

## DC Sources LAB/SMS 3 – 90 kW



 19" x 2 U x 440 – 600 mm

## DC Sources LAB/HP 5 – 120 kW



 19" x 3 U x 620 mm

### OVERVIEW

- Efficiency up to 94 %
- Compact design
- Active parallel and serial connectable
- Easiest operation via front panel
- Constant current, voltage, resistance and power operation
- Randomly programmable memory locations for U/I waves
- UI, UIP, UIR Mode, Simulation of PV-Arrays
- Script Control: process programming and booting from memory card
- Creating user defined output characteristics via memory card or digital interface
- Digital interfaces IEEE 488, RS232/485, USB and LAN (optional)
- Galvanically isolated analogue interface 0 – 5 V or 0 – 10 V (user selectable; optional)
- Storable U/I wave forms (e.g. for PV simulation and sequential control)
- Graphical display
- Special version on request
- Datalog function: operation values can be saved in an adjustable interval to a memory card
- Script operation in combination with Datalog function allows an independent stand-alone test field setup
- Umax and Imax randomly selectable to limit maximum output voltage and current

## PRODUCT EXAMPLES LAB/SMS

| Type          | Power W | Voltage V | Current A | Dimensions         |
|---------------|---------|-----------|-----------|--------------------|
| LAB/SMS 315   | 3,000   | 0 – 15    | 0 – 200   | 19" x 2 U x 440 mm |
| LAB/SMS 335   | 3,000   | 0 – 35    | 0 – 90    | 19" x 2 U x 440 mm |
| LAB/SMS 345   | 3,000   | 0 – 45    | 0 – 70    | 19" x 2 U x 440 mm |
| LAB/SMS 370   | 3,000   | 0 – 70    | 0 – 45    | 19" x 2 U x 440 mm |
| LAB/SMS 3100  | 3,000   | 0 – 100   | 0 – 30    | 19" x 2 U x 440 mm |
| LAB/SMS 3150  | 3,000   | 0 – 150   | 0 – 20    | 19" x 2 U x 440 mm |
| LAB/SMS 3300  | 3,000   | 0 – 300   | 0 – 10    | 19" x 2 U x 440 mm |
| LAB/SMS 3600  | 3,000   | 0 – 600   | 0 – 5     | 19" x 2 U x 440 mm |
| LAB/SMS 3800  | 3,000   | 0 – 800   | 0 – 4     | 19" x 2 U x 440 mm |
| LAB/SMS 31000 | 3,000   | 0 – 1,000 | 0 – 3     | 19" x 2 U x 440 mm |
| LAB/SMS 31200 | 3,000   | 0 – 1,200 | 0 – 2.6   | 19" x 2 U x 440 mm |
| LAB/SMS 31500 | 3,000   | 0 – 1,500 | 0 – 2     | 19" x 2 U x 440 mm |
| LAB/SMS 420   | 4,000   | 0 – 20    | 0 – 200   | 19" x 2 U x 440 mm |
| LAB/SMS 435   | 4,000   | 0 – 35    | 0 – 115   | 19" x 2 U x 440 mm |
| LAB/SMS 445   | 4,000   | 0 – 45    | 0 – 90    | 19" x 2 U x 440 mm |
| LAB/SMS 470   | 4,000   | 0 – 70    | 0 – 60    | 19" x 2 U x 440 mm |
