Datasheet Series QL



Model	QL10V10C38	H&H © Steller, Department of the Control of the Con
Order no.	27-038-000-01	
Basic operating modes		CC, CP, CR, CV
Standard interfaces		RS-232, USB, LAN, CAN
Voltage range		-10 V 10 V
Current range		-38 A 38 A
Resistance range		0.0132 5.26 Ω
Power		380 W
Rise/fall time CC, CV 1)		120 µs
Bandwidth		3 kHz
Adjustable int. resistance CC ²⁾		0.526 Ω ∞
Adjustable int. resistance CV		0 0.132 Ω
Output terminals rear 3)		BPK4-60L
Power consumption		765 VA
Mains voltage ⁴⁾		1/N/PE AC 230 V 50 60 Hz
Mains voltage toggleable		1/N/PE AC 115 V 50 60 Hz
Noise max. ca. ⁵⁾		67 dB(A)
Weight ca.		23 kg
Housing 6)		19" - 3 U

- 1. Rise and fall times are from 10 ... 90 % and 90 ... 10 % of the positive current or voltage setting range in "fast" regulation speed. Tolerance ±20 %. Measured with short-circuited output terminals (current) or with open output terminals (voltage). Other loads may increase rise times. Rise/fall time in "slow" regulation speed: approx. 2 ms.
- 2. Value is entered as conductance in S.
- 3. BPK4-30L: Touch-protected binding posts for 4 mm laboratory jacks and stripped wires with diameter up to 4 mm, max. 30 A BPK4-60L: Touch-protected binding posts for 4 mm laboratory jacks and stripped wires with diameter up to 6 mm, max. 60 A FKS25/10-SM10: Flat copper bars 25 x 10 mm vertical with hole for screw M10
- 4. Mains voltage tolerance: ±10 %.
- 5. Measured on the front from distance of 1 m.
- 6. 1 U = 44.45 mm.

QL Series **Technical Data**

Basic operating modes CC+CV, CV+CV, CP+CV, CR+CV COmbined operating modes CC+CV, CV+CV, CP+CV, CR+CV DC source-sink energy storage device test internal resistance measurement list function adjustable internal resistance expactance simulation function rectangular function (salo in PWM mode) modulation (sine, triangle, square, arbitrary) data acquisition (internally or to USB (fash drive) save and recall of device settings watchdog in remote operation AC source (only 40 models) AC source (only 40 in CC, CV mode (sine, triangular, square, sawtooth, arbitrary range values are peak values for V and I adjustable offset Frequency range 10 C. The MHz, also mains synchronizable User interface 4, 3° TFT touch display Accuracy of setting 0C Current 20.2 % ±0.05 % Current 20.2 % ±0.05 % Essistance (at MI - 5 % of positive voltage range) Fower (at MI and III - 30 % of corresponde to the corresponder to the corresponding positive range to the corresponder to the corresponding positive range to the corresponding positive	Operating modes, fund	es, functions			
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Ext. control signal ±0.2 % ±0.1 % Resistance is calculated from current and voltage Power is calculated from current and voltage Resolution 15 bits in each quadrant Sampling time 200 µs, triggerable Accuracy of measurement AC of measured value (real value) of corresponding positive range Voltage (RMS) ±0.5 % ±0.1 % Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement Accuracy of display No. of dec. places 4					
Resistance is calculated from current and voltage Power is calculated from current and voltage Resolution 15 bits in each quadrant Sampling time 200 µs, triggerable Accuracy of measurement AC of measured value (real value) of corresponding positive range Voltage (RMS) ±0.5 % ±0.1 % Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement Accuracy of display No. of dec. places 4	Ext. control signal	±0.2 %	±0.1 %		
Resolution 15 bits in each quadrant Sampling time 200 µs, triggerable Accuracy of measurement AC of measured value (real value) of corresponding positive range Voltage (RMS) ±0.5 % ±0.1 % Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4		is calculated from current a	nd voltage		
Sampling time 200 μs, triggerable Accuracy of measurement AC of measured value (real value) of corresponding positive range Voltage (RMS) ±0.5 % ±0.1 % Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4	Power	*			
Accuracy of measurement AC of measured value (real value) of corresponding positive range Voltage (RMS) ±0.5 % ±0.1 % Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4	Resolution	*			
of measured value (real value) of corresponding positive range Voltage (RMS) ±0.5 % ±0.1 % Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4	Sampling time	200 μs, triggerable			
Voltage (RMS) ±0.5 % ±0.1 % Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4	Accuracy of measurement AC				
Current (RMS) ±0.5 % ±0.1 % Time constant of RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4					
Time constant of RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4					
RMS measurement ca. 500 ms Accuracy of display No. of dec. places 4		±0.5 %	±0.1 %		
No. of dec. places 4		ca. 500 ms			
	Accuracy of display				
Accuracy of measurement DC/AC ±1 digit of display value	No. of dec. places	4			
accuracy of measurement bor Ac ±1 digit of dispidy value	Accuracy	accuracy of measurement D	OC/AC ±1 digit of display value		

