	10mA	10mA	10mA
带载0...100% ΔU_{OUT} 时的稳定度	<0.15%	<0.15%	<0.15%	<0.15%	<0.15%	<0.15%
$\pm 10\% \Delta U_{IN}$ 时的稳定度	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%
纹波	<50mA _{pp}	<50mA _{pp}	<50mA _{pp}	<50mA _{pp}	<50mA _{pp}	<50mA _{pp}
输出 - 功率						
额定功率	320W	320W	325W	640W	650W	640W
数值精确度	<0.2%	<0.2%	<0.2%	<0.2%	<0.2%	<0.2%
其它						
工作温度	0...50° C	0...50° C	0...50° C	0...50° C	0...50° C	0...50° C
储存温度	-20...70° C	-20...70° C	-20...70° C	-20...70° C	-20...70° C	-20...70° C
相对湿度	<80%	<80%	<80%	<80%	<80%	<80%
尺寸 (WxHxD)	218x84x163mm	218x84x163mm	218x84x163mm	218x84x163mm	218x84x163mm	218x84x163mm
重量	2.2kg	2.2kg	2.2kg	2.2kg	2.2kg	2.2kg
产品编号	21540401	21540402	21540403	21540404	21540405	21540406
安全标准	EN 60950					
EMC标准	EN 61000-6-4, EN 61000-6-2, EN 55022 等级 B					
过压等级	等级 II					
保护等级	等级 I					

所有实际值总是与对应的额定值相关
所有都为典型值y

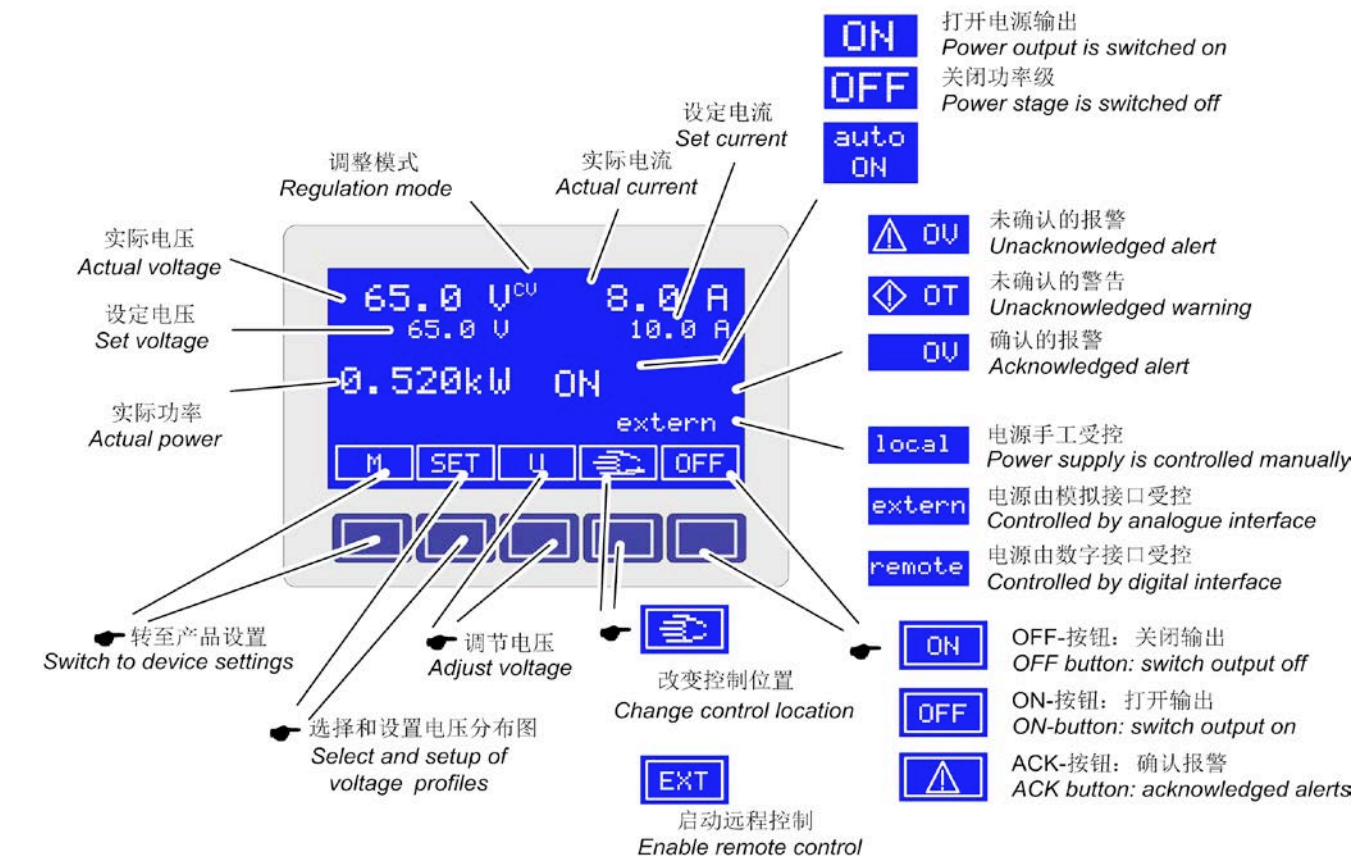


3.10 产品结构图



4. 显示器布局

4.1 控制和显示面板



4.1.1 显示屏分布图

显示和控制面板被分为设定值、实际值、输出状态、产品状态、按钮分配和按钮这些区域。

按钮分配条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。

显示器的左上半区显示大写的输出电压相关值。直接在相关设定值的下方。当输出关闭时，实际电压值旁的“CV”指示恒压操作。

显示器的右上半区显示大写的输出电流相关值。直接在相关设定值的下方。当输出关闭时，实际电流值旁的“CC”指示恒流操作。

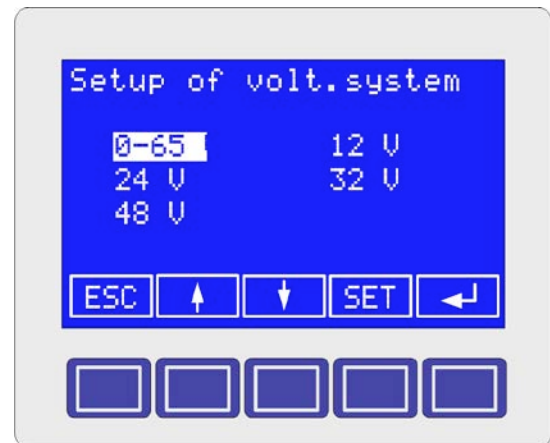
电压值区域的下方是实际功率。但无可调功率设定值。

输出状态、其它状态（报警，警告）和控制位置（见章节3.7）显示于右下区。

4.2 电压分布图的选择

提示：只有当输出=关闭时方能转换至电压分布图。

通过主显示屏上的“SET”按钮可进入电压分布图选择菜单。



提示：只有第一个电压分布图（此处为：0-65）允许调节全额输出值。其它分布图可以调节，但是只限于某部分值。

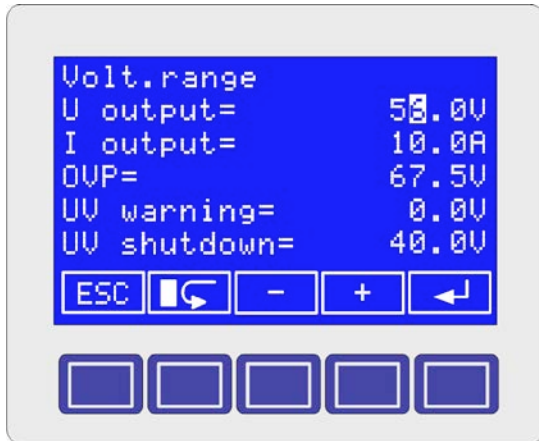
其它分布图允许调节，但是只能在某特定范围内调节电压。用 [Up] [Down] 按钮选择需要的分布图，然后用 [Left] 按钮提交。显示器返回正常界面，而输出值变为分布图下调节的数值。

