

**MPC20**



SAMLEX EUROPE<sup>®</sup> B.V.

# **Multi Purpose Converter – 20A**

**Owners Manual**

**Please read this manual before operating your converter**

## **OWNER'S MANUAL | Index**

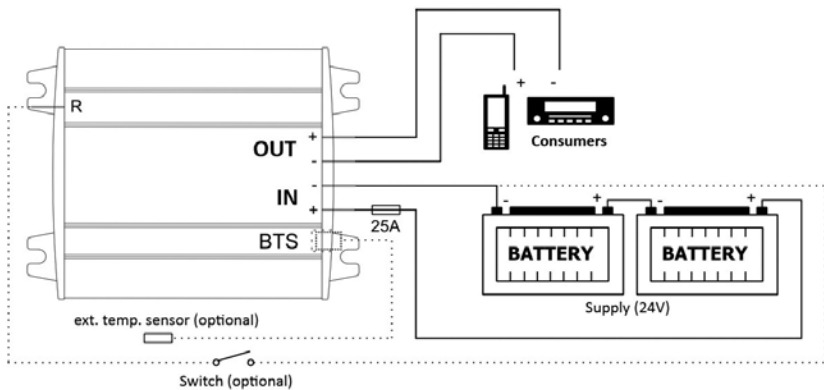
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## SECTION 1 | Features

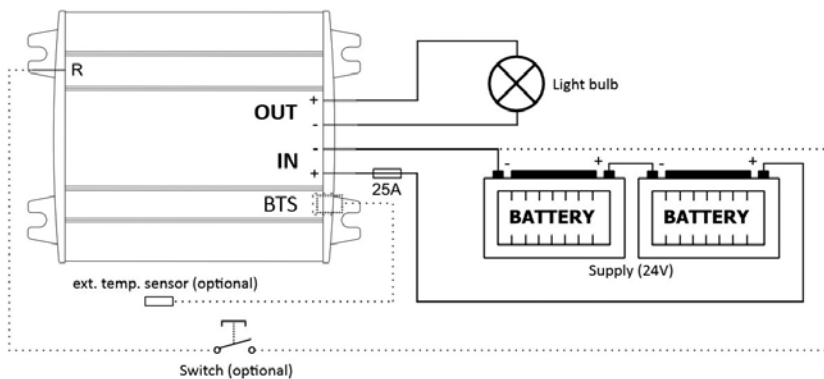
- Converter (24.0V DC → 13.6V DC)
- Charger (VRLA, GEL, AGM, Traction, Li-ion)
- Dimmer (24.0V DC → [4.0 ... 12.0V DC])
- Dimmer (24.0V DC → [8.0 ... 24.0V DC])

## SECTION 2 | Wiring Diagram

### 2.1 CONVERTOR

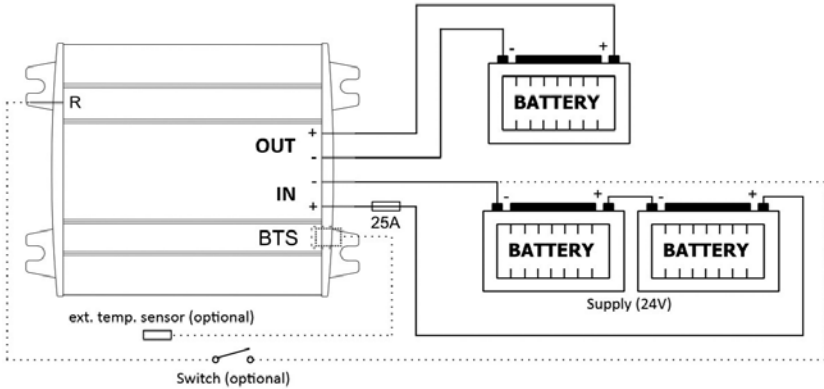


### 2.2 DIMMER



## SECTION 2 | Wiring Diagram

### 2.3 CHARGER



## SECTION 3 | Installation

1. Connect the positive (+) of the load to the "OUT+" of the MPC20.
2. Connect the negative (-) of the load to the "OUT -" of the MPC20.
3. Connect the positive (+) of the power to the input (+) of the MPC20.
4. Connect the negative (-) of the power to the input (-) of the MPC20.