Accuracy of trigger vo	ltage and current		
Trigger voltage	±1 % of positive voltage range		
Trigger current	±1 % of positive current range		
Sampling time	200 μs		
Dynamic function LIST			
Operating modes	CC, CV, CR, CP		
No. of settings	max. 300, with corresponding ramp, dwell and sample times		
Dwell time 1)	200 μs 1,000 s		
Ramp time 1)	0 1,000 s		
Resolution	200 μs		
Accuracy of setting times	±0.02 %		
Delay at triggered start	max. 300 μs		
Dynamic function rect	angular		
Operating modes	CC, CV		
No. of levels	2		
Pulse times ¹⁾ , resolution	1 μs 9,999.999 ms, resolution 1 μs		
Accuracy of setting times	±0.02 %		
Dynamic function PWN	4		
Operating modes	CC, CV		
No. of levels	2		
Frequency 1), resolution	0.1 Hz 10 kHz, resolution 0.1 Hz		
Accuracy of frequency	±0.02 %		
Duty cycle, resol.	1 99 %, resolution 1 %		
Dynamic function mod	lulation		
Operating modes	CC, CV		
Waveforms	Sine, square, triangular, arbitrary (1,024 points)		
Frequency 1), resol.	0.1 Hz 10 kHz, resolution 0.1 Hz		
Accuracy of frequency	±0.01 %		
Modulation depth	0 100 %		
Capacitance simulatio	function		
Capacitance	10 mF 99999,99 F		
Data acquisition			
to external USB flash dri	10		
Sampling time	0.1 30.0 s, resolution 0.1 s		
Measurement data	timestamp, voltage, current		
No. of measurement			
points	limited by flash drive memory capacity		
File format	.csv		
to internal memory			
Sampling time	200 μs 1,000 s, resolution 200 μs, synchronized with dynamic function		
Measurement data	timestamp, voltage, current		
No. of meas. points	max. 40,000		
Settings memory	Settings memory		
No. of memory positions	9, selectable (incl. programmed list) 1 for last device settings at power-off or power failure		
I/O port: inputs and outputs			
Inputs	analog setting I and V with -5 0 5 V or -10 0 10 V analog protection setting I or V with -10 0 10 V output activation operating mode CC/CV control speed selection slow/fast remote shut-down		

readable digital input (by SCPI command)

control input (activates I/O port)

trigger input

The specified accuracies refer to an ambient temperature of 23 ±5 °C. The specified accuracies are valid when the sense lines are connected. At voltages with higher disturbance values the accuracy can change for the worse.

