

 Hardware-controlled with fast control time Software-controlled with programmable control parameters

GTC





H&H

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SZ

ZSLC Water-coole

ZSLV Low Voltage

**ZSAC** AC

NL Source-Sink

Accesso-ries

**Application Notes** 

Software

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#### **Type Overview**

Model order number	M15-06	M15-12	M15-24	M30-06	M30-12	M30-24	M45-06	M45-12	M45-24	M60-06	M60-12	M60-24
Power	150 W	150 W	150 W	300 W	300 W	300 W	450 W	450 W	450 W	600 W	600 W	600 W
Voltage	60 V	120 V	240 V	60 V	120 V	240 V	60 V	120 V	240 V	60 V	120 V	240 V
Current	20 A	10 A	4.5 A	40 A	20 A	9 A	60 A	30 A	13.5 A	80 A	40 A	18 A
Size	1 Slot	1 Slot	1 Slot	2 Slots	2 Slots	2 Slots	3 Slots	3 Slots	3 Slots	4 Slots	4 Slots	4 Slots

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Time 10

Timer 10

#### **PMLI Software Tools**

#### TAT Test Automation Tool PMLI Control Tool The PMLI Test Automation Tool The PMLI Control Tool lets you simulates the timed process control up to 120 channels in 40 control of several individual PMLI devices. devices. The tool enables individual channel setting, voltage and current display and measured Typical use is to simulate all consumers in a vehicle. data recording. Each channel of the PMLI is · Beteter Aufgen Stellenge Derie St assigned a device with its typical current consumption (wind-2 (Inc Apple days) screen wiper, window winder etc.). There are 10 programmable timers for each channel. Test Inner i heard theory heard heard theory heard theory heard theory heard theory is routines can be carried out individually or in loops. at | tare last Simulated consumer 1: Timer 6 Time 1 Time 2 Timer 5 Tim 7 Timer 8 Time 9 Time 3 4 Discovery Sin ulated consumer n: On ÷ Off Timer 1 Timer 2 Timer 7 Timer 6 Timer 8 Timer 9 5 ÷ 3 4 Test cycle start Short test cycle Pre-calculated test cycle time Repeat of test cycle

Repeat of test cycle

Customer application: Vehicle simulation 132 channel

#### Input Input voltage See type overview Input resistance >50 k $\Omega$ when load input is off Input capacity Approx. 1 µF / 150 W Up to 3 channels can be connected in parallel Parallel operation Current range See type overview Current rise and fall 300 µs (10 % ... 90 % Inom) Minimum voltage Vmin 1.4 V at rated current, including linear derating of the current 1 Imax Vmin U Permissible operating voltages Negative load input to case: max. 100 V Load input to load input: max. 100 V Jack-in connections for 4 mm<sup>2</sup>, touch-protected (several pins have to be connected for currents greater than 20 A) Load connections available on the Analog I/O Interface Sense connections Voltable of the Antopy to Interface Over-current and power protection Over-voltage protection up to 120 % of rated voltage Reverse polarity protection with diode up to rated current Over-temperature cut-off Transient protection Protective devices Up to $T_A = 21 \text{ °C}$ -1.2 % / °C for $T_A > 21 \text{ °C}$ Rated power Derating Accuracy of setting of the setting value of the corresponding range ±0.25 % ±0.15 % Current Voltage Resistance Power SW control with adjustable control parameters Accuracy depends on accuracy of the measurement function for voltage and current and the accuracy of the current setting ±1 % ±0.15 % Trigger voltage Resolution of settings Accuracy of meas 12 Bit ent of the measured value (real value) of the corresponding range Voltage ±0.1 % ±0.2 % Current ±0.25 % ±0.1 % Resolution of measurements 12 Bit Sampling rate Dynamics 300 ms 2 programmable currents and times í 11 I1 12 12 t1 10 ms .... 60 s t1 t2 t t2 Setting range Accuracy of time setting ±2 ms Rise and fall times are defined as 10 % ... 90 % and 90 % ... 10 % of the maximum current. (current mode FAST, tolerance ±20 %)