若按下 SET 按钮，则打开所选分布图，可再次进行调节。

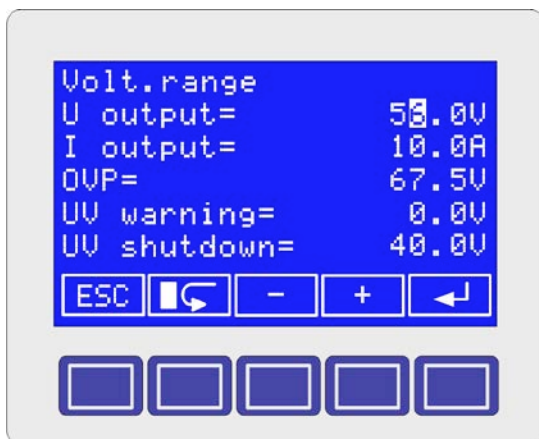
4.3 编辑电压分布图

用 **↑** **↓** 按钮选定即将调节的参数。推动 **SET** 按钮，选定的参数变为可调，按下 **←** 按钮可提交或用 **ESC** 按钮终止操作（数值未提交出去）。

参数的更改



选定一个需调节的参数后，用 **↑** **↓** 按钮增加或减少当前带标记的小数位（光标所在位），用 **←** 按钮可移动光标位置。



ESC 按钮终止调节，并回到前菜单。要提交菜单下的数值，必须使用 **←** 按钮。

4.4 直接对电压的调整

在正常显示界面，也可通过 **U** 按钮直接进入输出电压的调节。它跳入当前选定的电压分布图，选择电压后可调节。

提交调节值或终止调节可按上述“4.3 编辑电压分布图”相同方法执行。

4.5 调节电流设定值

输出电流的设定值不可直接调整，但是可为每个电压分布图单独设置。详情请见章节“4.3 编辑电压分布图”。

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。

4.6.1 “General settings” 菜单项

“General Settings” 项可使用户在电源已打开的条件下配置电源输出，过温错误时的输出动作和LCD背光显示。

电源打开后的输出状态

Power ON_(默认: *restore*-恢复)

如果在产品打开后或电源断电之前已将**Power ON**设为*restore*，则再次打开输出。另外的选项**Power ON** = *OFF*，则在每次启动产品后保持输出为关闭状态。

OT-过温关闭后的输出状态

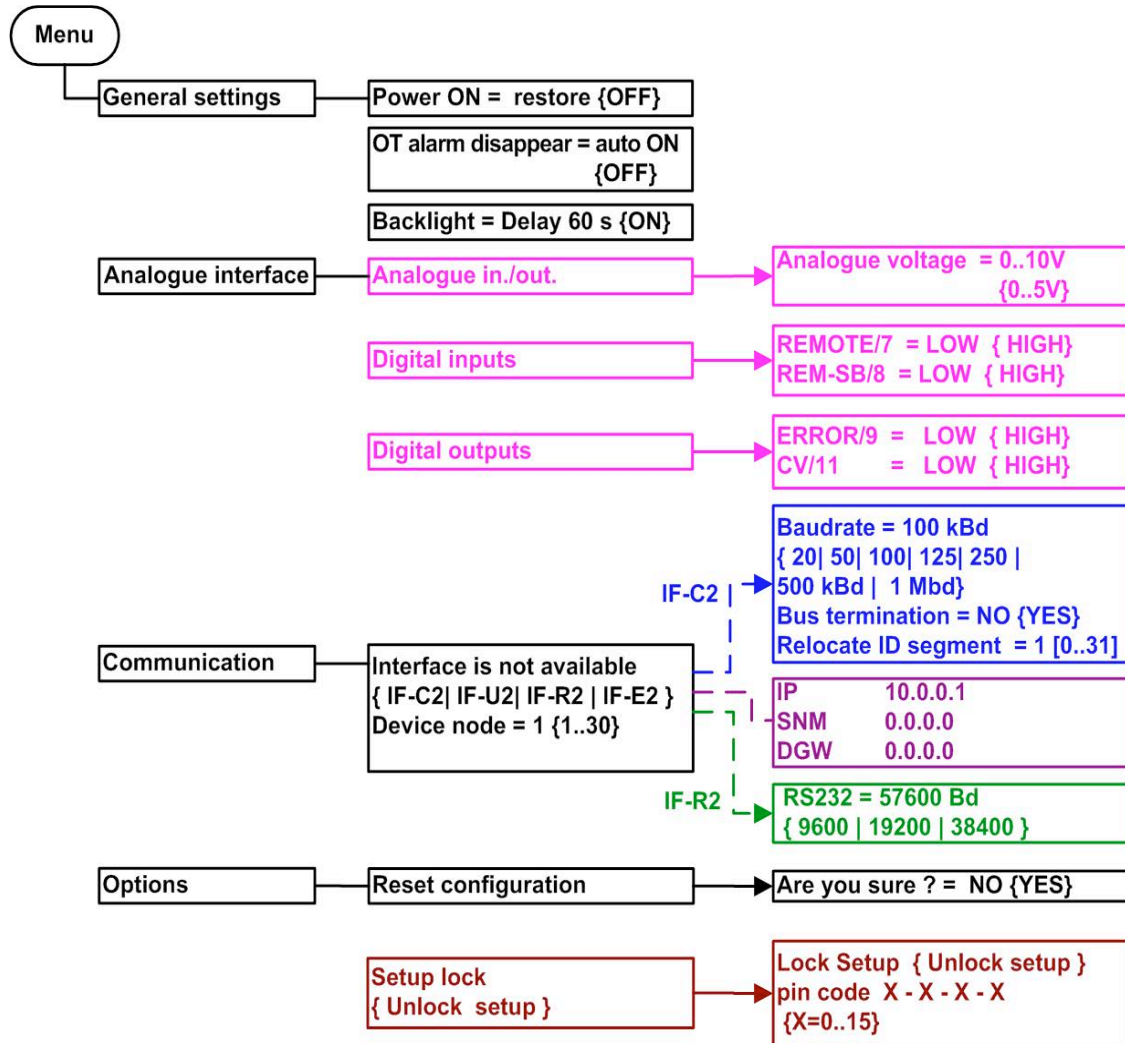
OT disappear_(默认: *on*)

如有需要，可在过温错误出现并消失后自动打开输出。这需选择*auto ON*选项。如果设置为*OFF*，那么输出一直关闭，只能手动打开。

显示器照亮度

Backlight_(默认: *Delay 60s*-延时60s)