| LAB/SMS 4100  | 4,000   | 0 – 100   | 0 – 40    | 19" x 2 U x 440 mm |
| LAB/SMS 4150  | 4,000   | 0 – 150   | 0 – 30    | 19" x 2 U x 440 mm |
| LAB/SMS 4300  | 4,000   | 0 – 300   | 0 – 15    | 19" x 2 U x 440 mm |
| LAB/SMS 4600  | 4,000   | 0 – 600   | 0 – 7     | 19" x 2 U x 440 mm |
| LAB/SMS 4800  | 4,000   | 0 – 800   | 0 – 5     | 19" x 2 U x 440 mm |
| LAB/SMS 41000 | 4,000   | 0 – 1,000 | 0 – 4     | 19" x 2 U x 440 mm |
| LAB/SMS 41200 | 4,000   | 0 – 1,200 | 0 – 3.4   | 19" x 2 U x 440 mm |
| LAB/SMS 41500 | 4,000   | 0 – 1,500 | 0 – 2.7   | 19" x 2 U x 440 mm |
| LAB/SMS 525   | 5,000   | 0 – 25    | 0 – 200   | 19" x 2 U x 440 mm |
| LAB/SMS 535   | 5,000   | 0 – 35    | 0 – 150   | 19" x 2 U x 440 mm |
| LAB/SMS 545   | 5,000   | 0 – 45    | 0 – 120   | 19" x 2 U x 440 mm |
| LAB/SMS 570   | 5,000   | 0 – 70    | 0 – 75    | 19" x 2 U x 440 mm |
| LAB/SMS 5100  | 5,000   | 0 – 100   | 0 – 50    | 19" x 2 U x 440 mm |
| LAB/SMS 5150  | 5,000   | 0 – 150   | 0 – 35    | 19" x 2 U x 440 mm |
| LAB/SMS 5300  | 5,000   | 0 – 300   | 0 – 17    | 19" x 2 U x 440 mm |
| LAB/SMS 5600  | 5,000   | 0 – 600   | 0 – 8,5   | 19" x 2 U x 440 mm |
| LAB/SMS 5800  | 5,000   | 0 – 800   | 0 – 6.25  | 19" x 2 U x 440 mm |
| LAB/SMS 51000 | 5,000   | 0 – 1,000 | 0 – 5     | 19" x 2 U x 440 mm |
| LAB/SMS 51200 | 5,000   | 0 – 1,200 | 0 – 4.2   | 19" x 2 U x 440 mm |
| LAB/SMS 51500 | 5,000   | 0 – 1,500 | 0 – 3.4   | 19" x 2 U x 440 mm |
| LAB/SMS 615   | 6,000   | 0 – 15    | 0 – 400   | 19" x 2 U x 600 mm |
| LAB/SMS 620   | 6,000   | 0 – 20    | 0 – 300   | 19" x 2 U x 600 mm |
| LAB/SMS 635   | 6,000   | 0 – 35    | 0 – 175   | 19" x 2 U x 600 mm |
| LAB/SMS 645   | 6,000   | 0 – 45    | 0 – 140   | 19" x 2 U x 600 mm |
| LAB/SMS 670   | 6,000   | 0 – 70    | 0 – 90    | 19" x 2 U x 600 mm |
| LAB/SMS 6100  | 6,000   | 0 – 100   | 0 – 60    | 19" x 2 U x 600 mm |
| LAB/SMS 6150  | 6,000   | 0 – 150   | 0 – 40    | 19" x 2 U x 600 mm |
| LAB/SMS 6300  | 6,000   | 0 – 300   | 0 – 20    | 19" x 2 U x 600 mm |
| LAB/SMS 6600  | 6,000   | 0 – 600   | 0 – 10    | 19" x 2 U x 600 mm |
| LAB/SMS 6800  | 6,000   | 0 – 800   | 0 – 7.5   | 19" x 2 U x 600 mm |
| LAB/SMS 61000 | 6,000   | 0 – 1,000 | 0 – 6     | 19" x 2 U x 600 mm |
| LAB/SMS 61200 | 6,000   | 0 – 1,200 | 0 – 5     | 19" x 2 U x 600 mm |
| LAB/SMS 61500 | 6,000   | 0 – 1,500 | 0 – 4     | 19" x 2 U x 600 mm |

