

SINEWAVE INVERTER-CHARGER



SAMLEX EUROPE[®] B.V.

Sinewave inverter-charger

Model No.

PSC1600-12-60
PSC2000-12-80
PSC3000-12-120
PSC1800-24-35
PSC2500-24-50
PSC3500-24-70

Manual, Gebruiksaanwijzing, Benutzerhandbuch,
Manuel Utilisateur, Manual Para Utilizador

Please read this manual before operating your inverter-charger

Notice of Copyright

Powersine Combi PSC1600-3500 inverter/charger owner's manual © 2012-2014 Samlex Europe BV. All rights reserved. No part of this document may be reproduced in any form or disclosed to third parties without the express written permission of Samlex Europe BV, Aris van Broekweg15, 1507 BA ZAANDAM, The Netherlands. Samlex Europe BV reserves the right to revise this document and to periodically make changes to the content hereof without obligation or organization of such revisions or changes, unless required to do so by prior arrangement.

Exclusions for documentation and product usage

UNLESS SPECIFICALLY AGREED TO IN WRITING, SAMLEX EUROPE BV ("SAMLEX") :

1. MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN ITS MANUALS OR OTHER DOCUMENTATION
2. ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSSES, DAMAGES, COSTS OR EXPENSES, WHETHER SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION. THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER'S RISK
3. REMINDS YOU THAT IF THIS MANUAL IS IN ANY LANGUAGE OTHER THAN ENGLISH OR DUTCH, ALTHOUGH STEPS HAVE BEEN TAKEN TO MAINTAIN THE ACCURACY OF THE TRANSLATION, THE ACCURACY CANNOT BE GUARANTEED.
4. MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, REGARDING THESE SAMLEX PRODUCTS AND MAKES SUCH SAMLEX PRODUCTS AVAILABLE SOLELY ON AN "AS IS" BASIS.
5. SHALL IN NO EVENT BE LIABLE TO ANYONE FOR SPECIAL, COLLATERAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF PURCHASE OR USE OF THESE SAMLEX PRODUCTS. THE SOLE AND EXCLUSIVE LIABILITY TO SAMLEX, REGARDLESS OF THE FORM OF ACTION, SHALL NOT EXCEED THE PURCHASE PRICE OF THE SAMLEX PRODUCTS DESCRIBED HERE IN.

Document name, date and part number

"Samlex PSC1600-3500 Manual Rev1endfs", January 2014, 201183

TABLE OF CONTENTS

1. INTRODUCTION	4
2. DESCRIPTION	5
3. CONFIGURING THE POWERSINE COMBI	6
3.1 General	6
3.2 Factory default parameter settings	6
3.3 DIP switch settings overview	9
4. GENERAL OPERATION.....	12
4.1 Operating the Powersine Combi	12
4.2 Powersine Combi LED indicators and error modes	12
4.2.1. Error indications	14
4.3 Programmable Alarm relay.....	14
4.4 Trigger input	15
4.5 Load requirements in inverter mode	15
5. CHARGER OPERATION	16
5.1 Charge programs	16
5.2 Equalizing a flooded battery	17
6. TROUBLESHOOTING GUIDELINE	19
7. TECHNICAL SPECIFICATIONS	23
8. WARRANTY CONDITIONS	26
9. DECLARATION OF CONFORMITY	27

1. INTRODUCTION

Thank you for purchasing a SAMLEX Powersine Combi inverter/charger combination. Please read this owner's manual for information about using the product correctly and safely. Keep this owner's manual and all other included documentation close to the product for future reference. For the most recent manual revision, please check the downloads section on our website.

The purpose of this owner's manual is to provide explanations and procedures for operating, and configuring the Powersine Combi. For installing the Powersine Combi, a separate installation guide is included. The installation guide is intended for installers that should have knowledge and experience in installing electrical equipment, knowledge of the applicable installation codes, and awareness of the hazards involved in performing electrical work and how to reduce those hazards.



WARNING

Before proceeding with this owner's manual, please make sure you have carefully read the enclosed safety flyer and installation guide!

2. DESCRIPTION

The Powersine Combi is an all-in-one combination of a DC to AC true sinewave inverter, an advanced multi-stage battery charger and a high speed AC transfer switch. All this is build into one compact, yet installer friendly enclosure. Besides these three main functions, there are several unique features offered as well. Some of which benefit from the strong interaction between the three main functions.

The main task of the Powersine Combi is to act as an uninterruptable AC power supply (UPS). In case of a grid/generator failure or disconnection, the Powersine Combi immediately stops charging the battery, releases the AC transfer switch and activates the inverter which takes over the supply to the connected loads. All this is achieved so fast, that even very critical loads like computers will continue to operate without any problems. In case the grid/generator is reconnected again and the voltage and frequency are within acceptable limits, the Powersine Combi activates the AC transfer switch and battery charger again, while deactivating the inverter. The connected loads are now supplied again by the grid/generator without any interruption.

Additionally, the Powersine Combi offers features like :

- **AC Input Power Boost**, which temporarily assists weak AC input sources when the connected load needs more power than available from the grid or generator.
- **AC Input Current Limit**, which limits the maximum current consumed from the AC input source by the Powersine Combi. This limit is user adjustable.
- **Power Factor Corrected AC Input**, which optimizes energy efficiency and makes sure that the maximum amount of charging current is available from your AC source.
- **Intelligent 4-stage charge programs**, user programmable to fit any battery type.
- **Fully programmable inverter, transfer switch and battery charger parameters**, using the SAMLEX Dashboard for Windows software.
- **Programmable alarm relay**, for optimal control of external devices like generator starting or selective load disconnection.
- **Freely assignable trigger input**, which allows the user to control the Powersine Combi by external events.
- **Temperature controlled fans**, to guarantee silent operation under less than full load conditions.
- **Temperature compensated battery charging**, using the standard supplied battery temperature sensor for maximum battery lifetimes.

