

DC Sources LAB SMS 3 – 80 kW



▶ 19" x 2 U x 440 – 600 mm

DC Sources LAB HP 5 kW – 1 MW



▶ 19" x 3 U x 620 mm

OVERVIEW

- 3 kW to 1 MW
- Output voltages up to 1,500 V (2,000 V)
- Output currents up to 50,000 A
- Quiet operation, ensuring that it is pleasant to work within the vicinity of the unit
- Very easy to control via front panel
- Information via graphic display
- Constant voltage, current, resistance, power operation and simulation of PV arrays
- Create any type of voltage or current curve via memory card or digital interface (sequential operation)
- Script operation, in conjunction with the Datalog function, enables an independent stand-alone test field to be set up
- Standard integrated ATI 5/10 galvanically isolated analogue interface: 0 – 5 V or 0 – 10 V (user selectable) and RS232, master/slave (LAB/HP and LAB/SMS), soft interlock
- Master/slave interface to parallel and series circuits (LAB/HP and LAB/SMS)
- Filter functions which can be adjusted for analogue interface
- Digital interfaces IEEE488, RS485, USB and LAN (optional)
- SD card slot (optional)
- Datalog function: Current operating values are saved to the memory card at adjustable time intervals, SD card (optional)
- Voltage rise time and current rise time (U and I slopes) are adjustable
- U_{max} and I_{max} can be set by the user in order to limit output voltage or output current
- A switch-off time can be set for the unit once the start button has been pressed
- Create U/I output characteristics which can be saved (e.g. for PV-Sim, shading)
- "High speed" optional
The secondary rise and fall time for the DC output voltage is reduced by a factor of 10 compared to standard times, on average.
- Autorange optional down to 33%
- OVP, OTP, UVP and OCP protective functions
- Special versions available on request

