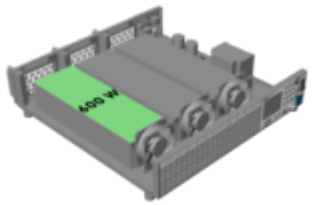
Datasheet MA60-24C20

Höcherl & Hackl
The electronic load

Module[1)]	MA60-24C20	
Order no.	23-030-000-04	

Maximum input voltage Umax	240 V
Maximum load current Imax	20 A
Continuous power	600 W
Resistance setting	0.1 Ω ... 200 Ω
Minimum input voltage Umin[2)]	1.4 V
Rise and fall time fast	200 µs
Accuracy of current setting	0.1 %
Accuracy of resistance setting	1.4 %
Accuracy of power setting (at U and I > 10 % of the range)	0.7 %
Accuracy of power setting (at U or I 5 ... 10 % of the range)	2 %
Accuracy of adjustable overcurrent limitation	0.2 %
Accuracy of current measurement	0.2 %
I/O port: accuracy of analog current control 0 ... 10 V	0.2 %
I/O port: accuracy of analog current monitor signal 0 ... 10 V	0.2 %
Input capacity	1 µF

1. A PMLA-M or PMLA-S housing and a Cooling Unit are required to operate a module.
2. Minimum input voltage for maximum static load current.

Series-Specific Data PMLA Standard

Series D, Rev. 1. Subject to technical changes.

The specified accuracies apply at an ambient temperature of 23±5 °C with connected sense lines and when the devices are used with clean voltages (ripple and noise < 0.1 %). Accuracy may worsen at voltages with higher interference values. Technical data may vary for special devices/modules.
"Permissible voltages" are positive or negative DC voltages.

Channels and functions	
Number of channels per device	max. 12
Number of channels per system	max. 96
Total power per device	max. 1800 W
Functions	group addressing and name assignment overcurrent protection undervoltage protection dynamic loads with list function internal measurement data memory discharge function for energy storage tests SCPI programming with measurement function MPP tracking trigger model SyncroLink for trigger synchronization saving and loading device settings watchdog in remote control mode external control and monitor signals via I/O port
Operating modes	
Basic operating modes	CC, CV, CR, CP
Combined operating modes	CC+CV, CP+CV, CR+CV, CP+CC, CR+CC, CV+CC
Setting ranges	module-dependent
User interface	master: 4.3" TFT touch display slave: none
Current rise and fall times	
With fast regulation	module-dependent
With slow regulation	ca. 1 ms
Accuracy of setting values	
Voltage	±0.1 % of setting, ±0.1 % of range
Current	module-dependent
Resistance	module-dependent
Power	module-dependent
Resolution	12 bits
Accuracy of adjustable protective devices	
Overcurrent limitation	module-dependent
Undervoltage protection	±0.2 % of setting ±0.2 % of range
Resolution	12 bits
Accuracy of measurement	
Voltage	±0.1 % of measured value ±0.05 % of range
Current	module-dependent
Resistance	calculated from voltage and current values
Power	calculated from voltage and current values
Resolution	16 bits
Sampling time	100 µs, not triggerable

Display accuracy	
Number of decimal digits	5
Accuracy	Accuracy of the respective measurement ±1 digit of the display value
Dynamic function (LIST)	
Operating modes	CC, CV, CR, CP
Number of load levels	max. 100, with associated ramp and dwell time
Accuracy of load levels	see accuracy of setting
Pulse duration	0.2 ms ... 1000 s
Ramp duration	0 ... 1000 s
Resolution	0.2 ms
Accuracy of setting times	±0.02 %
SyncroLink	
Synchronism between load channels (jitter) of the same system	max. 100 µs
Synchronism between load channels (jitter) to further systems	max. 250 µs
Measurement data acquisition (DAQ) to internal memory	
Accuracy	see accuracy of measurement
Resolution	16 bits
Sampling time	0.2 ms ... 1000 s, resolution 0.2 ms
Measurement data	timestamp, voltage, current
Number of measuring points	max. 500
Settings memory	
Number of memory positions (incl. programmed list)	10, selectable
I/O port: inputs and outputs	
Inputs	Activation state of load inputs sense inputs for all channels analog control signal 0 ... 10 V
Digital input levels	3 ... 30 V
Input resistance of analog inputs	> 10 kΩ
Outputs	Analog monitor outputs 0 ... 10 V for I and U
I/O port: accuracy of analog control 0 ... 10 V	
Voltage	±0.2 % of setting, ±0.1 % of range
Strom	module-dependent
I/O port: accuracy of analog monitor signals 0 ... 10 V	
Voltage	±0.1 % of analog measurement signal, ±15 mV offset
Current	module-dependent
Load capability	min. 2 kΩ

I/O port: permissible voltages	
Vin-io (GND - neg. load input)	max. 2 V
VioPE (GND - PE)	max. 40 V DC
Input	
Input resistance	> 50 kΩ with load input switched off, diode function with reverse polarity up to rated current
Input capacity	module-dependent
Parallel operation	up to 5 channels in analog master-slave mode (hardware-controlled)
Maximum input voltage Umax	module-dependent
Minimum input voltage Umin	module-dependent
Input: permissible voltages	
Uin-PE (neg. load input - PE)	max. ±40 V DC
Uin+PE (pos. load input - PE)	Umax + 40 V DC
Uin-in- (neg. load inputs between the channels)	max. ±40 V DC
Power	
Continuous power	module-dependent
Derating	-1.2 %/°C for Ta > 21 °C
Protection and monitoring	
Protective devices	overcurrent, overpower, overtemperature
Monitoring messages	overvoltage indicator, polarity reversal indicator, undervoltage indicator (if input voltage is too low for set load)
Connections	
Load input	Phoenix Contact PC5/8-STF1-7,62
Sense	37-pin D-sub female connector
Operating conditions	
Operating temperature	5 ... 40 °C
Storage temperature	-25 ... 65 °C
Max. operating height	2000 m above sea level
Pollution degree	2
Overvoltage category of mains	II
Max. Humidity	80 % at 31 °C, decreasing linearly to 50 % at 40 °C
Min. distance rear panel to wall or other objects	70 cm
Cooling	multi-stage air cooling, temperature-controlled, air inlet via the front panel, air outlet via the rear panel, suitable for gapless 19" mounting
Noise	max. 69 dB(A) at distance of 1 m
Mains voltage	1/N/PE AC 100 ... 240 V 50/60 Hz
Mains cable	length max. 3 m, cross-section of mains connection wires min. 1 mm^2
Power consumption	max. 160 VA

Mechanics	
Housing	19", 2 U
Dimensions W x H x D	485 x 109 x 485 mm
Installation depth	470 mm
Installation depth	89 mm
Weight	max. 18.3 kg
Color front panel	RAL7035 (light grey)
Color rear panel	stainless steel
Color cover	RAL7037 (stone grey)
Safety and EMC	
Protection class	1
Measurement category	0
Electrical safety	DIN EN 61010-1 DIN EN 61010-2-30
EMC, CE marking	DIN EN 61326-1 DIN EN 55011 DIN EN 61000-3-2 DIN EN 61000-3-3
Calibration	
Recommended calibration interval	2 years (empirical value as a guideline for the first period of use, can be adjusted depending on the intended use, duration of use, environmental conditions, relevance of the application)
FCC-PMLAxx	factory calibration certificate
Warranty	
Warranty	2 years