Accuracy of analog	control		H8H
0 10V for current	of the setting value	of the corresponding range	
Current	±0.25 %	±0.15 %	
Input resistance >20	kΩ		
GND max. ±2 V with	respect to negative load	input	
Accuracy of analog 0 10 V for curren	measurement output t, voltage	S	
	of analog signal of	offset voltage	
Voltage	±0.5 %	±30 mV	
Current	±0.5 %	±30 mV	U.
GND max. ±2 V with Minimum load capacit	respect to negative load y 2kΩ	input	
			U U
Operating condition	10		IS
Operating condition	5°C 40°C		
temperature	5 C 40 C		
Cooling	2-phase air-cooling,	temperature-controlled	-
	Air inlet via the front Air outlet via the bac	panel k panel for gap-free 19" rack	
	installation		N N
Noise	69 dBA (measured fr	om a distance of 1m)	
		F0 6011 11 11	н
Supply voltage	115/230 V~ ±10 %, Power consumption a	50 60 Hz switchable approx. 90 VA	Ξ
		₽.	
Dimensions	19"- 2 HU, 500 x 88	x 390 mm	
Weight	max. 18.3 kg, depen	ding on equipment	
			A
Color:			ZS
Side panels, top	RAL7032 (pebble gre RAL7037 (stone grey	(Y)	
Electrical safety	DIN EN 61010-1		
			l z
EMC, CE marking	DIN EN 55011 DIN EN 61326-1		
	DIN EN 61000-3-2 DIN EN 61000-3-3		
			ģ
Coone of sumply	ingl 10% mounting by	realizet, DC 222 eaching	SS
Scope of supply	Inci. 19 mounting br	dcket, KS-232 CdDie	l Ö
Warranty	2 years		Ā
Order details			se
PMLI-M	PMLI Master device v	vith GPIB + RS-232 + PMLI	
	system bus interface		
PMLI-S	PMLI Slave device wi	th system bus interface for device and for connection to	i.
	other Slave devices	device and for connection to	- E
SLOT4	Cooler module, empt	y with 4 slots (depending on	1
	use, 1x, 2x or 3x req	uired per PMLI device)	
Мхх-хх	Load module (see tv	pe overview, top).	Q.
	Unless otherwise ind	icated the modules are	ar
	mounted in the devic	e in the order specified in the	A L
PMLI05	Optional external I A	N-RS-232 adapter	j j
	<b>.</b>		
	Subject to	technical modifications	C

#### Technical Data PMLI Series

**Accessories** 

#### **High Current Cables**

#### High Current Cables

(Standard)

Highly flexible cables in different lengths, cross-sections and voltage strengths with cable lug.

Color coding via cable lug.
Two leads are always required for device connection.
Several cables can be connected

in parallel for higher currents.



Standard HKS cable in different cross sections

#### High current cables (low induction)

For dynamic load with high rise times and for long load lines.

These double cables enable the voltage of the test unit to be supplied to the load input with

Low induction high current HKI cables

The specified values for L and R relate to two parallel cables leading to the test

very low inductive losses.				
Only in this way it is possible to				
realize fast current rise times.				
The maximum voltage is 300V.				

Туре	Cross- section (mm²)	Cur- rent (A)	Vol- tage (V)	L <sup>1)</sup> (µH /m)	R <sup>1)</sup> (mΩ /m)	Con- nection mm
HKS16-I-rt/sw	16	120	100	0.64	3.02	Ø 10
HKS25-I-rt/sw	25	160	100	0.64	2.15	Ø 12
HKS35-I-rt/sw	35	200	100	0.62	1.54	Ø 12
HKS50-I-rt/sw	50	250	100	0.61	1.00	Ø 12
HKS70-I-rt/sw	70	300	100	0.52	0.68	Ø 12
HKS95-I-rt/sw	95	365	100	0.55	0.50	Ø 12
HKS120-I-rt/sw	120	450	100	0.44	0.37	Ø 12
HKM70- <i>I-rt/sw</i>	70	260	450	0.52	0.68	Ø 12
HKM240- <i>I-rtlsw</i>	240	750	450	0.50	0.22	Ø 16
HKV16- <i>I-rt/sw</i>	16	100	1,500	0.64	3.02	Ø 10
HKV70- <i>I-rt/sw</i>	70	250	1,500	0.52	0.68	Ø 12
Dielectric strength:			5 cable: M cable: / cable: 1	100V 450V L,500V		

HKS16-2-rt: 16 mm<sup>2</sup>, I=2 meters, red HKS50-1-sw: 50 mm<sup>2</sup>, I=1 meter, black