PRODUCT EXAMPLES LAB SMS

Type	Power W	Voltage V	Current A	Dimensions
LAB/SMS 315	3000	0 – 15	0 – 200	19" x 2 U x 440 mm
LAB/SMS 335	3000	0 – 35	0 – 90	19" x 2 U x 440 mm
LAB/SMS 345	3000	0 – 45	0 – 70	19" x 2 U x 440 mm
LAB/SMS 370	3000	0 – 70	0 – 45	19" x 2 U x 440 mm
LAB/SMS 3100	3000	0 – 100	0 – 30	19" x 2 U x 440 mm
LAB/SMS 3150	3000	0 – 150	0 – 20	19" x 2 U x 440 mm
LAB/SMS 3300	3000	0 – 300	0 – 10	19" x 2 U x 440 mm
LAB/SMS 3600	3000	0 – 600	0 – 5	19" x 2 U x 440 mm
LAB/SMS 3800	3000	0 – 800	0 – 4	19" x 2 U x 440 mm
LAB/SMS 31000	3000	0 – 1000	0 – 3	19" x 2 U x 440 mm
LAB/SMS 31200	3000	0 – 1200	0 – 2.6	19" x 2 U x 440 mm
LAB/SMS 31500	3000	0 – 1500	0 – 2	19" x 2 U x 440 mm
LAB/SMS 420	4000	0 – 20	0 – 200	19" x 2 U x 440 mm
LAB/SMS 435	4000	0 – 35	0 – 115	19" x 2 U x 440 mm
LAB/SMS 445	4000	0 – 45	0 – 90	19" x 2 U x 440 mm
LAB/SMS 470	4000	0 – 70	0 – 60	19" x 2 U x 440 mm
LAB/SMS 4100	4000	0 – 100	0 – 40	19" x 2 U x 440 mm
LAB/SMS 4150	4000	0 – 150	0 – 30	19" x 2 U x 440 mm
LAB/SMS 4300	4000	0 – 300	0 – 15	19" x 2 U x 440 mm
LAB/SMS 4600	4000	0 – 600	0 – 7	19" x 2 U x 440 mm
LAB/SMS 4800	4000	0 – 800	0 – 5	19" x 2 U x 440 mm
LAB/SMS 41000	4000	0 – 1000	0 – 4	19" x 2 U x 440 mm
LAB/SMS 41200	4000	0 – 1200	0 – 3.4	19" x 2 U x 440 mm
LAB/SMS 41500	4000	0 – 1500	0 – 2.7	19" x 2 U x 440 mm
LAB/SMS 525	5000	0 – 25	0 – 200	19" x 2 U x 440 mm
LAB/SMS 535	5000	0 – 35	0 – 150	19" x 2 U x 440 mm
LAB/SMS 545	5000	0 – 45	0 – 120	19" x 2 U x 440 mm
LAB/SMS 570	5000	0 – 70	0 – 75	19" x 2 U x 440 mm
LAB/SMS 5100	5000	0 – 100	0 – 50	19" x 2 U x 440 mm
LAB/SMS 5150	5000	0 – 150	0 – 35	19" x 2 U x 440 mm
LAB/SMS 5300	5000	0 – 300	0 – 17	19" x 2 U x 440 mm
LAB/SMS 5600	5000	0 – 600	0 – 8.5	19" x 2 U x 440 mm
LAB/SMS 5800	5000	0 – 800	0 – 6.25	19" x 2 U x 440 mm
LAB/SMS 51000	5000	0 – 1000	0 – 5	19" x 2 U x 440 mm
LAB/SMS 51200	5000	0 – 1200	0 – 4.2	19" x 2 U x 440 mm
LAB/SMS 51500	5000	0 – 1500	0 – 3.4	19" x 2 U x 440 mm
LAB/SMS 615	6000	0 – 15	0 – 400	19" x 2 U x 600 mm
LAB/SMS 620	6000	0 – 20	0 – 300	19" x 2 U x 600 mm
LAB/SMS 635	6000	0 – 35	0 – 175	19" x 2 U x 600 mm
LAB/SMS 645	6000	0 – 45	0 – 140	19" x 2 U x 600 mm
LAB/SMS 670	6000	0 – 70	0 – 90	19" x 2 U x 600 mm
LAB/SMS 6100	6000	0 – 100	0 – 60	19" x 2 U x 600 mm
LAB/SMS 6150	6000	0 – 150	0 – 40	19" x 2 U x 600 mm
LAB/SMS 6300	6000	0 – 300	0 – 20	19" x 2 U x 600 mm
LAB/SMS 6600	6000	0 – 600	0 – 10	19" x 2 U x 600 mm
LAB/SMS 6800	6000	0 – 800	0 – 7.5	19" x 2 U x 600 mm
LAB/SMS 61000	6000	0 – 1000	0 – 6	19" x 2 U x 600 mm
LAB/SMS 61200	6000	0 – 1200	0 – 5	19" x 2 U x 600 mm
LAB/SMS 61500	6000	0 – 1500	0 – 4	19" x 2 U x 600 mm

