

# SmartSolar Charge Controllers with load output

## MPPT 75/10, 75/15, 100/15, 100/20-48V

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SmartSolar Charge Controller  
MPPT 75/15



Bluetooth sensing  
Smart Battery Sense



Bluetooth sensing  
BMV-712 Smart Battery Monitor



### Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

### VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

### Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a clouded sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

### Load output

Over-discharge of the battery can be prevented by connecting all loads to the load output. The load output will disconnect the load when the battery has been discharged to a pre-set voltage (48V model: interface with a relay).

Alternatively, an intelligent battery management algorithm can be chosen: see Battery Life.

The load output is short circuit proof.

### Battery Life: intelligent battery management

When a solar charge controller is not able to recharge the battery to its full capacity within one day, the result is often that the battery will continually be cycled between a 'partially charged' state and the 'end of discharge' state. This mode of operation (no regular full recharge) will destroy a lead-acid battery within weeks or months.

The Battery Life algorithm will monitor the state of charge of the battery and, if needed, day by day slightly increase the load disconnect level (i.e. disconnect the load earlier) until the harvested solar energy is sufficient to recharge the battery to nearly the full 100%. From that point onwards, the load disconnect level will be modulated so that a nearly 100% recharge is achieved about once every week.

### Programmable battery charge algorithm

See the software section on our website for details

### Day/night timing and light dimming option

See the software section on our website for details

### Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

### Optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense or a BMV-712 Smart Battery Monitor can be used to communicate battery voltage and temperature to one or more SmartSolar Charge Controllers.

### Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

SmartSolar Charge Controller	MPPT 75/10	MPPT 75/15	MPPT 100/15	MPPT 100/20-48V
Battery voltage (auto select)		12/24V		12/24/48V
Rated charge current	10A	15A	15A	20A
Nominal PV power, 12V 1a,b)	145W	220W	220W	290W
Nominal PV power, 24V 1a,b)	290W	440W	440W	580W
Nominal PV power, 48V 1a,b)	n. a.	n. a.	n. a.	1160W
Max. PV short circuit current 2)	13A	15A	15A	20A
Automatic load disconnect		Yes		
Max. PV open circuit voltage	75V			100V
Peak efficiency		98%		
Self-consumption – load on		12V: 19 mA 24V: 16 mA		26 / 20 / 19 mA
Self-consumption – load off		12V: 10 mA 24V: 8 mA		10 / 8 / 7 mA
Charge voltage 'absorption'		14,4V / 28,8V (adjustable)		14,4V / 28,8V / 57,6V (adj.)
Charge voltage 'float'		13,8V / 27,6V (adjustable)		13,8V / 27,6V / 55,2V (adj.)
Charge algorithm		multi-stage adaptive		
Temperature compensation		-16 mV / °C resp. -32 mV / °C		
Max. continuous load current		15A		20A / 20A / 1A
Low voltage load disconnect		11,1V / 22,2V / 44,4V or 11,8V / 23,6V / 47,2V or Battery Life algorithm		
Low voltage load reconnect		13,1V / 26,2V / 52,4V or 14V / 28V / 56V or Battery Life algorithm		
Protection		Output short circuit / Over temperature		
Operating temperature		-30 to +60°C (full rated output up to 40°C)		
Humidity		95%, non-condensing		
Data communication port		VE.Direct (see the data communication white paper on our website)		

### ENCLOSURE

Colour	Blue (RAL 5012)		
Power terminals	6 mm <sup>2</sup> / AWG10		
Protection category	IP43 (electronic components), IP22 (connection area)		
Weight	0,5 kg	0,6 kg	0,65 kg
Dimensions (h x w x d)	100 x 113 x 40 mm	100 x 113 x 50 mm	100 x 113 x 60 mm

### STANDARDS

Safety	EN/IEC 62109-1, UL 1741, CSA C22.2		
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1a) If more PV power is connected, the controller will limit input power.

1b) The PV voltage must exceed Vbat + 5V for the controller to start.

Thereafter the minimum PV voltage is Vbat + 1V

2) A PV array with a higher short circuit current may damage the controller.