## PRODUCT EXAMPLES LAB/SMS

| Type          | Power W | Voltage V | Current A | Dimensions         |
|---------------|---------|-----------|-----------|--------------------|
| LAB/SMS 820   | 8,000   | 0 – 20    | 0 – 440   | 19" x 2 U x 600 mm |
| LAB/SMS 825   | 8,000   | 0 – 25    | 0 – 320   | 19" x 2 U x 600 mm |
| LAB/SMS 835   | 8,000   | 0 – 35    | 0 – 230   | 19" x 2 U x 600 mm |
| LAB/SMS 845   | 8,000   | 0 – 45    | 0 – 180   | 19" x 2 U x 600 mm |
| LAB/SMS 870   | 8,000   | 0 – 70    | 0 – 115   | 19" x 2 U x 600 mm |
| LAB/SMS 8100  | 8,000   | 0 – 100   | 0 – 80    | 19" x 2 U x 600 mm |
| LAB/SMS 8150  | 8,000   | 0 – 150   | 0 – 55    | 19" x 2 U x 600 mm |
| LAB/SMS 8300  | 8,000   | 0 – 300   | 0 – 30    | 19" x 2 U x 600 mm |
| LAB/SMS 8600  | 8,000   | 0 – 600   | 0 – 15    | 19" x 2 U x 600 mm |
| LAB/SMS 8800  | 8,000   | 0 – 800   | 0 – 10    | 19" x 2 U x 600 mm |
| LAB/SMS 81000 | 8,000   | 0 – 1,000 | 0 – 8     | 19" x 2 U x 600 mm |
| LAB/SMS 81200 | 8,000   | 0 – 1,200 | 0 – 6.7   | 19" x 2 U x 600 mm |
| LAB/SMS 81500 | 8,000   | 0 – 1,500 | 0 – 5.4   | 19" x 2 U x 600 mm |
| LAB/SMS1020   | 10,000  | 0 – 20    | 0 – 500   | 19" x 2 U x 600 mm |
| LAB/SMS1035   | 10,000  | 0 – 35    | 0 – 350   | 19" x 2 U x 600 mm |
| LAB/SMS1045   | 10,000  | 0 – 45    | 0 – 250   | 19" x 2 U x 600 mm |
| LAB/SMS1070   | 10,000  | 0 – 70    | 0 – 175   | 19" x 2 U x 600 mm |
| LAB/SMS10100  | 10,000  | 0 – 100   | 0 – 100   | 19" x 2 U x 600 mm |
| LAB/SMS10150  | 10,000  | 0 – 150   | 0 – 75    | 19" x 2 U x 600 mm |
| LAB/SMS10300  | 10,000  | 0 – 300   | 0 – 40    | 19" x 2 U x 600 mm |
| LAB/SMS10600  | 10,000  | 0 – 600   | 0 – 17    | 19" x 2 U x 600 mm |
| LAB/SMS10800  | 10,000  | 0 – 800   | 0 – 13    | 19" x 2 U x 600 mm |
| LAB/SMS101000 | 10,000  | 0 – 1,000 | 0 – 10    | 19" x 2 U x 600 mm |
| LAB/SMS101200 | 10,000  | 0 – 1,200 | 0 – 8.4   | 19" x 2 U x 600 mm |
| LAB/SMS101500 | 10,000  | 0 – 1,500 | 0 – 7     | 19" x 2 U x 600 mm |

Other versions on request

## PRODUCT EXAMPLES LAB/HP

| Type         | Power W | Voltage V | Current A | Dimensions         |
|--------------|---------|-----------|-----------|--------------------|
| LAB/HP 520   | 5,000   | 0 – 20    | 0 – 250   | 19" x 3 U x 620 mm |
| LAB/HP 540   | 5,000   | 0 – 40    | 0 – 125   | 19" x 3 U x 620 mm |
| LAB/HP 580   | 5,000   | 0 – 80    | 0 – 65    | 19" x 3 U x 620 mm |
| LAB/HP 5100  | 5,000   | 0 – 100   | 0 – 50    | 19" x 3 U x 620 mm |
| LAB/HP 5150  | 5,000   | 0 – 150   | 0 – 35    | 19" x 3 U x 620 mm |
| LAB/HP 5300  | 5,000   | 0 – 300   | 0 – 17    | 19" x 3 U x 620 mm |
| LAB/HP 5600  | 5,000   | 0 – 600   | 0 – 8.5   | 19" x 3 U x 620 mm |
| LAB/HP 5800  | 5,000   | 0 – 800   | 0 – 6.25  | 19" x 3 U x 620 mm |
| LAB/HP 51000 | 5,000   | 0 – 1,000 | 0 – 5     | 19" x 3 U x 620 mm |
| LAB/HP 51200 | 5,000   | 0 – 1,200 | 0 – 4     | 19" x 3 U x 620 mm |
| LAB/HP 51500 | 5,000   | 0 – 1,500 | 0 – 3.4   | 19" x 3 U x 620 mm |
| LAB/HP 1020  | 10,000  | 0 – 20    | 0 – 500   | 19" x 3 U x 620 mm |
| LAB/HP 1040  | 10,000  | 0 – 40    | 0 – 250   | 19" x 3 U x 620 mm |
| LAB/HP 1080  | 10,000  | 0 – 80    | 0 – 130   | 19" x 3 U x 620 mm |
| LAB/HP 10100 | 10,000  | 0 – 100   | 0 – 100   | 19" x 3 U x 620 mm |
| LAB/HP 10150 | 10,000  | 0 – 150   | 0 – 70    | 19" x 3 U x 620 mm |
| LAB/HP 10300 | 10,000  | 0 – 300   | 0 – 34    | 19" x 3 U x 620 mm |
| LAB/HP 10600 | 10,000  | 0 – 600   | 0 – 17    | 19" x 3 U x 620 mm |
| LAB/HP 10800 | 10,000  | 0 – 800   | 0 – 13    | 19" x 3 U x 620 mm |
| LAB/HP101000 | 10,000  | 0 – 1,000 | 0 – 10    | 19" x 3 U x 620 mm |
| LAB/HP101200 | 10,000  | 0 – 1,200 | 0 – 8     | 19" x 3 U x 620 mm |
| LAB/HP101500 | 10,000  | 0 – 1,500 | 0 – 7     | 19" x 3 U x 620 mm |