PRODUCT EXAMPLES LAB SMS

Type	Power W	Voltage V	Current A	Dimensions
LAB/SMS 820	8000	0 – 20	0 – 440	19" x 2 U x 600 mm
LAB/SMS 825	8000	0 – 25	0 – 320	19" x 2 U x 600 mm
LAB/SMS 835	8000	0 – 35	0 – 230	19" x 2 U x 600 mm
LAB/SMS 845	8000	0 – 45	0 – 180	19" x 2 U x 600 mm
LAB/SMS 870	8000	0 – 70	0 – 115	19" x 2 U x 600 mm
LAB/SMS 8100	8000	0 – 100	0 – 80	19" x 2 U x 600 mm
LAB/SMS 8150	8000	0 – 150	0 – 55	19" x 2 U x 600 mm
LAB/SMS 8300	8000	0 – 300	0 – 30	19" x 2 U x 600 mm
LAB/SMS 8600	8000	0 – 600	0 – 15	19" x 2 U x 600 mm
LAB/SMS 8800	8000	0 – 800	0 – 10	19" x 2 U x 600 mm
LAB/SMS 81000	8000	0 – 1000	0 – 8	19" x 2 U x 600 mm
LAB/SMS 81200	8000	0 – 1200	0 – 6.7	19" x 2 U x 600 mm
LAB/SMS 81500	8000	0 – 1500	0 – 5.4	19" x 2 U x 600 mm
LAB/SMS 1020	10000	0 – 20	0 – 500	19" x 2 U x 600 mm
LAB/SMS 1035	10000	0 – 35	0 – 350	19" x 2 U x 600 mm
LAB/SMS 1045	10000	0 – 45	0 – 250	19" x 2 U x 600 mm
LAB/SMS 1070	10000	0 – 70	0 – 175	19" x 2 U x 600 mm
LAB/SMS 10100	10000	0 – 100	0 – 100	19" x 2 U x 600 mm
LAB/SMS 10150	10000	0 – 150	0 – 75	19" x 2 U x 600 mm
LAB/SMS 10300	10000	0 – 300	0 – 40	19" x 2 U x 600 mm
LAB/SMS 10600	10000	0 – 600	0 – 17	19" x 2 U x 600 mm
LAB/SMS 10800	10000	0 – 800	0 – 13	19" x 2 U x 600 mm
LAB/SMS 101000	10000	0 – 1000	0 – 10	19" x 2 U x 600 mm
LAB/SMS 101200	10000	0 – 1200	0 – 8.4	19" x 2 U x 600 mm
LAB/SMS 101500	10000	0 – 1500	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	5000	0 – 20	0 – 250	19" x 3 U x 620 mm
LAB/HP 540	5000	0 – 40	0 – 125	19" x 3 U x 620 mm
LAB/HP 580	5000	0 – 80	0 – 65	19" x 3 U x 620 mm
LAB/HP 5100	5000	0 – 100	0 – 50	19" x 3 U x 620 mm
LAB/HP 5150	5000	0 – 150	0 – 35	19" x 3 U x 620 mm
LAB/HP 5300	5000	0 – 300	0 – 17	19" x 3 U x 620 mm
LAB/HP 5600	5000	0 – 600	0 – 8.5	19" x 3 U x 620 mm
LAB/HP 5800	5000	0 – 800	0 – 6.25	19" x 3 U x 620 mm
LAB/HP 51000	5000	0 – 1000	0 – 5	19" x 3 U x 620 mm
LAB/HP 51200	5000	0 – 1200	0 – 4	19" x 3 U x 620 mm
LAB/HP 51500	5000	0 – 1500	0 – 3.4	19" x 3 U x 620 mm
LAB/HP 1020	10000	0 – 20	0 – 500	19" x 3 U x 620 mm
LAB/HP 1040	10000	0 – 40	0 – 250	19" x 3 U x 620 mm
LAB/HP 1080	10000	0 – 80	0 – 130	19" x 3 U x 620 mm
LAB/HP 10100	10000	0 – 100	0 – 100	19" x 3 U x 620 mm
LAB/HP 10150	10000	0 – 150	0 – 70	19" x 3 U x 620 mm
LAB/HP 10300	10000	0 – 300	0 – 34	19" x 3 U x 620 mm
LAB/HP 10600	10000	0 – 600	0 – 17	19" x 3 U x 620 mm
LAB/HP 10800	10000	0 – 800	0 – 13	19" x 3 U x 620 mm
LAB/HP 101000	10000	0 – 1000	0 – 10	19" x 3 U x 620 mm
LAB/HP 101200	10000	0 – 1200	0 – 8	19" x 3 U x 620 mm
LAB/HP 101500	10000	0 – 1500	0 – 7	19" x 3 U x 620 mm

PRODUCT EXAMPLES LAB HP

Type	Power W	Voltage V	Current A	Dimensions
LAB/HP 1520	15000	0 – 20	0 – 750	19" x 3 U x 620 mm
LAB/HP 1540	15000	0 – 40	0 – 375	19" x 3 U x 620 mm
LAB/HP 1580	15000	0 – 80	0 – 195	19" x 3 U x 620 mm
LAB/HP 15100	15000	0 – 100	0 – 150	19" x 3 U x 620 mm
LAB/HP 15150	15000	0 – 150	0 – 100	19" x 3 U x 620 mm
LAB/HP 15300	15000	0 – 300	0 – 50	19" x 3 U x 620 mm
LAB/HP 15600	15000	0 – 600	0 – 25	19" x 3 U x 620 mm
LAB/HP 15800	15000	0 – 800	0 – 19	19" x 3 U x 620 mm
LAB/HP 151000	15000	0 – 1000	0 – 15	19" x 3 U x 620 mm
LAB/HP 151200	15000	0 – 1200	0 – 12	19" x 3 U x 620 mm
LAB/HP 151500	15000	0 – 1500	0 – 10	19" x 3 U x 620 mm

Other versions on request

MODEL NUMBER DESCRIPTION

LAB /	HP	15	150 / 3P400	LAN	Kfz 12	Mod
DC-Source	Series	Output power	Output voltage Input voltage description	Interface option	Process option	Modification

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
../LT IEEE	IEEE488 Interface
../LTRS485	RS485 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
../2000V	2000 V output voltage (application must be known. Please contact us.)