# SmartSolar Charge Controllers MPPT 100/30 & 100/50

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**SmartSolar Charge Controller  
MPPT 100/50**



**Bluetooth sensing  
Smart Battery Sense**



**Bluetooth sensing  
BMV-712 Smart Battery Monitor**



### Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

### VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

### Ultrafast Maximum Power Point Tracking (MPPT)

Especially in case of a clouded sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

### Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points may be present on the power-voltage curve. Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative BlueSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

### Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 98%.

The full output current up to 40°C (104°F).

### Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

### Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

### Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

### Optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense or a BMV-712 Smart Battery Monitor can be used to communicate battery voltage and temperature to one or more SmartSolar Charge Controllers.

### Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

SmartSolar Charge Controller	MPPT 100/30	MPPT 100/50
Battery voltage	12/24V Auto Select	
Rated charge current	30A	50A
Nominal PV power, 12V 1a,b)	440W	700W
Nominal PV power, 24V 1a,b)	880W	1400W
Maximum PV open circuit voltage	100V	100V
Max. PV short circuit current 2)	35A	60A
Maximum efficiency	98%	98%
Self-consumption	12V: 30 mA 24V: 20 mA	
Charge voltage 'absorption'	Default setting: 14,4V / 28,8V (adjustable)	
Charge voltage 'float'	Default setting: 13,8V / 27,6V (adjustable)	
Charge algorithm	multi-stage adaptive	
Temperature compensation	-16 mV / °C resp. -32 mV / °C	
Protection	PV reverse polarity Output short circuit Over temperature	
Operating temperature	-30 to +60°C (full rated output up to 40°C)	
Humidity	95%, non-condensing	
Data communication port	VE.Direct See the data communication white paper on our website	
<b>ENCLOSURE</b>		
Colour	Blue (RAL 5012)	
Power terminals	16 mm <sup>2</sup> / AWG6	
Protection category	IP43 (electronic components), IP22 (connection area)	
Weight	1,3 kg	
Dimensions (h x w x d)	130 x 186 x 70 mm	
<b>STANDARDS</b>		
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2	
1a) If more PV power is connected, the controller will limit input power.		
1b) The PV voltage must exceed Vbat + 5V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1V.		
2) A PV array with a higher short circuit current may damage the controller.		

# SmartSolar Charge Controller MPPT 150/35 & 150/45



**SmartSolar Charge Controller  
MPPT 150/35**



**Bluetooth sensing  
Smart Battery Sense**



**Bluetooth sensing  
BMW-712 Smart Battery Monitor**



### Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

### VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

### Ultrafast Maximum Power Point Tracking (MPPT)

Especially in case of a cloudy sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

### Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points may be present on the power-voltage curve. Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative BlueSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

### Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 98%. Full output current up to 40°C (104°F).

### Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight preprogrammed algorithms, selectable with a rotary switch (see manual for details).

### Extensive electronic protection

- Over-temperature protection and power derating when temperature is high.
- PV short circuit and PV reverse polarity protection.
- PV reverse current protection.

### Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

### Optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense or a BMV-712 Smart Battery Monitor can be used to communicate battery voltage and temperature to one or more SmartSolar Charge Controllers.

### Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

SmartSolar Charge Controller	MPPT 150/35	MPPT 150/45
Battery voltage	12 / 24 / 48V Auto Select (software tool needed to select 36V)	
Rated charge current	35A	45A
Nominal PV power 1a, b)	35A 12V: 500W / 24V: 1000W / 36V: 1500W / 48V: 2000W 45A 12V: 650W / 24V: 1300W / 36V: 1950W / 48V: 2600W	
Max. PV short circuit current 2)	40A	50A
Maximum PV open circuit voltage	150V absolute maximum coldest conditions 145V start-up and operating maximum	
Maximum efficiency	98%	
Self-consumption	12V: 20mA 24V: 15mA 48V: 10mA	
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6V (adjustable)	
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2V (adjustable)	
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms)	
Temperature compensation	-16 mV / -32 mV / -64 mV / °C	
Protection	PV reverse polarity / output short circuit / over-temperature	
Operating temperature	-30 to +60°C (full rated output up to 40°C)	
Humidity	95%, non-condensing	
Data communication port	VE.Direct See the data communication white paper on our website	
<b>ENCLOSURE</b>		
Colour	Blue (RAL 5012)	
Power terminals	16 mm <sup>2</sup> / AWG6	
Protection category	IP43 (electronic components), IP22 (connection area)	
Weight	1,25 kg	
Dimensions (h x w x d)	130 x 186 x 70 mm	
<b>STANDARDS</b>		
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2	
1a) If more PV power is connected, the controller will limit input power. 1b) The PV voltage must exceed Vbat + 5V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1V. 2) A PV array with a higher short circuit current may damage the controller.		