#### CAUTION!

The remote input switch and the external temperature sensor can be connected/disconnected at any time. As a result the MPC20 will simply carry on working.



#### WARNING!

- The product should only be connected by skilled fitters/mechanics, who are aware of the regulations for working with high battery voltages.
- The use of poor quality connection materials and/or insufficient diameter cables may result in damage to the product.
- A short circuit between the positive and negative terminals of the battery may cause severe damage to your system.
- Always use fuses.

## SECTION 4 | Operation

The MPC20 can function as 4 different products: converter, dimmer 12V, dimmer 24V and charger. New out of the box it will function as a standard converter. By changing the position of the dip switches this can be changed by the user. Refer to the chapter “Dip switch settings” for more information.

### 4.1 CONVERTOR

The moment the MPC20 is connected, the output will immediately carry 13.6V.

#### 4.1.1 LED

**Converter is active:** LED is green.

**Converter is inactive:** LED is red.

**Converter has a fault:** LED flashes red.

#### 4.1.2 Remote

The converter can be switched off by connecting the Remote input (R) to the “IN-” of the MPC20.

#### 4.1.3 Output current

If the output voltage gets below 4.0V for more than 1 second – for example if it is overloaded or short-circuited – the maximum current is set to 5.0A. As soon as the voltage rises above 4.0V once more, the maximum current will again be set to 20.0A.

### 4.2 DIMMER 12V

In the Dimmer 12V setting the output voltage of the MPC20 can be set from 4.0V to 12.0V. The dimmer will be active the moment the MPC20 – with the right dip switch settings – is connected to the power supply.

#### 4.2.1 LED

**Dimmer is active:** LED is green. Flashes with a duty cycle of 50%. Period time is variable from 2 sec. at 4.0V to 0.5 sec. at 12.0V.

**Dimmer is inactive:** LED is red.

**Dimmer has a fault:** LED flashes red.

## SECTION 4 | Operation

### 4.2.2 Remote

When the Remote input (R) is connected to the “IN–” for more than 1 second, the dimmer will start to operate. The output voltage will slowly decrease until 4.0V is reached. The dimmer will now remain at 4.0V for 1 second and then slowly increase again to 12.0V. If during this process the connection between the “IN–” and the Remote is broken, the voltage that is carried at that moment on the output will remain.

If the remote input is connected to the “IN–” for a short period of time (less than 1 second), the dimmer will be inactive: 0.0V is carried on the output. If this is repeated, the dimmer becomes active once more: the voltage that was last set will be carried on the output.

### 4.3 DIMMER 24V

In the Dimmer 24V setting the output voltage of the MPC20 can be set from 8.0V to 24.0V. The dimmer will be active the moment the MPC20 – with the right dip switch settings – is connected to the power supply.

#### 4.3.1 LED

**Dimmer is active:** LED is green. Flashes with a duty cycle of 50%. Period time is variable from 2 sec. at 8.0V to 0.5 sec. at 24.0V.

**Dimmer is inactive:** LED is red.

**Dimmer has a fault:** LED flashes red.

### 4.3.2 Remote

When the Remote input (R) is connected to the “IN–” for more than 1 second, the dimmer will start to operate. The output voltage will slowly decrease until 8.0V is reached. The dimmer will now remain at 8.0V for 1 second and then slowly increase again to 24.0V. If during this process the connection between the “IN–” and the Remote is broken, the voltage that is carried at that moment on the output will remain.

If the remote input is connected to the “IN–” for a short period of time (less than 1 second), the dimmer will be inactive: 0.0V is carried on the output. If this is done again, the dimmer becomes active once more: the voltage that was last set will be carried on the output.