若选了**Backlight** = *Delay 60s*，背光一般情况下是灭的，只有在每次按下按键60s后才亮。要永久亮背光，可选择**Backlight** = *ON*。



4.6.2 “Analogue interface” 菜单项

该选项配置模拟接口。模拟输入和输出脚可在普通0..5V和0..10V控制电压范围下工作。0..5V的分辨率和精确度只有0..10V的一半。

Analogue in/out (默认: 0...10V)

若选了 **Analogue voltage = 0...10V**，不管是选定哪个电压分布图，模拟输入和输出脚接受对应0...10V的0...100%额定值。相应地，**Analogue voltage = 0...5V**选项也能工作。如果选择0..5V范围，>5V的电压都只被当成100%的额定值。

提示：只有当选择了电压分布图1时才可执行模拟远程控制。否则产品会以EXT报警显示。

Digital inputs (默认: LOW)

数字输入脚可选为低态动作或高态动作。

如果是 **LOW**，输出脚在低输入电平下执行其指定功能。详情请见模拟接口的技术规格表。

如果是 **HIGH**，输出脚在高输入电平下动作。

Digital outputs (默认: LOW)

数字输出脚可选为低态动作或高态动作。

根据所选电平，输出脚报告其指定功能。如果该功能未出现，输出电平被颠倒。详情请见模拟接口的技术规格表。

4.6.3 “Communication” 菜单项

如果产品配有数字接口卡，可用该菜单配置通讯设置。在另外一份接口卡用户指南中有详细解释。

4.6.4 “Options” 菜单项

Options选项提供了将产品重设为默认设置，以及用pin码锁定控制面板的可能性。

Reset configuration

若选择 **YES** 为 “**Are you sure?**” 确认提示的回答，所有可编辑参数都重设为默认值。若选 **NO**，则所有设定保持不变。

配置重设后，必须再次提交所选电压分布的 “**U output**” 值。

Lock setup

用箭头按钮输入4位数PIN码，可锁定控制面板，解锁按钮除外。这四个数可为0 - 15，形成 $16^4 = 65536$ 个组合。解锁方法与锁定方法一样，再次输入PIN码即可。如果PIN码丢失，只有执行 “**Reset configuration**” 操作才可再次操作产品。见上面所述。

提醒，配置重设将使所有设置重置为默认值！

4.7 报警

所本产品会通过  符号，缩写，以及模拟接口的输出引脚**ERROR**，在显示器上指示出不同的报警。

用户必须使用  按钮确认这些报警信息。有些报警信息(**OT**, **OVP**) 会关闭输出，但是确认报警后可在此打开。

有一例外就是OT报警，如果在 „General settings“菜单下 „OT disappear“选项已设为 „auto ON“，产品冷却将自动打开输出。

4.7.1 报警类型

OT - 因过热而过温关断

OVP - 因内部或外部原因而过压关断

EXT - 远程控制错误

提示：

- 如果出现**OT**或**OVP**输出被关闭，不管产品位于手动还是远程控制模式。
- EXT**报警指示当2-5或2-6电压配置文档被选定时，用户尝试通过模拟接口转换到远程控制。要转换到模拟远程控制，需先用  按钮选择电压配置文档1。也可参考4.2章节。

5. 远程控制

5.1 数字远程控制

可供用户选择的还有数字接口卡（**USB**, **RS232**或**CAN**），用它可完全远程控制和监控产品。关于其功能和技术规格详情请见接口卡的用户手册。

利用**CAN**，可将多台电源联网。

5.2 模拟远程控制

根据所选控制电压范围（见“4.6 设置菜单”章节），通过**0...10V**或**0...5V**控制电压，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**。

根据所选控制电压范围（见“4.6 设置菜单”章节），通过**0...10V**或**0...5V**控制电压，将实际输出电压和电流作为监控电压传给输出脚**VMON**和**CMON**。

远程控制产品前，须用引脚7 “Remote” 将产品转至远程控制。且需输入两个值。若只调节其中一个，另一个要绑定到**VREF**脚，以便始终为100%值。

用模拟接口远程控制以 “extern” 状态文本显示于显示屏上。

注意：数字输入引脚不具有**CMOS**兼容性。如想将其下拉至**GND**，需接一个像继电器货三极管之类的底阻接触件或开关。此处**PLC**的数字输出脚货类似引脚可能也不够。具体情况可咨询控制硬件供货商相关的技术规格。

5.2.1 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 V_{cc} ⁽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 V_{cc} ⁽²⁾
12	+VCC	AO	辅助电压	12... 16V	$I_{Max} 24mA$ ，对AGND有短路保护

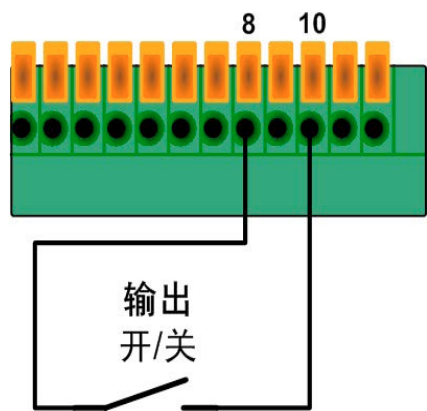
¹⁾ AI = 模拟输入脚，AO = 模拟输出脚，DO = 数字输出脚

²⁾ 12V...15V

5.2.2 模拟接口应用举例

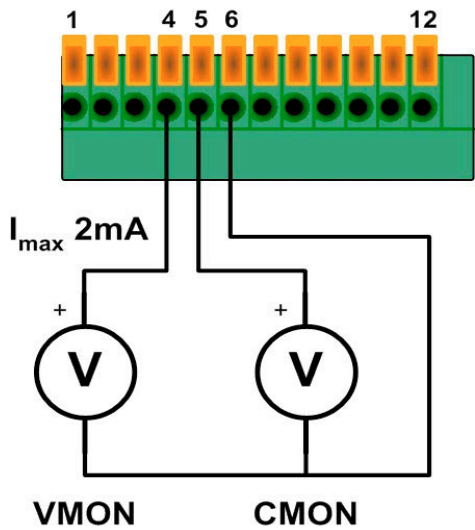
注意：连接模拟接口的引脚时，建议使用如下直径的连线：0,1mm²（AWG26）至0,5mm²（AWG20）。

远程打开/关闭输出



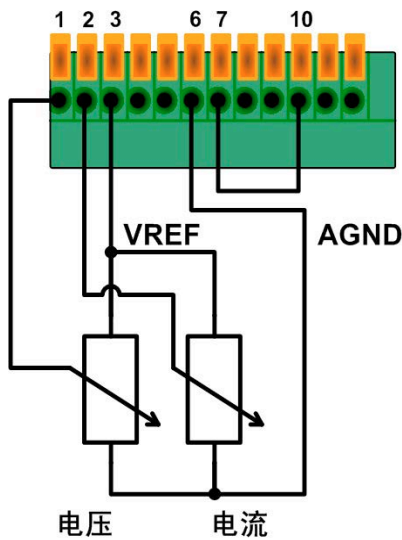
该输入脚在未激活远程控制时关闭电源输出，除非控制模式设为`local`（也可见章节3.7）。如果输入脚配置成`LOW`（也可见章节4.6.2），只有打开触点或释放开关，才能再次打开电源输出。
引脚8的触点/开关优先于“On”按钮。