Туре	Cross- secti- on	Cur- rent	Vol- tage	L (uH/	R (mΩ/	Con- nection
	(mm²)	(A)	(V)	m)	`m)	mm
HKI12-I	2x12	80	300	0.065	3.79	Ø 10
HKI30-I	2x30	130	300	0.065	1.82	Ø 12
HKI70-I	3x70	250	300	0.081	0.68	Ø 12

Order example: HKI30-3: 30 mm<sup>2</sup>, I=3 meters

## Comparison: Standard cable - low inductance cable Voltage source 5 V, load variation 0 to 100 A



Order examples:

Voltage and current diagram with 2 m standard cable HKS35, slack. Voltage drops as current on cable increases. The cable determines the maximum rise speed of the current. Voltage and current diagram with 2 m low-induction cable HKI30. The voltage remains stable while the current increases at the load input.

The actual control behaviour of the test unit can be analyzed.

Ч ZS **ZSLC** Water-cooled ZSLV Low Voltage ē PMLI Multi-channe **ZSAC** AC NL Source-Sink Accesso-ries **Application Notes** Software

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### Accessories

The HKV16/CON high-current

cables are manufactured with an

SB6 jack at one end which fits the electronic ZSAC loads with

#### HKV16/CON High Current Cable (for ZSAC Series )

H&H

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ZS

**ZSLC** Water-cooled

**PMLI** Multi-chann

**ZSAC** AC

NL Source-Sink

Accessories 1 set HKV16 cable (red and black), 2 m long, included as standard with all loads with SB6 connection.

The other end is unassembled.

SB6 connections.

#### Order examples: HKV16/CON-2-rt: 16mm², l=2 meters, red HKV16/CON-6-sw: 16mm², l=6 meters, black



HKV16/CON high current cable for ZSAC series with SB6 socket

SLV /oltage	Туре	Cross section (mm²)	Current (A)	Voltage (V)	Inductance <sup>1)</sup> (µH/m)	Resistance <sup>1)</sup> (mΩ/m)	Connection
N	HKV16/CON-I-(rt/sw)	16	100	600	0.64	3.02	SB6
-							

#### **Other Cables**

#### Master-Slave Cable Order no.: K-MS-ZS For Master-Slave operation of two devices. Length: 2m

#### RS-232 Cable Order no.: K-RS-SNM9-9 Null modem cable (RTS-CTShandshake) Length: 2m

## Manuals

#### German + English: Order no.: HB-XXXX<sup>2)</sup>

Coola

ant	Distrib	ution

## olant Distribution for ZSLC Loads

We supply the coolant distributors to match the configuration of your loads.

GTC Software Application Notes

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The specified values for resistance and inductivity relate to two parallel cables leading to the test unit

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ZS

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Accesso-ries

**Application Notes** 

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**Accessories** 

#### 19" Racks

air.

#### 19"Racks for the Installation of Electronic Loads The installation of electronic

loads requires special racks

which are designed for adequate air outlet of the heated exhaust

H&H racks are fitted at the back

with large scale air vents to allow exhaust air to escape practically unhindered.

The rear door is shorter to accommodate the connection cable.

The installation depth is 680 mm.

Model	Installation height front (HU)	Air outlet rear (HU)	Height (mm)
Rack 34	34	27	1,710
Rack 38	38	32	1,910
Rack 43	43	36	2,110
Rack 47	47	41	2,310
		-	
The connectio	n cable is guided		

through flexible foam rubber lips.

A socket strip near the floor is provided for mains connection of devices.





19" rack for electronic loads

#### **Mains Switches for Rack Installation**

Model	Voltage	Current	Switches	RCCB	Connection	Miscellaneous	Height
SE-1PH	1~230 V	16 A	Central emergency- off switch	-	Terminal	-	2 HU
SE-3PH-16	3~230/400 V	16 A	Central emergency- off switch	-	Terminal	-	2 HU
SE-3PH-32	3~230/400 V	32 A	Central emergency- off switch	-	Terminal	-	2 HU
SE-3PH-DC	3~230/400 V	32 A	Central emergency- off switch	30 mA	2x16 A CEE 3x safety sockets	DC power supply 12 V/8 A	3 HU
SE-3PH-FI	3~230/400 V	16 A	Central emergency- off switch	30 mA	1x16 A CEE 3x safety sockets	-	3 HU







SE-3PH-FI





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The Electronic Load



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