1. The applicable time or frequency range is limited by the bandwidth of the respective device.

2. at 50 ... 60 Hz

3. only -10 V ... 0 ... 10 V

- positive/negative DC voltage or RMS value of a sinusoidal AC voltage

Technical Data

Digital input level	logical low: 0 0.8 V, logical high: 3 30 V			
Outputs	analog voltage monitor output -10 0 10 V analog current monitor output -10 0 10 V output activation state status output for upper protection value V or I status output for lower protection value V or I trigger output			
Digital output level	logical low: 0 0.8 V logical high: 5 V/24 V selectable, max. 10 mA (push-pull)			
I/O port: accuracy of ana	alog control -5 0 5 V or -1	10	0 10 V	
	of setting	of	corresponding positive range	
Voltage	±0.2 %	±C	0.1 %	
Current	±0.2 %	±C	0.1 %	
Resistance (at V > 5 % of positive voltage range)	±1.6 %	±C).4 % of current range	
Power (at V and I > 30 % of corresp. pos. range) (at V and I > 5 % and < 30 % of corresp. pos. range)	±0.55 % ±0.9 %		0.2 % 0.35 %	
Current protection ³⁾	±1 %	±0.4 %		
Voltage protection ³⁾	±1 %	±0.4 %		
	input resistance of analog	inp	outs >10 kΩ	
I/O port: accuracy of ana	alog monitor outputs -10 0	1	0 V	
	of analog signal of actual value	off	fset voltage	
Voltage	±0.2 %	±15 mV		
Current	±0.2 %	±15 mV		
	permissible load > 2 kΩ			
I/O port: permissible vol	tages			
	standard I/O port		isolated I/O port (option QLO6)	
Vout-io (GND - neg. output)	max. 2 V ⁴⁾		max. 125 V ⁴⁾	

VioPE (GND - PE)		- PE)	max. 125 V ⁴⁾		max. 125 V ⁴⁾		
		USB RS-	232 LAN CAN GPI	B Output		Vout+PE	_
			Output -		- 1	Vmax	_
	Vmax	Sense + Sense -	Source-S			Vout-PE VioPE	Vout-io
	(•	I/O port	GND/			_
					_		

Max. output voltage Vmax	see model overview			
Min. output voltage Vmin	see model overview			
Output: permissible voltages				
	standard I/O port	isolated I/O port (option QLO6)		
Vout-PE (neg. output - PE)	max. 125 V ⁴⁾	max. 125 V ⁴⁾		
Vout+PE (pos. output - PE)	Vmax + max. 125 V ⁴⁾	Vmax + max. 125 V ⁴⁾		
Power				
Nominal power	see model overview (at Ta = 21 °C)			
Derating	-1.2 %/°C for Ta > 21 °C			

>50 k Ω when output is off

Protection and monitoring			
Protective devices	overcurrent overtemperature		
Monitoring	overvoltage indication		
Terminals			
Output	see model overview		
Sense	PH4/3.5-ST8, see starting at page 123		
Operating conditions			
Operating tempe- rature	5 40 °C		
Stock temperature	-25 65 °C		
Max. operating height	2,000 m above sea level		
Pollution degree	2		
Overvoltage category of mains	п		
Max. humidity	80 % at 31 °C, linear decreasing to 50 % at 40 °C		
Min. distance rear panel to wall or other objects	70 cm		
Cooling	temperature-controlled air cooling		
Noise, weight	see model overview		
Mains voltage	see model overview		
Mains cable	length max. 3 m cross-section of mains leads min. 1 mm²		
Power consumption	see model overview		
Housing			

Size	see model overview	
Color front rear top, side panels	RAL7035 (light grey) stainless steel RAL7037 (dusty grey)	
Safety and EMC		
Protection class	1	
Measuring category	O (CAT I according to EN 61010:2004)	
Electrical safety	DIN EN 61010-1 DIN EN 61010-2-030	
EMC	DIN EN 61326-1 DIN EN 55011 DIN EN 61000-3-2 DIN EN 61000-3-3	
Standard interfaces		
Data interfaces	RS-232, USB, LAN, CAN	
I/O port	standard (not isolated)	
Available options		
Data interface QL02	GPIB	
Hardware extensions QL06 QL14	galvanically isolated I/O port heavy-weight castors for models from 5 U	
Calibration, warranty		
FCC-QLxx	Factory Calibration Certificate, twice for free after registration	
Recommended cali- bration interval	2 years	
Warranty	2 years	

Technical data of production series B, rev. 6. Subject to technical changes without notice.

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- The applicable time or frequency range is limited by the bandwidth of the respective device. at 50 ... 60 Hz only $-10\,V$... 0 ... 10 V positive/negative DC voltage or RMS value of a sinusoidal AC voltage

Output

Output resistance