## PRODUCT EXAMPLES LAB/HP

| Type          | Power W | Voltage V | Current A | Dimensions         |
|---------------|---------|-----------|-----------|--------------------|
| LAB/HP 1520   | 15,000  | 0 – 20    | 0 – 750   | 19" x 3 U x 620 mm |
| LAB/HP 1540   | 15,000  | 0 – 40    | 0 – 375   | 19" x 3 U x 620 mm |
| LAB/HP 1580   | 15,000  | 0 – 80    | 0 – 195   | 19" x 3 U x 620 mm |
| LAB/HP 15100  | 15,000  | 0 – 100   | 0 – 150   | 19" x 3 U x 620 mm |
| LAB/HP 15150  | 15,000  | 0 – 150   | 0 – 100   | 19" x 3 U x 620 mm |
| LAB/HP 15300  | 15,000  | 0 – 300   | 0 – 50    | 19" x 3 U x 620 mm |
| LAB/HP 15600  | 15,000  | 0 – 600   | 0 – 25    | 19" x 3 U x 620 mm |
| LAB/HP 15800  | 15,000  | 0 – 800   | 0 – 19    | 19" x 3 U x 620 mm |
| LAB/HP 151000 | 15,000  | 0 – 1,000 | 0 – 15    | 19" x 3 U x 620 mm |
| LAB/HP 151200 | 15,000  | 0 – 1,200 | 0 – 12    | 19" x 3 U x 620 mm |
| LAB/HP 151500 | 15,000  | 0 – 1,500 | 0 – 10    | 19" x 3 U x 620 mm |

Other versions on request

## OPTIONS

| Appendix   | Description   |
|------------|---|
| ../230     | 230 / 207 – 253 VAC Input                                       |
| ../3P208   | 3 x 208 / 187 – 229 VAC Input                                   |
| ../3P400   | 3 x 400 / 360 – 440 VAC Input                                   |
| ../3P440   | 3 x 440 / 396 – 484 VAC Input                                   |
| ../3P480   | 3 x 480 / 432 – 528 VAC Input                                   |
| ../400Hz   | 400 Hz Input  |
| ../DC      | 250...750 VDC Input   |
| ../ATE     | Without Manual Operation  |
| ../ATI5/10 | Galvanically isolated Analogue Interface 0 – 5 VDC / 0 – 10 VDC |
| ../LT IEEE | 488 Interface   |
| ../LTRS485 | RS 485 Interface  |
| ../LTRS232 | RS 232 Interface  |
| ../LAN     | LAN Interface   |
| ../USB     | USB Interface   |
| ../KFZ12   | Preselected Start-up Curve 12 V                                 |
| ../KFZ24   | Preselected Start-up Curve 24 V                                 |
| ../OPT     | Predefined Output characteristic                                |
| ../SD      | SD Card Slot  |
| ../M-S     | Master/Slave Option for power up to 120 kW                      |