监控电压和电流



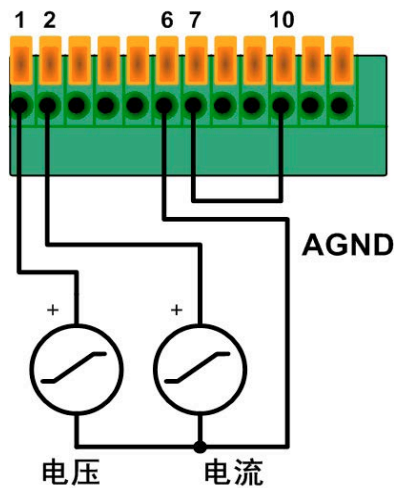
根据设置下的电压范围选项，模拟监控输出脚输出0...5V或0...10V电压，对应额定值的0...100%。
参考脚为模拟地（AGND）。

设定值1



这个例子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



这个例子显示如何通过外部电压源控制电压和电流。
注意！严禁连接>12V的电压至这些输入脚！
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。

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：

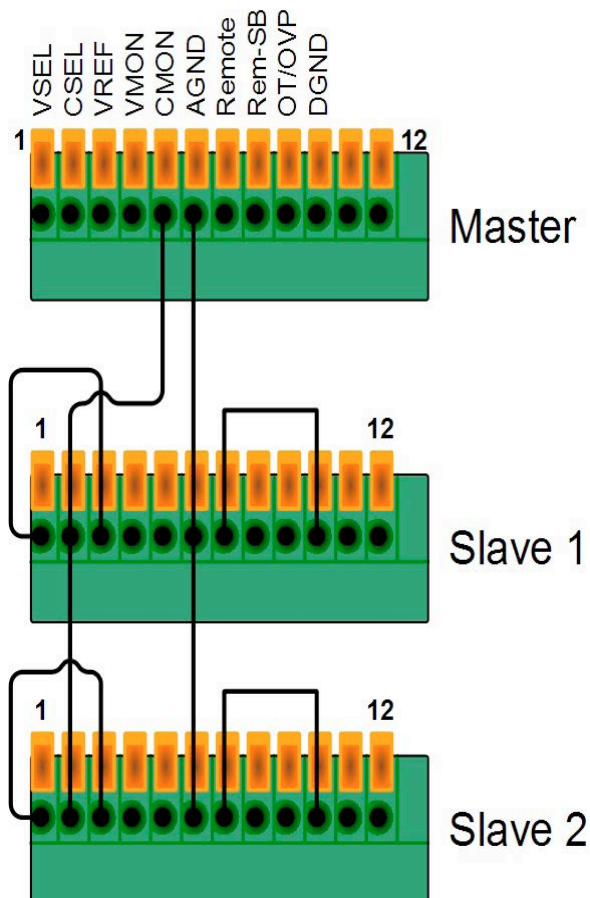
- 没有主-从操作
- 模拟接口的地**不准**相互连接。这也适用于模拟接口的所有其它信号地。如果需要远程控制，可使用隔离放大器，并联控制所有产品。
- 任何承受负载电流的导体直径必须符合该产品最大的额定输出电流。
- 连接中任何产品的负极直流输出极对地(PE)电压都不能 $>300V!$

6.2 并联

输出电压相同的产品，理想情况下电流也相同，可以无限制地多台并联（主-从或其它）在一起。例如：主控机配有数字接口卡，经过模拟接口其它从机连到主控机上。主机的多个监控输出脚（或者其中一输出脚）连到第一台从机的多个设定值输入脚。

或者，在所有机上装一数字接口卡，以便分别监控和控制任意一台产品。利用广播信息可以相同的设定值控制产品。

下图为主-从机的连线举例，且为电流控制。此处电压设定为100%，故从机也一样：



7. 其它

7.1 其它附件和选项功能

本系列产品可供下列附件：

a) 数字接口卡

还可供配USB，RS232，CAN用可插拔式数字接口卡。每款型号都有一接口卡插槽。

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，需要用到某一数字接口卡，新的固件文档，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。更新工具将会指导用户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!

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1. General

1.1 Introduction

The microprocessor controlled power supplies of the PSI 800 R series are designed for wall mount and work with a convectional 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). At an overtemperature (OT) event, the power output will be switched off until the unit has cooled down and automatically switch on again.

The devices are equipped with an analog interface and an extension card slot by default, that enables remote control and monitoring by digital interfaces like USB, RS232 or CAN.

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 Replacing the internal fuse

The main fuse is located inside the device. Before opening the device, completely disconnect it from mains.

Working on the open device must only be done by trained technical personnel which is instructed about the dangers and safety regulations.

In order to replace the fuse, unscrew the front cover plate and remove it precautiously. The fuse is located on the main PCB, on the left-hand side.

1.4 Scope of delivery

- 1 x Power supply unit
- 1 x Printed user manual
- 1 x Mains connector/Installation

2. Installation

2.1 Mounting

The device is designed for 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.

2.2 Mains connection

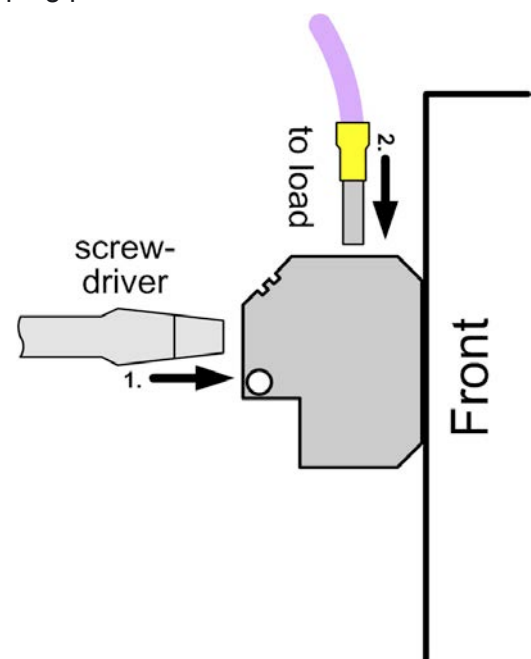
All models are equipped with an active PFC (power factor correction) and a wide range input. It can be operated at AC input voltages from 90V to 264V and mains frequencies of 45Hz up to 65Hz.

The connection is done with the included 3pole plug (Phoenix Combicon GMSTB 2,5/3-ST-7,62) according to the print on the front plate. It must only be carried out by trained technical personnel. Main focus lies on an appropriate cross section of the mains lead, as well as the fact that the device does not feature a power switch. The mains input is fused by a standard 5x20mm fuse which is located inside the unit.

2.3 DC output and sense 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:

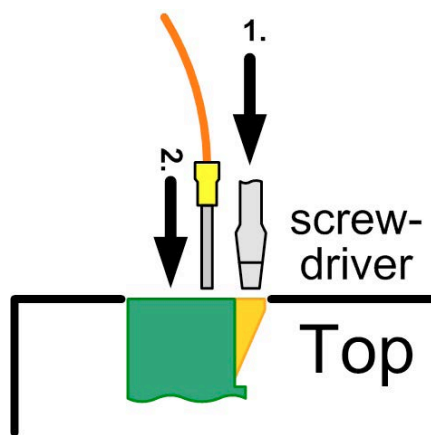


2.4 Analog interface connection

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 analog 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 a certain voltage and current.