LINE INPUT

LAB HP

Device Power	LAB SMS									
	3 kW	4 kW	5 kW	6 kW	8 kW	10 kW	15 kW	20 kW	30 kW	45 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/200	3 x 200 VAC (180 – 220 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 ^{1,2}	22 A	28 A	33 A	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴
Input current 3P/200 model ^{1,2}	15	20	25	30	40	50	74	99	148	221
Input current 3P/208 model ^{1,2}	14 A	19 A	23 A	28 A	37 A	46 A	69 A	92 A	138 A	207 A
Input current 3P/400 model ^{1,2}	7.5 A	10 A	11.5 A	15 A	20 A	22.9 A	34.4 A	45.8 A	68.7 A	103.1 A
Input current 3P/440 model ^{1,2}	7 A eff	9 A	11 A	14 A	18 A	21 A	32.5 A	42 A	63.5 A	95 A
Input current 3P/480 model ^{1,2}	6.5 A	8 A	10 A	12.5 A	16.5 A	19.5 A	30.0 A	39 A	58 A	87 A
Inrush transient current ²	< 25	< 25	< 25	< 51	< 51	< 51	< 76	< 102	< 153	< 229
Norminal current Internal Fuse 3P/400 model	15 A	15 A	15 A	30 A	30 A	30 A	45 A	60 A	90 A	135 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	32 A Type D/K	32 A Type D/K	40 A Type D/K	63 A Type D/K	80 A Type D/K	120 A Type D/K
Leakage current	< 35 mA									
cos phi	> 0.7									
Harmonic Content ³	50 Hz = 72 % 100 Hz = 2 % 150 Hz = 0.9 % 200 Hz = 0.1 % 250 Hz = 11 % 350 Hz = 0.6 %									
Efficiency Type	94 %									

¹ For nominal current and nominal voltage

² For nominal input voltage

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

⁴ 250 A is the maximum possible current for an 5 kW Unit

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

⁶ The measurement of the peak peak rippel is strongly dependent of the measurement setup

⁷ The given accuracy is also all interfaces valid

⁸ Notices: The relative accuracy will not change.

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

⁹ A higher number is possible, ask the manufactor

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

¹¹ The ripple measurement methode of ET System is specifid at application note : ET Rippel-Spec

¹² Ther rippel specification are reservation to change on the part of manufactor

¹³ Device Is at the moment only avalibale with highspped output (Low output cap)

¹⁴ Not as standard unit available

LINE INPUT	LAB HP (Single Cabinet Version)							
Device Power	60 kW	75 kW	90 kW	100 kW	125 kW	150 kW	180 kW	195 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/200	3 x 200 VAC (180 – 220 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 ^{1,2}	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴
Input current 3P/200 model ^{1,2}	295	370	444	494	617	740	888	962
Input current 3P/208 model ^{1,2}	276 A	345 A	414 A	460 A	575 A	690 A	828 A	897 A
Input current 3P/400 model ^{1,2}	137.5 A	172.5 A	207 A	230 A	287.5 A	345 A	414 A	448.5 A
Input current 3P/440 model ^{1,2}	127 A	162.5 A	195 A	217 A	271 A	325 A	390 A	422.5 A
Input current 3P/480 model ^{1,2}	117 A	150 A	180 A	200 A	250 A	300 A	360 A	390 A
Inrush transient current ²	< 305	< 380	< 456	< 506	< 633	< 760	< 912	< 988
Norminal current Internal Fuse 3P/400 model	180 A	200 A	250 A	300 A	359 A	400 A	500 A	500 A
Recommended Supply Breaker 3P/400 model (value and curve)	150 A Type D/K	200 A Type D/K	230 A Type D/K	250 A Type D/K	320 A Type D/K	380 A Type D/K	450 A Type D/K	490 A Type D/K
Leakage current	< 100 mA							
cos phi	> 0.7							
Harmonic Content ³	50 Hz = 72 % 100 Hz = 2 % 150 Hz = 0.9 % 200 Hz = 0.1 % 250 Hz = 11 % 350 Hz = 0.6 %							
Efficiency Type	94 %							