## INPUT

|   | LAB/HP   |               |               |               |               |               |               |                |                |
|---|--|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|
|   | LAB/SMS  |               |               |               |               |               |               |                |                |
| Device Power  | 3 kW   | 4 kW          | 5 kW          | 10 kW         | 15 kW         | 20 kW         | 30 kW         | 45 kW          | 60 kW          |
| Connection  | 3 wire (1P+N+E) / 5 wire (3P+N+E)  |               |               |               |               |               |               |                |                |
| Input 1P/230  | 1 x 230 Vac (207 – 253, Vac 47 – 63 Hz)  |               |               |               |               |               |               |                |                |
| Input 3P/208  | 3 x 208 Vac (187 – 229, Vac 47 – 63 Hz)  |               |               |               |               |               |               |                |                |
| Input 3P/400  | 3 x 400 Vac (360 – 440, Vac 47 – 63 Hz)  |               |               |               |               |               |               |                |                |
| Input 3P/440  | 3 x 440 Vac (396 – 484, Vac 47 – 63 Hz)  |               |               |               |               |               |               |                |                |
| Input 3P/480  | 3 x 480 Vac (432 – 528, Vac 47 – 63 Hz)  |               |               |               |               |               |               |                |                |
| Max. allowed non symmetry (3P-System)                     | < 3 %  |               |               |               |               |               |               |                |                |
| Input current 1P/230 model                                | 22 A   | 28 A          | 33 A          | x             | x             | x             | x             | x              | x              |
| Input current 3P/208 mode                                 | TBD  | TBD           | 23 A          | 46 A          | 69 A          | 92 A          | 138 A         | 207 A          | 276 A          |
| Input current 3P/400 model <sup>1,2</sup>                 | 7.5 A  | 10 A          | 11.5 A        | 22.9 A        | 34.4 A        | 45.8 A        | 68.7 A        | 103.1 A        | 137.5 A        |
| Inrush transient current <sup>2</sup>                     | < 25   | < 25          | < 25          | < 51          | < 76          | < 102         | < 153         | < 229          | < 305          |
| Norminal current Internal Fuse 3P/400 model               | 15 A   | 15 A          | 15 A          | 30 A          | 45 A          | 60 A          | 90 A          | 135 A          | 180 A          |
| Recommended Supply Breaker 3P/400 model (value and curve) | 16 A Type D/K  | 16 A Type D/K | 16 A Type D/K | 32 A Type D/K | 63 A Type D/K | 63 A Type D/K | 80 A Type D/K | 120 A Type D/K | 150 A Type D/K |
| Leakage current   | < 35 mA  |               |               |               |               |               |               |                |                |
| cos phi   | > 0.7  |               |               |               |               |               |               |                |                |
| Harmonic Content <sup>3</sup>                             | 50 Hz = 72 %   100 Hz = 2 %   150 Hz = 0.9 %   200 Hz = 0.1 %   250 Hz = 11 %   350 Hz = 0.6 % |               |               |               |               |               |               |                |                |
| Efficiency Type   | 94 %   |               |               |               |               |               |               |                |                |

<sup>1</sup> For nominal current and nominal voltage

<sup>2</sup> For nominal input voltage

<sup>3</sup> Total harmonic distortion input current ([%]/lin)

<sup>4</sup> 250 A is the maximum possible current for an 5 kW Unit

<sup>5</sup> If the rippel is not specified, the maximum allowed rippel is 0.2 % of F.S.

<sup>6</sup> The measurement of the peak peak rippel is strongly dependent of the measurement setup

<sup>7</sup> The given accuracy is also all interfaces valid

<sup>8</sup> Notices: The relative accuracy will not change.

Only the absolute value will be change because the nominal Values of the "unit" are change

<sup>9</sup> A higher number is possible, ask the manufactor

<sup>10</sup> The LAB/HP unit can also build up at 30 kW, 45 kW, 60 kW, 75 kW and 90 kW units