The output voltage is supervised for adjustable undervoltage thresholds.

The control panel is used to set conditions, set up the device and to adjust output values. Alternatively, the device can be remotely controlled via the internal, analog interface or an option, digital interface card.

3.2 Remote sense

In order to compensate voltage drops along the load leads, the device features remote sense inputs on the front. Here the sensed voltage from the load is connected with correct polarity. Remote sense can compensate up to 2V.

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)

All models feature an overvoltage protection circuit which is set 110% of the nominal 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 „OV“ in the display and also by pin „ERROR“ of the analog interface. The error indications remains in the display until acknowledged by button .

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

3.4 Output restoration after mains blackout

After a mains blackout (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.

3.5 Overtemperature (OT)

All models also feature 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“ will indicate that the output will be on after the OT condition is 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 indicated by the status text „OT“ in the display and by pin „ERROR“ of the analog interface. The output state restoration can be deactivated in the setup menu by the parameter „OT disappear = OFF“.

3.6 Undervoltage supervision

The supervision of an undervoltage condition is done with two thresholds. It will be activated after 250ms and everytime the output is switched on.

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 unseen errors. 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 on the „ERROR“ pin of the analog interface.

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

3.7 Configurable voltage profiles

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

PSI816-20				
	Voltage ranges			
Profile	1	2	3	4
Name	0..16V	5V	6V	12V
U adj max	16.00V	6.00V	7.20V	14.40V
U adj min	0.00V	4.00V	4.80V	9.60V
U output	0.00V	5.00V	6.00V	12.00V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	17.60V	5.50V	6.60V	13.20V
UV warning	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V

PSI865-05R / PSI865-10R					
	Voltage ranges				
Profile	1	2	3	4	5
Name	0..65V	12V	24V	36V	48V
U adj max	65.00V	14.40V	28.80V	43.20V	57.60V
U adj min	0.00V	9.60V	19.20V	28.80V	38.40V
U output	0.00V	12.00V	24.00V	36.00V	48.00V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	71.50V	13.20V	26.40V	39.60V	52.80V
UV warning	0.00V	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V	0.00V

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 , 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 analog interface and manual access is not possible. Pressing button  changes to **local** and aborts **extern**.

PSI832-10R / PSI832-20R				
	Voltage ranges			
Profile	1	2	3	4
Name	0..32V	6V	12V	24V
U adj max	32.00V	7.20V	14.40V	28.80V
U adj min	0.00V	4.80V	9.60V	19.20V
U output	0.00V	6.00V	12.00V	24.00V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	35.20V	6.60V	13.20V	26.40V
UV warning	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V

PSI8160-04R					
	Voltage ranges				
Profile	1	2	3	4	5
Name	0..160V	24V	48V	60V	110V
U adj max	160.00V	28.80V	57.60V	72.00V	132.00V
U adj min	0.00V	19.20V	38.40V	48.00V	88.00V
U output	0.00V	24.00V	48.00V	60.00V	110.00V
I output	0.. Inom	0.. Inom	0.. Inom	0.. Inom	0.. Inom
OVP	176.00V	26.40V	52.80V	66.00V	121.00V
UV warning	0.00V	0.00V	0.00V	0.00V	0.00V
UV alarm	0.00V	0.00V	0.00V	0.00V	0.00V