¹ For nominal current and nominal voltage

² For nominal input voltage

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

⁴ 250 A is the maximum possible current for an 5 kW Unit

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

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¹⁴ Not as standard unit available

LINE INPUT	LAB HP (Cabinet M/S Version ¹⁵)						
Device Power	200 kW (2x 100 kW)	250 kW (2x 125 kW)	300 kW (2x 150 kW)	400 kW (4x 100 kW)	450 kW (3x 150 kW)	500 kW (4x 125 kW)	600 kW (4x 150 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/200	3 x 200 VAC (180 – 220 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 ^{1,2}	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴	x ¹⁴
Input current 3P/200 model ^{1,2}	987	1234	1480	1974	2220	2467	2960
Input current 3P/208 model ^{1,2}	920 A	1150 A	1380 A	1484 A	2070 A	2300 A	2760 A
Input current 3P/400 model ^{1,2}	460 A	575 A	690 A	920 A	1035 A	1150 A	1380 A
Input current 3P/440 model ^{1,2}	434 A	542 A	650 A	867 A	975 A	1084 A	1300 A
Input current 3P/480 model ^{1,2}	400 A	500 A	600 A	800 A	900 A	1000 A	1200 A
Inrush transient current ²	< 1013	< 1266	< 1520	< 2026	< 2280	< 2533	< 3040
Norminal current Internal Fuse 3P/400 model	Fuse for each cabinet						
Recommended Supply Breaker 3P/400 model (value and curve)	500 A Type D/K	620 A Type D/K	750 A Type D/K	1000 A Type D/K	1100 A Type D/K	1230 A Type D/K	1500 A Type D/K
Leakage current	< 100 mA						
cos phi	> 0.7						
Harmonic Content ³	50 Hz = 72 % 100 Hz = 2 % 150 Hz = 0.9 % 200 Hz = 0.1 % 250 Hz = 11 % 350 Hz = 0.6 %						
Efficiency Type	94 %						