## OUTPUT

|  | LAB/HP                |       |            |       |             |       |       |                 |        |
|--|-----------------------|-------|------------|-------|-------------|-------|-------|-----------------|--------|
|  | LAB/SMS               |       |            |       |             |       |       |                 |        |
| Output voltage / [V]   | 15                    | 35    | 70         | 100   | 300         | 600   | 800   | 1.000           | 1.200  |
| Output current for 5 kW Unit/ [A]  | 250 <sup>4</sup>      | 142   | 72         | 50    | 17          | 8,5   | 6,25  | 5               | 4,2    |
| Static Regulation  | ± 0.05 % of F.S.      |       |            |       |             |       |       |                 |        |
| Line Regulation voltage  | ±0.01 % F.S.          |       |            |       |             |       |       |                 |        |
| Line Regulation current  | ±0.01 % F.S.          |       |            |       |             |       |       |                 |        |
| Load Regulation voltage  | ±0.02 % F.S. ± 2 mV   |       |            |       |             |       |       |                 |        |
| Load Regulation current  | ±0.02 % F.S. ± 20 mA  |       |            |       |             |       |       |                 |        |
| Dynamic Response Time @ Load Step 10 – 90 %  | < 2 ms                |       |            |       |             |       |       |                 |        |
| Voltage Ripple (p-p)   | TBD <sup>6</sup>      |       |            |       |             |       |       |                 |        |
| Voltage Ripple (rms) <sup>5</sup>  | 15                    | 35    | 60         | 60    | 400         | 400   | 400   | 400             | 800    |
| Current Ripple (p-p)   | TBD <sup>6</sup>      |       |            |       |             |       |       |                 |        |
| Current Ripple (rms)   | < 0.2 % of F.S.       |       |            |       |             |       |       |                 |        |
| Isolation Primary / Secondary  | 3.000 VDC             |       |            |       |             |       |       |                 |        |
| Isolation DC-Output / Earth  | 500 VDC               |       |            |       | 2.000 VDC   |       |       |                 |        |
| Isolation Primary / Earth  | 2.150 VDC             |       |            |       |             |       |       |                 |        |
| Programming Response Time  | < 10 ms               |       |            |       |             |       |       |                 |        |
| Rise Time, Full load   | 6 ms                  | 6 ms  | 12 ms      | 20 ms | 20 ms       | 20 ms | 40 ms | 40 ms           | 40 ms  |
| Rise Time, No load   | 5 ms                  | 5 ms  | 10 ms      | 10 ms | 10 ms       | 20 ms | 20 ms | 20 ms           | 20 ms  |
| Fall Time, Full Load   | 15 ms                 | 15 ms | 20 ms      | 20 ms | 40 ms       | 50 ms | 60 ms | 80 ms           | 100 ms |
| Fall Time, No Load   | 5 s to get below 50 V |       |            |       |             |       |       |                 |        |
| Relative Accuracy [%] <sup>7</sup>   |                       |       |            |       |             |       |       |                 |        |
| Voltage [V] 0,25   | 0.038                 | 0.088 | 0.175      | 0.250 | 0.750       | 1.500 | 2.000 | 2.500           | 3.000  |
| Current [A] 0,4  | 1.000                 | 0.568 | 0.288      | 0.200 | 0.068       | 0.034 | 0.025 | 0.020           | 0.017  |
| Relative Accuracy for Sens Operation (worst case) [%] <sup>7</sup>                     |                       |       |            |       |             |       |       |                 |        |
| Voltage [V] 0,5  | 0.075                 | 0.175 | 0.350      | 0.500 | 1.500       | 3.000 | 4.000 | 5.000           | 6.000  |
| Absolute Accuracy for Master-Slave Operation [%] <sup>7</sup>                          |                       |       |            |       |             |       |       |                 |        |
| M/S-Parallel-Mode <sup>7,8</sup>   N: number of parallel connected device; example N=3 |                       |       |            |       |             |       |       |                 |        |
| Voltage [V] 0,25   | 0.038                 | 0.088 | 0.175      | 0.250 | 0.750       | 1.500 | 2.000 | 2.500           | 3.000  |
| Current [A] 0,4 x N  | 3.000                 | 1.704 | 0.864      | 0.600 | 0.204       | 0.102 | 0.075 | 0.060           | 0.050  |
| M/S-Serial-Mode <sup>7,8</sup>   N: number of serial connected device; example N=3     |                       |       |            |       |             |       |       |                 |        |
| Voltage [V] 0,25 x N   | 0.113                 | 0.263 | 0.525      | 0.750 | 2.250       | 4.500 | 6.000 | 7.500           | 9.000  |
| Current [A] 0,4  | 1.000                 | 0.568 | 0.288      | 0.200 | 0.068       | 0.034 | 0.025 | 0.020           | 0.017  |
| Resolution voltage Display   | 10 – 60 V             |       | 70 – 90 V  |       | 100 – 900 V |       |       | 1.000 – 1.200 V |        |
| Voltage Setting resolution   | 00.00                 |       | 00.0       |       | 000         |       |       | 0000            |        |
| Resolution current Display   | 2 – 60 A              |       | 70 – 100 A |       | 100 – 900 A |       |       | 1.000 – 2.000 A |        |
| Current Setting resolution   | 00.00                 |       | 00.0       |       | 000         |       |       | 0000            |        |