not editable

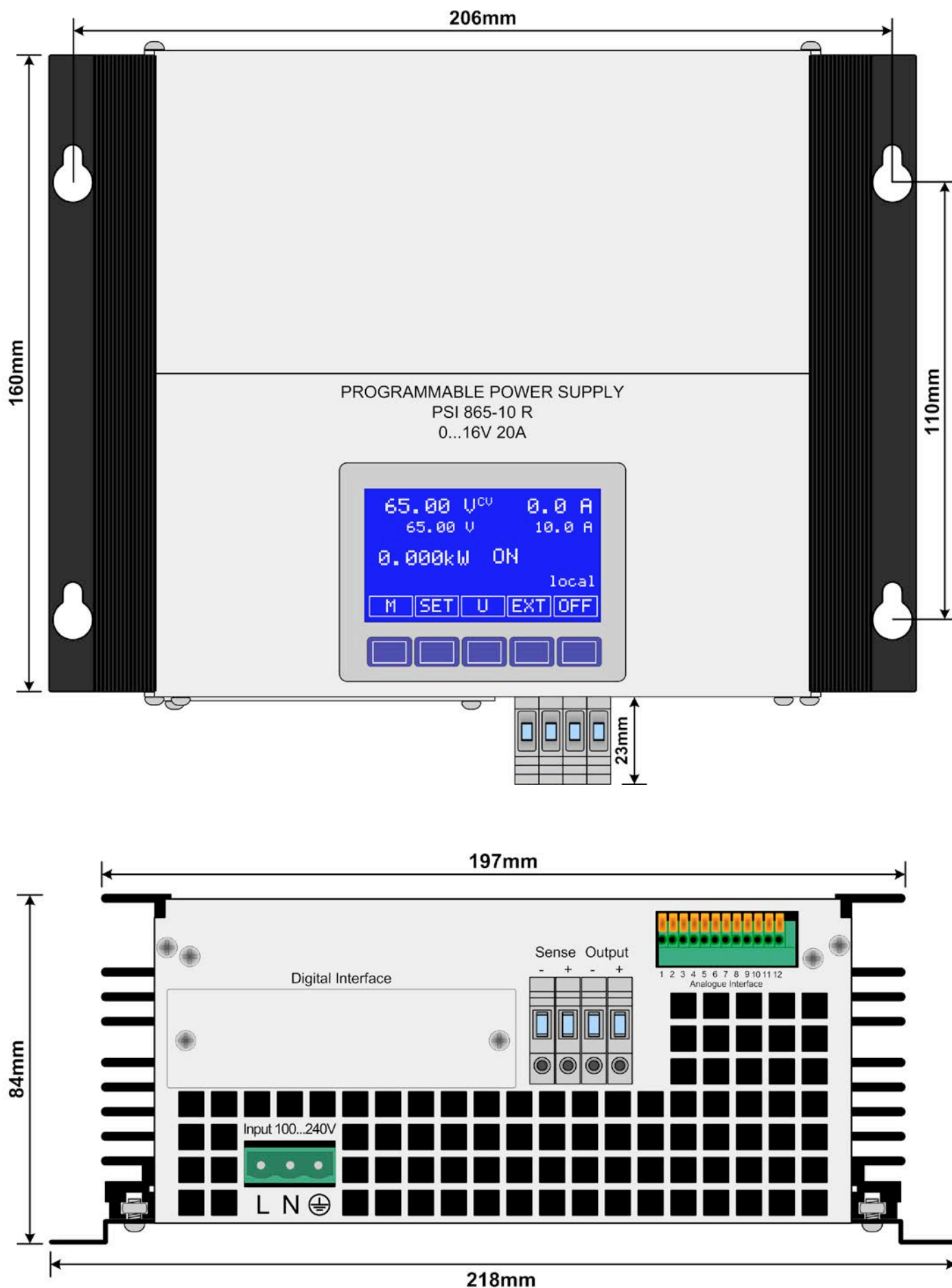
3.9 Technical specifications

	PSI 816-20 R	PSI 832-10 R	PSI 865-05 R	PSI 832-20 R	PSI 865-10 R	PSI 8160-04 R
Mains input						
Input voltage	90...264V	90...264V	90...264V	90...264V	90...264V	90...264V
Frequency	45...65Hz	45...65Hz	45...65Hz	45...65Hz	45...65Hz	45...65Hz
Power factor correction	>0.99	>0.99	>0.99	>0.99	>0.99	>0.99
Input current at 230V	1.6A	1.6A	1.6A	3.2A	3.3A	3.2A
Fuse	M6.3A	M6.3A	M6.3A	T10A	T10A	T10A
Output - Voltage						
Output Voltage	0...16V	0...32V	0...65V	0...32V	0...65V	0...160V
Accuracy of values	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Accuracy of set values	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Resolution of voltage adjustment	10mV	10mV	10mV	10mV	10mV	100mV
Fixed voltage ranges	3	3	4	3	4	4
Stability at 10-90% ΔU_{in}	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%
Stability at $\pm 10\% \Delta U_{in}$	<0.02%	<0.02%	<0.02%	<0.02%	<0.02%	<0.02%
Ripple	<40mV _{PP} <4mV _{RMS}	<100mV _{PP} <10mV _{RMS}	<150mV _{PP} <20mV _{RMS}	<100mV _{PP} <8mV _{RMS}	<150mV _{PP} <10mV _{RMS}	<120mV _{PP} <20mV _{RMS}
Regulation 10-100% load	<2ms	<2ms	<2ms	<2ms	<2ms	<2ms
Output - Current						
Output current	0...20A	0...10A	0...5A	0...20A	0...10A	0...4A
Accuracy of values	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Accuracy of set values	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Resolution of current adjustment	10mA	10mA	10mA	10mA	10mA	10mA
Stability at 0-100% ΔU_{out}	<0.15%	<0.15%	<0.15%	<0.15%	<0.15%	<0.15%
Stability at $\pm 10\% \Delta U_{in}$	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%	<0.05%
Ripple	<50mA _{PP}	<50mA _{PP}	<50mA _{PP}	<50mA _{PP}	<50mA _{PP}	<50mA _{PP}
Output - Power						
Nominal power	320W	320W	325W	640W	650W	640W
Accuracy of values	<0.2%	<0.2%	<0.2%	<0.2%	<0.2%	<0.2%
Miscellaneous						
Operation temperature	0...50°C	0...50°C	0...50°C	0...50°C	0...50°C	0...50°C
Storage temperature	-20...70°C	-20...70°C	-20...70°C	-20...70°C	-20...70°C	-20...70°C
Humidity	<80%	<80%	<80%	<80%	<80%	<80%
Dimensions (WxHxD)	218x84x163mm	218x84x163mm	218x84x163mm	218x84x163mm	218x84x163mm	218x84x163mm
Weight	2.2kg	2.2kg	2.2kg	2.2kg	2.2kg	2.2kg
Article No.	21540401	21540402	21540403	21540404	21540405	21540406
Safety	EN 60950					
EMC standards	EN 61000-6-4, EN 61000-6-2, EN 55022 Klasse B					
Overvoltage category	Class II					
Protection class	Class I					

Accuracy values are always related to the corresponding nominal value

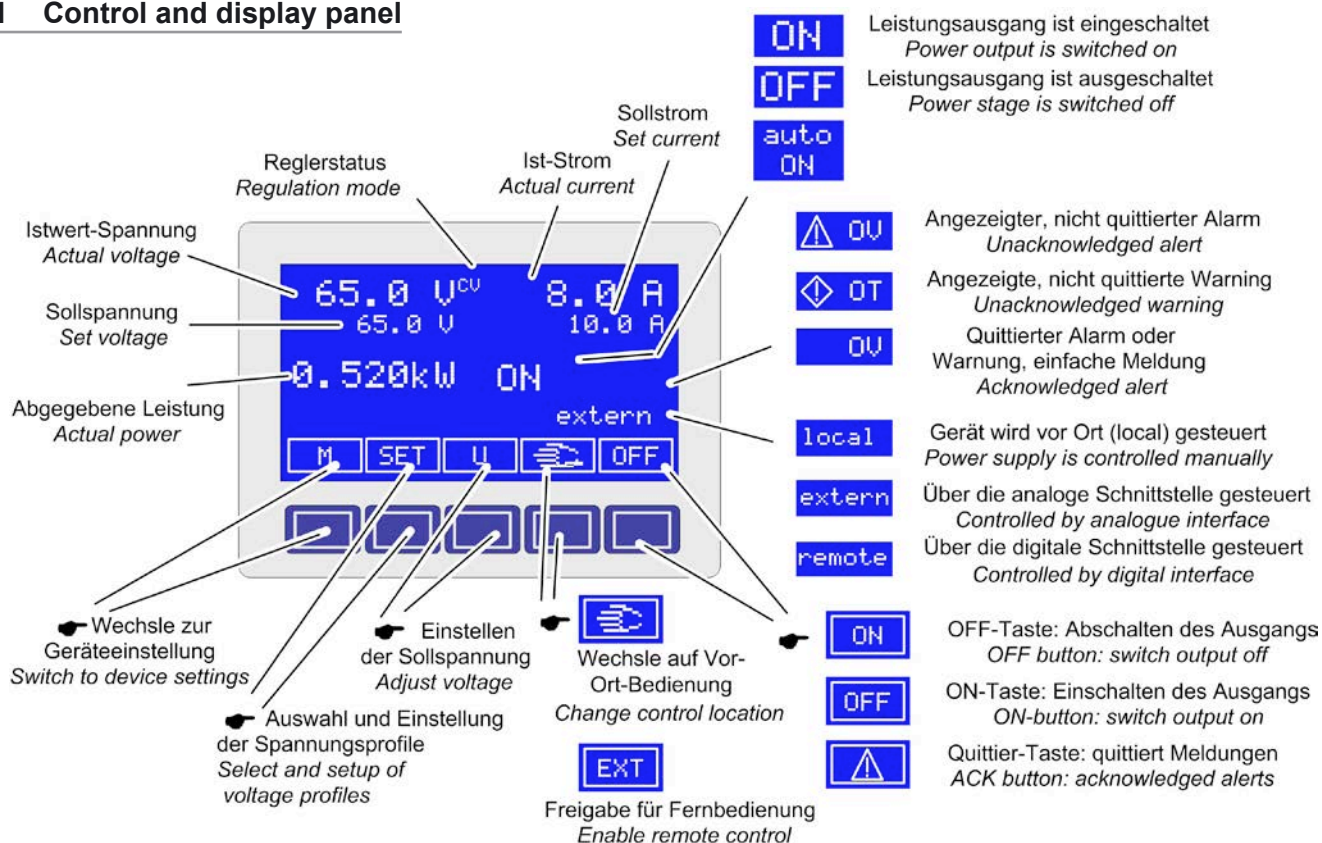
All values are typical values

3.10 Mechanical drawings



4. Handling

4.1 Control and display panel



4.1.1 Layout of the display

The display and control panel is separated into areas for set values, actual values, the output state, device status, the button assignments and the buttons themselves.

The button assignment strip 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 off, 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 off, the text „CC“ right next to the current actual value indicates constant current operation.