¹ For nominal current and nominal voltage

² For nominal input voltage

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

⁴ 250 A is the maximum possible current for an 5 kW Unit

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OUTPUT

	LAB HP																	
	LAB SMS																	
Control quality	Static Regulation	± 0.1 % of F.S.																
	Line Regulation voltage	± 0.02 % F.S.																
	Line Regulation current	± 0.02 % F.S.																
	Load Regulation voltage	± 0.05 % F.S. ± 2 mV																
	Load Regulation current	± 0.05 % F.S. ± 20 mA																
	Dynamic Responce Time @ Load Step 10 – 90 %	< 3 ms																
Output current	Output voltage / [V]	15	20	25	35	40	45	70	80	100	150	300	600	800	1000	1200	1500	
	SMS: 3 kW Unit/ [A]	200	x	x	90	x	70	45	x	x	20	10	5	x	3	2,6	2	
	SMS: 4 kW Unit/ [A]	x	200	x	115	x	90	60	x	x	30	15	7	x	4	3,4	x	
	SMS: 5 kW Unit/ [A]	x	250	200	150	125	120	75	65	50	35	17	8,5	6,5	5	4,2	3,3	
	SMS: 6 kW Unit/ [A]	400	300	x	175	x	140	90	x	x	40	20	10	x	6	5	x	
	SMS: 8 kW Unit/ [A]	x	440	320	230	x	180	115	x	x	55	30	15	x	8	6,7	x	
	SMS/HP: 10 kW Unit/ [A]	x	500	x	350	250	250	175	130	100	75	40	17	13	10	8	6,6	
	HP: 15 kW Unit/ [A]	x	750	x	x	375	x	x	195	150	100	50	25	19	15	12	10	
	Other combinations of voltage and current also possible, ask the manufactory																	
	Basic calculation of possible combinations are:																	
	Pout = Vout x Iout Pmax for one unit 90 kW Vmax = 1500 V Cmax = 250 A each 5 kW																	
Rippel and Noise ¹⁾	Voltage Ripple (p-p) 20 MHz	40 ¹²	80 ¹²	80 ¹²	80 ¹²	140 ¹²	140 ¹²	140 ¹²	140 ¹²	140 ¹²	900 ¹²	900 ¹²	350 ¹²	350 ¹²	400 ¹²	850 ¹²	900 ¹²	
	Voltage Ripple (p-p) 300 kHz	15 ¹²	35 ¹²	35 ¹²	35 ¹²	60 ¹²	60 ¹²	60 ¹²	60 ¹²	60 ¹²	400 ¹²	400 ¹²	250 ¹²	250 ¹²	300 ¹²	500 ¹²	550 ¹²	
	Voltage Ripple (rms) ⁵ mV 20 MHz	15 ¹²	35 ¹²	35 ¹²	35 ¹²	60 ¹²	60 ¹²	60 ¹²	60 ¹²	60 ¹²	400 ¹²	400 ¹²	150 ¹²	150 ¹²	150 ¹²	150 ¹²	200 ¹²	
	Voltage Ripple (rms) ⁵ mV 300 kHz	10 ¹²	25 ¹²	25 ¹²	25 ¹²	40 ¹²	40 ¹²	40 ¹²	40 ¹²	40 ¹²	300 ¹²	300 ¹²	100 ¹²	100 ¹²	100 ¹²	100 ¹²	150 ¹²	
	Current Ripple (p-p)	< 0.5 % of F.S.																
	Current Ripple (rms)	< 0.4 % of F.S.																
Isolation	Primary / Secondary	3000 VAC																
	DC-Output / Earth	500 VDC										2000 VDC						
	Primary / Earth	2150 VDC																
Output speed	Rise Time, Full load	6 ms	6 ms	6 ms	6 ms	12 ms	12 ms	12 ms	20 ms	20 ms	20 ms	20 ms	20 ms	40 ms	40 ms	40 ms	6 ms ¹³	
	Rise Time, No load	5 ms	5 ms	5 ms	5 ms	10 ms	10 ms	10 ms	10 ms	10 ms	10 ms	10 ms	10 ms	10 ms	20 ms	20 ms	5 ms ¹³	
	Fall Time, Full Load	15 ms	15 ms	15 ms	15 ms	20 ms	20 ms	20 ms	20 ms	20 ms	40 ms	40 ms	50 ms	60 ms	80 ms	100 ms	25 ms ¹³	
	Fall Time, No Load	5 s to get below 50 V																
Accuracy	Rel. Accuracy ± [%] ⁷																	
	Voltage [V] 0.25	0.038	0.050	0.063	0.088	0.100	0.113	0.175	0.200	0.250	0.375	0.750	1.500	2.000	2.500	3.000	3.750	
	Current [A] 0.4	1.000	1.000	0.800	0.600	0.500	0.480	0.300	0.260	0.200	0.140	0.068	0.034	0.026	0.020	0.017	0.013	
	Relative Accuracy for Sens Operation (worst case) [%] ⁷																	
	Voltage [V] 0.5	0,075	0,100	0,125	0,175	0,200	0,225	0,350	0,400	0,500	0,750	1,500	3,000	4,000	5,000	6,000	7,500	
	Max. Sens Voltage over nominal Voltage	± 1 % of F.S.																
Max. Sens Voltage inside the nominal Voltage range	5 % of F.S. (if higher voltage is needed ask manufactory)																	