## INTERFACE

### Analog Interface

|   |  |
|---|--|
| Digital outputs<br>(CV, Standby, Error)   | Output type: Open collector with pull-up resistor 10 k $\Omega$ after +5 V<br>Isinkmax: 50 mA  |
| Digital inputs<br>(Ext. Control, Standby) | Input resistance: 47 k $\Omega$<br>Maximum input voltage: 50 V<br>High level: Uin > 2 V<br>Low level: Uin < 0.8 V                                  |
| Analog outputs (Xmon)                     | Output resistance: 100 $\Omega$<br>Minimum permissible load resistance: 2 k $\Omega$<br>Minimum load resistance for 0.1 % accuracy: 100 k $\Omega$ |
| Analog inputs (Xset)                      | Input resistance: 1 M $\Omega$<br>Maximum permissible input voltage: 25 V  |
| Reference voltage                         | Reference voltage Uref: 10 V $\pm$ 10 mV<br>Output resistance: < 10 $\Omega$<br>Maximum output current: 10 mA (not short-circuit-proof)            |
| 5 V – supply voltage                      | Output voltage: 5 V $\pm$ 300 mV<br>Maximum output current: 50 mA (not short-circuit-proof)  |

### RS 232

|                            |  |
|----------------------------|--|
| Signal inputs (Rx/D, CTS)  | Maximum input voltage: $\pm$ 25 V<br>Input resistance: 5 k $\Omega$ (Type)<br>Switching thresholds: UH < -3 V, UL > +3 V   |
| Signal outputs (Tx/D, RTS) | Output voltage (at RL > 3 k $\Omega$ ): min $\pm$ 5 V, Type $\pm$ 9 V, max $\pm$ 10 V<br>Output resistance: < 300 $\Omega$ ; Short circuit current: Type $\pm$ 10 mA |

### RS 485

|                       |                 |
|-----------------------|-----------------|
| Maximum input voltage | $\pm$ 5 V       |
| Input resistance      | > 12 k $\Omega$ |
| Output current        | $\pm$ 60 mA Max |
| High level            | Ud > 0,2 V      |
| Low level             | Ud < -0,2 V     |

### Master-Slave

|  |                               |
|--|-------------------------------|
| Number of devices <sup>9</sup>                     | up to 8                       |
| Maximum voltage serial                             | 2,000 V                       |
| Maximum Power standard device                      | LAB/SMS 80 kW   LAB/HP 120 kW |
| Maximum Power LAB/HP modified Device <sup>10</sup> | 720 kW                        |

## EMC AND SAFETY STANDARDS

|  |                   |
|--|-------------------|
| Safety standard                                | EN 60950          |
| Emission                                       | EN 61000-6-4:2007 |
| Immunity                                       | EN 61000-6-2:2005 |
| Measurement, control- and laboratory equipment | EN 61010-1:2006   |

## AMBIENT CONDITIONS

|                       |   |
|-----------------------|---|
| Cooling               | Fans                                    |
| Operating temperature | 0 – 50°C                                |
| Storage temperature   | -20°C – 70°C                            |
| Humidity              | < 80 %                                  |
| Operating height      | < 2000 m                                |
| Vibration             | 10 – 55 Hz / 1 min / 2G XYZ             |
| Shock                 | < 20 G                                  |
| Weight LAB/SMS        | 3 – 5 kW, 18 kg, 6 – 10 kW, 25 kg       |
| Weight LAB/HP         | 5 kW, 19 kg, 10 kW, 26 kg, 15 kW, 33 kg |