# SmartSolar Charge Controllers with screw- or MC4 PV connection

## MPPT 150/45 up to MPPT 150/70



**SmartSolar Charge Controller  
MPPT 150/70-Tr  
without optional display**



**SmartSolar Charge Controller  
MPPT 150/70-Tr  
without optional display**



**Bluetooth sensing:  
Smart Battery Sense**



**Bluetooth sensing:  
BMV-712 Smart Battery Monitor**



**Bluetooth sensing: SmartShunt**

### Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

### Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a cloudy sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30% compared to PWM charge controllers and by up to 10% compared to slower MPPT controllers.

### Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points (MPP) may be present on the power-voltage curve.

Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

### Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 98%.

### Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

### Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

### Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

### Optional external battery voltage, temperature and current sensing via Bluetooth

A Smart Battery Sense, a BMV-712 Smart Battery Monitor or a SmartShunt can be used to communicate battery voltage and temperature (and current, in case of a BMV 712 or a SmartShunt) to one or more SmartSolar Charge Controllers.

### Synchronized parallel charging with Bluetooth

Up to 10 units can be synchronized with Bluetooth.

### Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

### VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

### Remote on-off

To connect for example to a VE.BUS BMS.

### Programmable relay

Can be programmed to trip on an alarm, or other events.

### Optional: SmartSolar pluggable LCD display

Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.



**SmartSolar pluggable display**



SmartSolar Charge Controller	150/45	150/60	150/70
Battery voltage	12 / 24 / 48V Auto Select (software tool needed to select 36V)		
Rated charge current	45A	60A	70A
Nominal PV power, 12V 1a,b)	650W	860W	1000W
Nominal PV power, 24V 1a,b)	1300W	1720W	2000W
Nominal PV power, 36V 1a,b)	1950W	2580W	3000W
Nominal PV power, 48V 1a,b)	2600W	3440W	4000W
Max. PV short circuit current 2)	50A (max 30A per MC4 conn.)		
Maximum PV open circuit voltage	150V absolute maximum coldest conditions 145V start-up and operating maximum		
Maximum efficiency	98%		
Self-consumption	Less than 35mA @ 12V / 20mA @ 48V		
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)		
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2V (adjustable: rotary switch, display, VE.Direct or Bluetooth)		
Charge voltage 'equalization'	Default setting: 16,2V / 32,4V / 48,6V / 64,8V (adjustable)		
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms) or user defined algorithm		
Temperature compensation	-16 mV / -32 mV / -64 mV / °C		
Protection	PV reverse polarity / Output short circuit / Over temperature		
Operating temperature	-30 to +60°C (full rated output up to 40°C)		
Humidity	95%, non-condensing		
Maximum altitude	5000m (full rated output up to 2000m)		
Environmental condition	Indoor, unconditioned		
Pollution degree	PD3		
Data communication port	VE.Direct or Bluetooth		
Remote on/off	Yes (2 pole connector)		
Programmable relay	DPST AC rating: 240VAC / 4A DC rating: 4A up to 35VDC, 1A up to 60VDC		
Parallel operation	Yes: up to 10 units can be synchronized with Bluetooth		
<b>ENCLOSURE</b>			
Colour	Blue (RAL 5012)		
PV terminals 3)	35 mm <sup>2</sup> / AWG2 (Tr models) Two pairs of MC4 connectors (MC4 models)		
Battery terminals	35mm <sup>2</sup> / AWG2		
Protection category	IP43 (electronic components), IP22 (connection area)		
Weight	3 kg		
Dimensions (h x w x d)	Tr models: 185 x 250 x 95 mm MC4 models: 215 x 250 x 95 mm		
<b>STANDARDS</b>			
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2		
<p>1a) If more PV power is connected, the controller will limit input power.  1b) The PV voltage must exceed Vbat + 5V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1V.  2) A PV array with a higher short circuit current may damage the controller.  3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels  Maximum current per MC4 connector: 30A (the MC4 connectors are parallel connected to one MPPT tracker)</p>			

# SmartSolar Charge Controllers with screw- or MC4 PV connection

## MPPT 250/60 and MPPT 250/70



**SmartSolar Charge Controller  
MPPT 250/70-Tr  
with optional pluggable display**



**SmartSolar Charge Controller  
MPPT 250/70-MC4  
without display**



**Bluetooth sensing:  
Smart Battery Sense**



**Bluetooth sensing:  
BMV-712 Smart Battery Monitor**



**Bluetooth sensing: SmartShunt**

### Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

### Ultra-fast Maximum Power Point Tracking (MPPT)

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The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

### Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 99%.

### Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

### Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

### Internal temperature sensor and optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense, a BMV-712 Smart Battery Monitor or a SmartShunt can be used to communicate battery voltage and temperature (and current, in case of a BMV 712 or a SmartShunt) to one or more SmartSolar Charge Controllers

### Synchronized parallel charging with Bluetooth

Up to 10 units can be synchronized with Bluetooth.

### Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

### VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

### Remote on-off

To connect for example to a VE.BUS BMS.

### Programmable relay

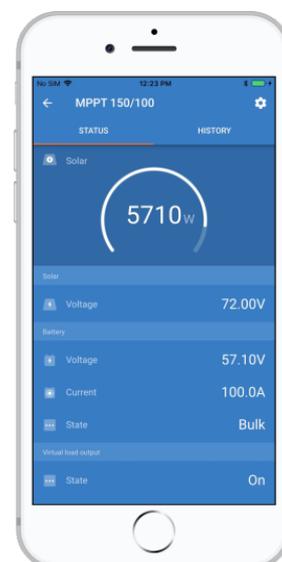
Can be programmed (a.o. with a smartphone) to trip on an alarm, or other events.

### Optional: SmartSolar pluggable LCD display

Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.



**SmartSolar pluggable display**



SmartSolar Charge Controller	250/60	250/70
Battery voltage	12 / 24 / 48V Auto Select (software tool needed to select 36V)	
Rated charge current	60A	70A
Nominal PV power, 12V 1a,b)	860W	1000W
Nominal PV power, 24V 1a,b)	1720W	2000W
Nominal PV power, 36V 1a,b)	2580W	3000W
Nominal PV power, 48V 1a,b)	3440W	4000W
Max. PV short circuit current 2)	35A (max 30A per MC4 conn.)	
Maximum PV open circuit voltage	250V absolute maximum coldest conditions 245V start-up and operating maximum	
Maximum efficiency	99%	
Self-consumption	Less than 35mA @ 12V / 20mA @ 48V	
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)	
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2V (adjustable: rotary switch, display, VE.Direct or Bluetooth)	
Charge voltage 'equalization'	Default setting: 16,2V / 32,4V / 48,6V / 64,8V (adjustable)	
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms) or user defined algorithm	
Temperature compensation	-16 mV / -32 mV / -64 mV / °C	
Protection	PV reverse polarity / Output short circuit / Over temperature	
Operating temperature	-30 to +60°C (full rated output up to 40°C)	
Humidity	95%, non-condensing	
Maximum altitude	5000m (full rated output up to 2000m)	
Environmental condition	Indoor, unconditioned	
Pollution degree	PD3	
Data communication port	VE.Direct or Bluetooth	
Remote on/off	Yes (2 pole connector)	
Programmable relay	DPST AC rating: 240VAC / 4A DC rating: 4A up to 35VDC, 1A up to 60VDC	
Parallel operation	Yes: up to 10 units can be synchronized with Bluetooth	
<b>ENCLOSURE</b>		
Colour	Blue (RAL 5012)	
PV terminals 3)	35 mm <sup>2</sup> / AWG2 (Tr models) Two pairs of MC4 connectors (MC4 models)	
Battery terminals	35mm <sup>2</sup> / AWG2	
Protection category	IP43 (electronic components), IP22 (connection area)	
Weight	3 kg	
Dimensions (h x w x d)	Tr models: 185 x 250 x 95 mm MC4 models: 215 x 250 x 95 mm	
<b>STANDARDS</b>		
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2	
<p>1a) If more PV power is connected, the controller will limit input power.  1b) The PV voltage must exceed Vbat + 5V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1V.  2) A PV array with a higher short circuit current may damage the controller.  3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels  Maximum current per MC4 connector: 30A (the MC4 connectors are parallel connected to one MPPT tracker)</p>		