## SECTION 4 | Operation

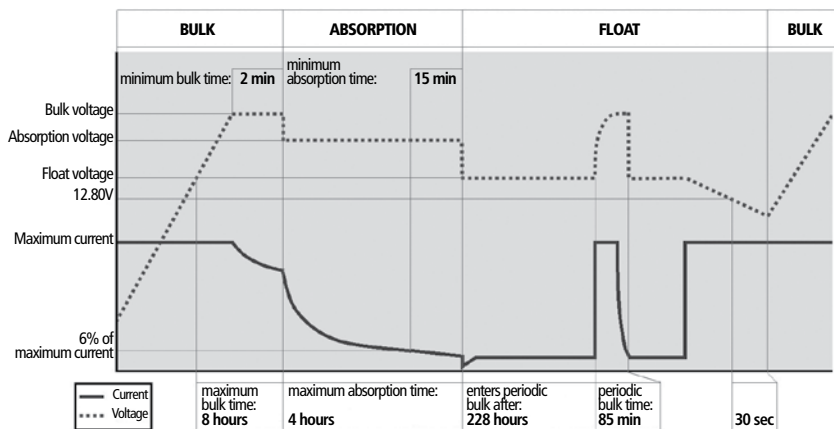
### 4.4 CHARGER

For charging a battery the MPC20 makes use of a three-step load protocol. The voltages in the below description apply to a VRLA battery. For the voltages of the other types of batteries, the relevant table should be consulted.

MODE	DESCRIPTION
Start	The MPC20 will always start in Bulk mode.
Bulk	The bulk voltage is 14.40V and is not temperature compensated. If the battery voltage is equal to or higher than 14.40V (bulk voltage), a minimum bulk timer of 2 minutes will be started. After this time the charger goes into Absorption mode. If the battery voltage is equal to or higher than 13.25V (float voltage), a maximum bulk timer of 8 hours will be started. After this time the charger goes into Absorption mode.
Absorption	The absorption voltage is 14.25V and is temperature compensated. If the measured output current gets below 6% of the maximum current for 1 minute, then the minimum absorption timer of 15 minutes will have to be set. As soon as this is finished, the charger will enter Float mode. (The maximum current is 20.0A, 6% of this is 1.2A). When starting the Absorption mode, the maximum absorption timer of 4 hours is set. As soon as this is finished, the charger will enter Float mode.
Float	The float voltage is 13.25V and is temperature compensated. If the battery voltage is lower than 12.80V, then the charger enters Bulk mode. When the Float mode is started, a maximum float timer of 228 hours will start. As soon as this has finished, the charger enters (periodic) Bulk mode for 85 minutes.

## SECTION 4 | Operation

### 4.4.1 Charging graph



### 4.4.2 Battery types and associated (charger) voltage values

Battery type	Charger voltages		
	BULK	ABSORPTION	FLOAT
VRLA	14.40V	14.25V	13.25V
GEL	14.40V	14.25V	13.80V
AGM	14.40V	14.25V	13.80V
Traction	14.60V	14.45V	13.25V
Li-ion	14.40V	14.40V	13.30V
	Temperature compensated*		

\*) Refer to the paragraph "Temperature compensation" for further explanation and a graphical representation of the temperature compensation.

### 4.4.3 Temperature safety

If the external temperature reaches above +55°C or below -20°C, the charger will have a fixed output of 11.5V, irrespective of the mode the charger is in at that moment.



## SECTION 4 | Operation

### 4.4.4 Temperature compensation

The absorption and float voltages of the charger have to be temperature compensated. If the external temperature sensor is not connected, it is assumed that the external temperature is 25°C.

Two rules apply for the temperature compensation:

1. The temperature compensation occurs with  $-30\text{mV}/^\circ\text{C}$  (with  $0\text{mV}$  at  $+25^\circ\text{C}$ ).
2. The absorption and float voltages never go above the bulk voltage.

### 4.4.5 LED

**Charger in Bulk:** LED flashes green 1x.

**Charger in Absorption:** LED flashes green 2x.

**Charger in Float:** LED is green.

**Charger inactive:** LED is red.

**Charger has a fault:** LED flashes red.

### 4.4.6 Remote

The charger can be switched off by connecting the Remote input (R) to the "IN-" of the MPC20.

### 4.4.7 Output current

If the output voltage gets below 4.0V for more than 1 second – for example if it is overloaded or short-circuited – the maximum current is set to 5.0A. As soon as the voltage gets above 4.0V once more, the maximum current will again be set to 20.0A.

## SECTION 5 | Faults

For all modes there are four different variables that can cause a fault situation.