OUTPUT

	LAB HP															
	LAB SMS															
Output voltage / [V]	15	20	25	35	40	45	70	80	100	150	300	600	800	1000	1200	1500
Maximum Device at Master/Slave-Mode is 8																
Absolute Accuracy for Master-Slave Operation \pm [%] ⁷																
M/S-Parallel-Mode ^{7,8} N: number of parallel connected device; example N=3																
Voltage [V] 0.25	0.038	0.050	0.063	0.088	0.100	0.113	0.175	0.200	0.250	0.375	0.750	1.500	2.000	2.500	3.000	3.750
Current [A] 0.4 x N	3.000	3.000	2.400	1.740	1.500	1.440	0.864	0.780	0.600	0.420	0.204	0.102	0.078	0.060	0.050	0.040
M/S-Serial-Mode ^{7,8} N: number of serial connected device; example N=3																
Voltage [V] 0.25 x N	0.113	0.150	0.188	0.263	0.300	0.338	0.525	0.600	0.750	1.125	0.525	0.750	2.250	4.500	6.000	7.500
Current [A] 0.4	1.000	1.000	0.800	0.580	0.500	0.480	0.288	0.260	0.200	0.140	0.288	0.200	0.068	0.034	0.026	0.020
Resolution voltage Display	15 V – 99.99 V					100 V – 999.9 V					1000 V – 1500 V					
Voltage Setting resolution Single & M/S-Serial-Mode	0.000					000.0					0000					
Voltage Setting resolution M/S-Parallel Mode	N x 0.001			N x 00.01			N x 000.1			N x 0001						
Resolution current Display	0 A – 9.999 A			10 A – 99.99 A			100 A – 999.9 A			1000 A – 9999 A						
Current Setting resolution Single & M/S-Serial-Mode	0.000			00.00			000.0			0000						
Current Setting resolution M/S-Parallel Mode	N x 0.001			N x 00.01			N x 000.1			N x 0001						
OVP	Over Voltage Protection: is adjustable between 0 % and 120 % of Voltage full range															
OCP	Over Current Protection: is realised by the current setpoint, the output current can not go over the set output current															
OTP	Over Temperature Protection: if the internal heat sink temperature is go above 90°C the device will automatical shut down															
UVLO	Under Voltage Lock out: if set limit reach device shut down															
UI-MODE	Voltage and Current Operation Mode: Voltage and current are settable															
UIP-MODE	Power Limit Mode: A Powerlimit is settable															
UIR-MODE	Output Resistor Mode: A Output resistor is settable between [Rmax=Vout_max/Iout_max] and [Rmin=Rmax X 0.1]															
PV-SIM-MODE	Photovoltaic Simulation Mode: Simulation of a PV-Cell is possible															
SLOPE-FUNCTION	Adjustable Slope for current and Voltage: Range-Minimum 1 A/s resp. 1 V/s Range-Maximum is 30 ms to Vmax resp. Imax															
AI-FILTER	Adjustable filter function for Analoginterface Setvalues. Averagare time is adjustable between approximate 0 s to 80 s 0=0 s; 2=15 ms; 3=30 ms; 4=60 ms; 5=125 ms; 6=250 ms; 7=500 ms; 8=1 s; 9=2 s; 10=3 s; 11=5 s; 12=10 s; 13=20 s; 14=40 s; 15=80 s															
t-ENABLE	Adjustable on time for the device after press the start button (standby). Time is adjustable between 1 s and 65000 s															



riešenia na presné meranie

Elso Philips Service
 Jilemnického 2; 911 01 Trenčín
 tel: +421 32 6582410
 fax: +421 32 6582592
 email: elso@elso.sk
 web: www.elso.sk

INTERFACE

Analog Interface

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

RS232

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

RS485

Maximum input voltage	\pm 5 V
Input resistance	> 12 k Ω
Output current	\pm 60 mA Max
High level	Ud > 0.2 V
Low level	Ud < -0.2 V

Master-Slave

Number of devices ⁹	up to 8
Maximum Voltage serial	1000 V
Maximum Power Standard Device	LAB/SMS 80 kW LAB/HP 120 kW
Maximum Power LAB HP modified Device ¹⁰	720 kW
Set-Value Accuracy (V/A) by using internal Reference	\pm 0.5 %

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 61010-1:2010

AMBIENT CONDITIONS

Cooling	Fans
Operating temperature	0 – 50°C
Storage temperature	-20°C – 70°C
Humidity	< 80 %
Operating height	< 2000 m
Weight / Dimension LAB SMS 3 – 5 kW	18 kg / 19" x 2 U x 440 mm
Weight / Dimension LAB SMS 6 – 10 kW	25 kg / 19" x 2 U x 600 mm
Weight/Dimension LAB HP	5 kW 19 kg, 10 kW 26 kg, 15 kW 33 kg / 19" x 3 U x 620 mm
FAN Volume	42 – 43 dB