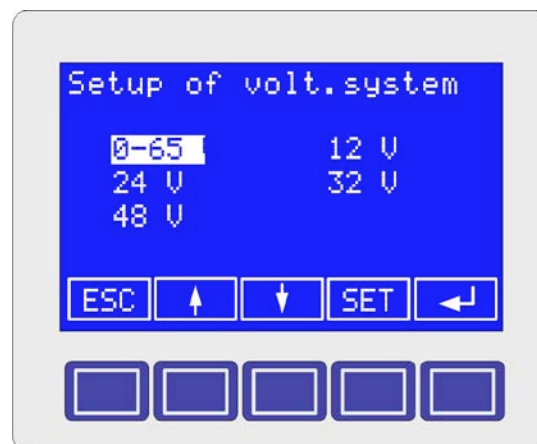
Beneath the voltage value area the actual output power is indicated. There is no adjustable power set value.

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.



Note: 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 limit.

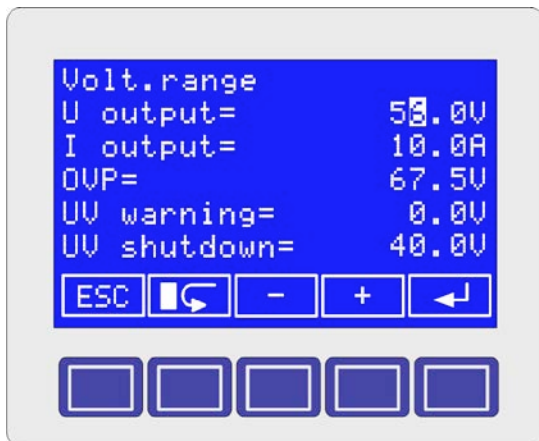
The buttons are used to select the desired profile, which is then submitted with the button. The display will return to normal and the output values are changed to the ones as adjusted in the profile.

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  the selected parameter becomes adjustable and is submitted with the  button or aborted with  (value is not submitted).

Changing parameters



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

The  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.

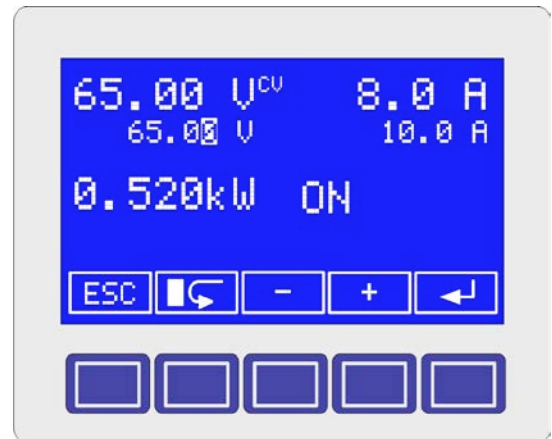
4.4 Adjusting the set value for current

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

4.5 Direct voltage adjustment

From the normal display, the output voltage can also be directly accessed for adjustment by the  button. It jumps into the currently selected voltage profile and selects the voltage for adjustment.

Submission or abortion of the adjustment is done the same way as described above in „4.3 Editing a voltage profile“.



4.6 The setup menu

The setup menu is accessed with the button . 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 has been switched on, the behaviour of the power output at overtemperature errors and the LCD backlight.

Output state after mains switch-on

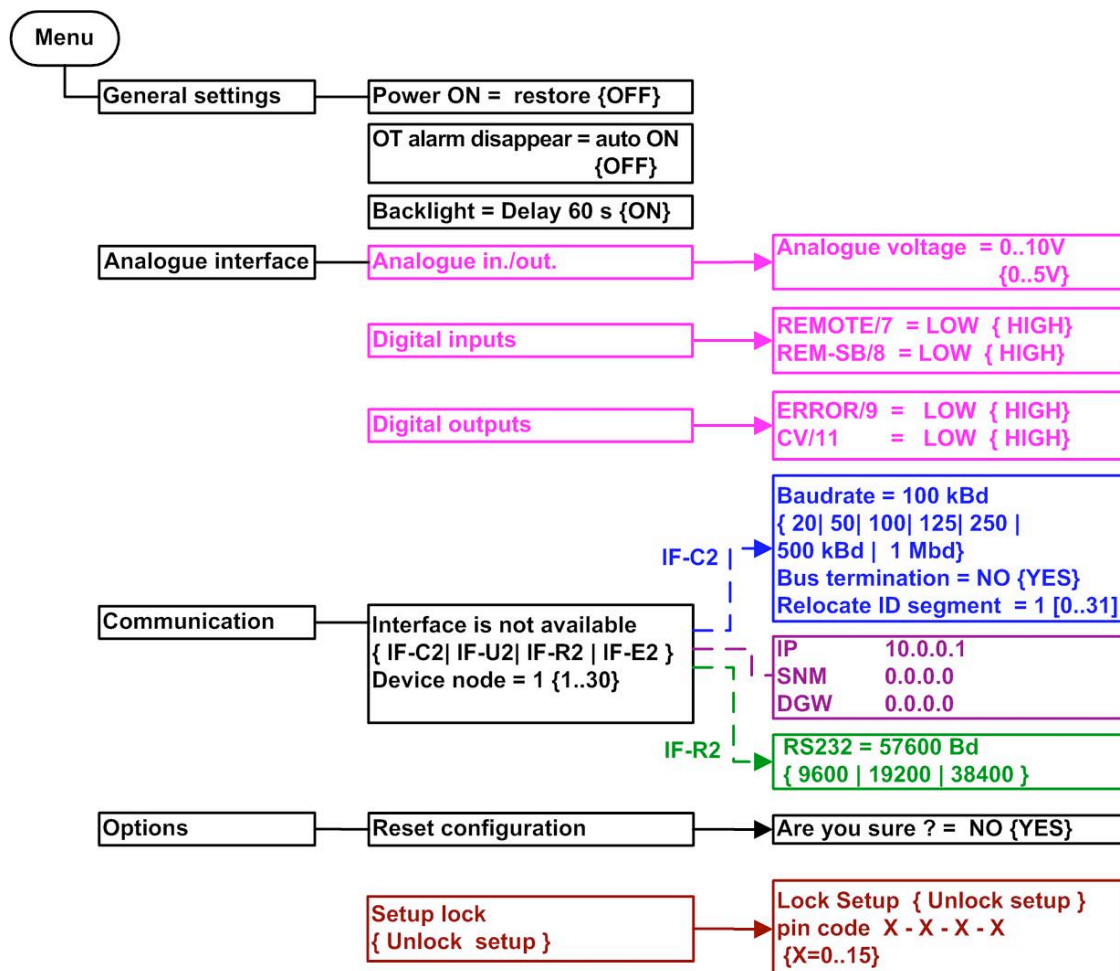
Power ON (default: *restore*)

After the device has been switched on or after a mains blackout, the output is switched on again if it was before, 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: *on*)

If desired, the output can automatically switch on again after an overtemperature condition is occurred and gone again. This is selected by the option set to *auto ON*. With setting *OFF*, the output will remain off and has to be switched on manually.



Display illumination

Backlight (default: *Delay 60s*)

With *Backlight = Delay 60s* selected, the backlight will be generally off and will be switched on for 60s after every keystroke. For permanent backlight, select option *Backlight = ON*.

4.6.2 Menu item „Analogue interface“

This configures the 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, disregarding the selected voltage profile. Accordingly, the selection *Analogue voltage = 0...5V* will work. With the 0...5V range selected, voltages of >5V are clipped to 100%.