	Cause	Reset
Input voltage	Input voltage below 18.0V or above 35.0V for more than 0.5 sec.	Input voltage between 18.5V and 34.5V for 0.5 sec.
Output voltage	Output voltage below 2.0V for 0.5 sec.	30 seconds after activation.
Internal temperature	Temperature on the PCB above +75°C for 0.5 sec.	Temperature on the PCB below +70°C for 0.5 sec.
External temperature	(Any connected) external temperature below -30°C or above +65°C for 0.5 sec.	External temperature above -25°C and below +60°C for 0.5 sec.

*NB: If a fault is reset whilst another is still active, the MPC20 will not become active. This occurs the moment all faults have been resolved.*

## SECTION 6 | Dip Switch Settings

The dip switches are used to apply settings to the MPC20. Dip switch 1 and 2 are responsible for setting 1 of the 4 main functions. If the user chooses to use the MPC20 as charger, then the other three dip switches can be used to set the type of battery. When the DIP switch settings are changed, the MPC20 will switch off its output. It will take another  $\pm 15$  seconds after the last made change before the selected mode will be activated. This period is needed to, for example, prevent any overvoltage on the output.

## SECTION 6 | Dip Switch Settings

Operation	Dip switch settings					Type of battery
	1	2	3	4	5	
Converter	off	off	N/A	N/A	N/A	N/A
Dimmer 12V	off	on	N/A	N/A	N/A	N/A
Dimmer 24V	on	on	N/A	N/A	N/A	N/A
Charger	on	off	off	off	off	VRLA
			on	off	off	GEL
			off	on	off	AGM
			on	on	off	Traction
			off	off	on	Li-ion

*NB: If a dip switch setting is made that is not in the above table, then the output will not output any voltage and turn the LED red.*

Examples:

Dip switch settings		Selected modes	Comment
on	off		
	1, 2, 3, 4, 5	Converter	Dip 3 to 5 have no effect on the operation
1, 4	2, 3, 5	Charger for AGM battery	
1, 2, 3	4, 5	Dimmer 24V	Dip 3 to 5 have no effect on the operation
1, 3, 5	2, 4	Nothing	The MPC20 will not output any voltage and the red LED will light up.

## SECTION 7 | Technical Details

INPUT		
Nominal input voltage	24.0V DC	
Input voltage range, three-step charger	18.0 ... 35.0V DC	
Input voltage range, full output specification	18.0 ... 35.0V DC	
Input voltage range, no defects	0.0 ... 35.0V DC	
OUTPUT		
Nominal output voltage	13.6 VDC	
Voltage correction	12.0 ... 15.0V DC	
Output voltage dimmer	<b>12V:</b> 4.0 ... 12.0V DC	<b>24V:</b> 8.0 ... 24.0V DC
Output precision	2%	
Output voltage ripple, peak-to-peak	1%	
Maximum output power	680W	
Maximum output current	20.0A	
Maximum output current (@40°C)	20.0A	
CHARGER		
Bulk time of charger	8 hours	
Absorption time of charger	4 hours	
Float time of charger	228 hours	
OPTIONS		
Remote contact switch on/off	Yes, 6.3 mm faston contact	
External temperature sensor	Yes (can be delivered separately)	
PROTECTION		
Overcurrent / Short circuit	Limited through current measurement	
Overheating, switch off	Limited power after temperature measurement	
Output overvoltage	Crowbar circuit on input at 17.0V DC (switched off at 24.0V DC output)	
Polarity protection	Yes, Input and Output with resp. diode and fuse	
GENERAL		
Efficiency	>90%	
Standby power consumption	±60mA	
Operational ambient temperature	-10°C to +40°C, DE-rating to +60°C	
Storage temperature	-25°C to +85°C	
Operational air humidity	95%, non-condensing	
Galvanic insulation	None	
Cooling concept	Forced ventilation, temperature regulated	

## SECTION 7 | Technical Details

<b>MECHANICAL</b>	
Faston wiring	6 mm <sup>2</sup>
Connections	6,3 mm Faston
Mounting holes footprint	6 mm
IP Code	IP20
Housing material	Aluminium PA6 casing
Housing colour	RAL 9006 / Black RAL 9011
Meets the following standards	EN60950-1, EN55022, CE Marking



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