Note: analog remote control is only possible with voltage profile 1 selected. Otherwise, the device will signalise alarm EXT.

Digital inputs (Default: *LOW*)

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

If set to *LOW* the input will react his defined function at low input level. See the technical specs table of the analog 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 analog interface for details.

4.6.3 Menu item „Communication“

This menu item defines settings for the communication via the digital interface card, if equipped. The settings are explained in detail in the user guide that belongs to the interface cards. Only a few or no settings at all are required. It depends on the type of the card.

4.6.4 Menu item „Options“

The item *Options* 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 selection **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 $16^4 = 65536$ combinations. Unlocking is done the same way, by entering the PIN code again. If the PIN code is lost, the device can only be accessed again by doing a „Reset configuration“. See above.

Remind, that a configuration reset will reset all settings to their default values!

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 analog 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 analog interface while one of the voltage profiles 2-5 resp. 2-6 was selected. In order to switch to analog remote control, first select voltage profile 1 via **SET** button. Also see section 4.2.

5. Remote control

5.1 Via 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 Via analog remote control

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.

Before controlling the device remotely it has to be switched to remote control by pin 7 „Remote“. Both values must 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%.

Remote control by analog interface is indicated in the display with the status text „extern“.

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 analog 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%, $U_{Max} = 12V$ Input impedance >100k
2	CSEL	AI	Set value: current	0....10V correspond to 0....100% I_{Nom}	
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 V_{CC} ²
10	DGND		Reference for digital 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 V_{CC} ²
12	+VCC	AO	Auxiliary voltage	12....16V	
					$I_{Max} = 24mA$ Short-circuit-proof against DGND

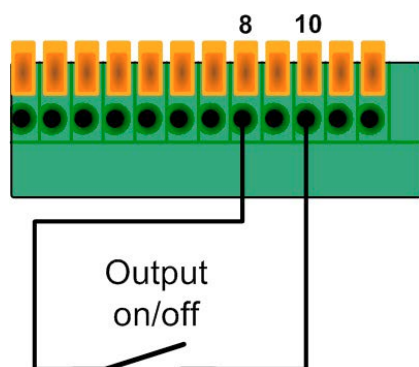
¹⁾ AI = Analogue input, AO = Analogue output, DO = digital output

²⁾ 12V...15V

5.2.2 Application examples

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

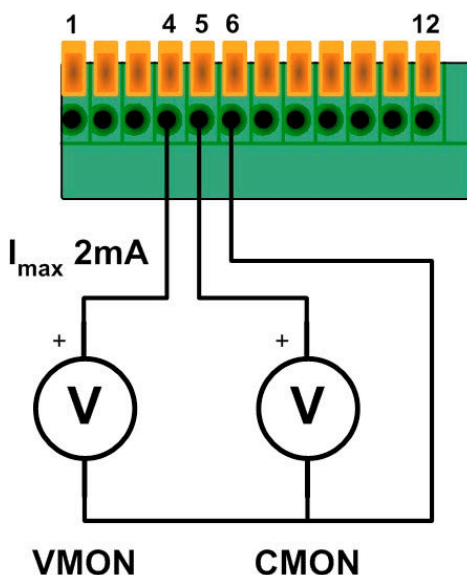
Remotely switching output on / off



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“.

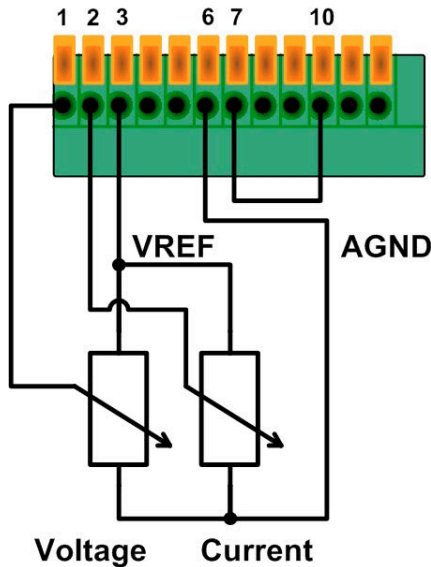
Monitoring voltage and current



The analog monitoring outputs put out 0...5V or 0...10V, depending on the voltage range selection in the setup, which each corresponding to 0...100% of the nominal values.

Reference is analog ground (AGND).

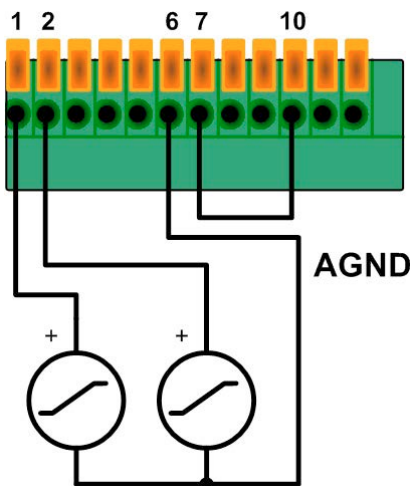
Set values 1



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. Other applications

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:

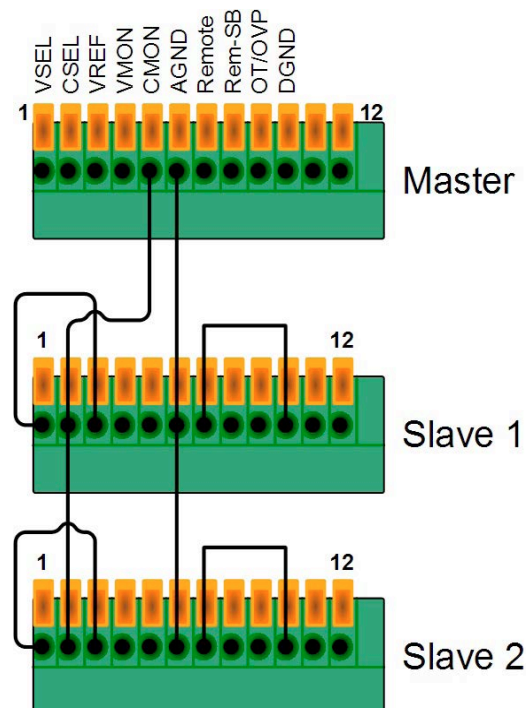
- No master-slave operation
- The grounds of the analog interfaces **MUST NOT** be connected to each other. This also applies for any other signal on the analog interfaces. If remote control is required, it can be done using galvanic isolation amplifiers and by controlling all units in parallel.
- Any 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

Multiple units with identical output voltage and ideally identical output current can be used in parallel connection (master-slave or other) without any restrictions. For example, the master is equipped with a digital interface card and the units are wired via their analog interfaces. Here the monitor outputs (or one of them) of the master are connected to the set value inputs of the first slave etc.

Alternatively, all units can be equipped with a digital interface card in order to supervise and control any units separately. Controlling the units with identical set values is possible by using broadcast messages.

An example of master-slave wiring and current control. The voltage is here tied to 100%, so the slaves can follow:



7. Miscellaneous

7.1 Accessories and options

Following accessories are optionally available:

a) Digital interface cards

Pluggable and retrofitable, digital interface cards for USB, RS232 or CAN are available. There is one interface card slot available with every model.

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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