3. CONFIGURING THE POWERSINE COMBI

3.1 General

The Powersine Combi can be configured in two ways. Using the DIP switches located in the connection bay, a small selection of basic settings can be made. In most cases this will be sufficient to quickly setup the unit for typical applications. Another option is to setup the Powersine Combi using the SAMLEX Dashboard for Windows software. This software is included in the optional SAMLEXLink to USB Communication Kit (art.# 64660), which also contains an isolated interface box required to connect the Powersine Combi to a PC. Using SAMLEX Dashboard, all available parameters can be edited, and it is also possible to edit or create your own battery charge programs.

CAUTION

When configuring the Powersine Combi by SAMLEX Dashboard, make sure that DIP switch 1 is set to ON (External). When set to ON, all remaining DIP switch settings (2 up to 7 or 9) are ignored and the Powersine Combi will always load the parameter settings as configured in SAMLEX Dashboard.

When DIP switch 1 is set to OFF (Local) again, DIP switch 2 up to 7 or 9 are overriding the corresponding parameter settings previously made in SAMLEX Dashboard. The parameters that cannot be configured by DIP switches, shall return to the factory default settings.

This manual will only describe the DIP switch settings and all relevant factory default parameters. Configuration by SAMLEX Dashboard will be explained in the SAMLEX Dashboard manual that comes with the SAMLEXLink to USB Communication Kit.

3.2 Factory default parameter settings

The table below shows an overview of the most relevant factory parameter settings, as stored in the Powersine Combi. These settings are based on an average application. SAMLEX cannot guarantee that these are correct for your specific application. Please check all parameters carefully, especially the battery charging voltages.

Parameter	Inverter frequency
Value	50Hz
Description	Output frequency in inverter mode. Can be set to 50Hz or 60Hz
Configurable by	DIP switch (DIP 2) and Dashboard
Parameter	Inverter voltage
Value	230V
Description	Output voltage in inverter mode. Can be set from 200V to 240V
Configurable by	Dashboard





Parameter	Low Battery Protect
Value	On
Description	Enables or disables low battery protection with user programmable shutdown, restart and delay values (standard respectively 10V, 12V and 5 seconds). Turning Low Battery Protect off, results in immediate inverter shutdown when the battery voltage is less than 8.0V.
Configurable by	DIP switch (DIP 3) and Dashboard
Parameter	Automatic Stand By (ASB)
Value	Off
Description	Enables or disables ASB. If enabled, the inverter will jump to ASB mode automatically, when the connected load power consumption drops below a user programmable level. In ASB mode the inverter pulses it's output sinewave in order to detect when the connected load requires more power again. While running in ASB mode, the Powersine Combi itself draws significantly less current from the battery. As soon as the load power demand increases again, the inverter will automatically jump to continuous mode delivering uninterrupted power to the load. When disabled, the inverter will always run in continuous mode, which is better for critical loads like computers, clocks and AV equipment.
Configurable by	DIP switch (DIP 4) and Dashboard
Parameter	AC input voltage range (transfer switch)
Value	180V – 270V
Description	Input voltage range which is accepted by the Powersine Combi for feeding through to the connected load. Two AC undervoltage values can be set. An absolute undervoltage level which directly releases the AC transfer switch when exceeded (factory setting = 150V), and a delayed undervoltage level, which releases the AC transfer switch after a certain delay (factory settings are 180V and 5 seconds). The charger stops charging when the AC input voltage drops below 185V and restarts again above 190V.
Configurable by	Dashboard
Parameter	AC input frequency range
Value	45Hz – 65Hz
Description	Input frequency range which is accepted by the Powersine Combi. Can be set to full range (45Hz – 65Hz), or to a smaller range within the 45Hz lower and 65Hz upper boundaries.
Configurable by	Dashboard
Parameter	AC Input Current Limit
Value	16.0A or 30.0A (depending on model)
Description	Represents the maximum continuous current that the Powersine Combi will draw from the AC input source. To assure this, the Powersine Combi will either reduce the charge current automatically, or (when enabled) will activate the AC Input Power Boost feature which will supply the additional power demand by running the inverter in parallel with the AC input source. When the connected load still draws too much current, the





	installer can either choose to deactivate the AC transfer switch, or keep it closed and allow it to exceed the AC input current limit value. This value can be set from 1.0A to 16.0A or 2.0A to 30.0A (depending on model) by Dashboard or the optional Universal Remote Control.
Configurable by	Dashboard and Universal Remote Control
Parameter	AC Input Power Boost
Value	On
Description	AC Input Power Boost temporarily assists weak AC input sources when the connected load needs more power than available from the grid or generator. This is accomplished by running the inverter in parallel with the AC input source. The inverter can add power up to it's nominal output power rating assuming the battery is healthy. This parameter can be set On or Off.
Configurable by	DIP switch (DIP 7) and Dashboard
Parameter	Ground switch
Value	Enabled
Description	The ground switch is an internal relay that automatically connects AC output Neutral (N) to Protective Earth (PE = chassis) in <u>inverter mode</u> . This enables the use of a ground fault circuit interrupter (GFCI) at the AC output of the Powersine Combi. When a non-grounded (floating-) output is required, this Parameter can be disabled.
Configurable by	DIP switch 8 (on PSC2000-3500 models only) and Dashboard
Parameter	AC input fail sensitivity
Value	Normal
Description	This parameter can be set to Very Low, Low, Normal, High and Very High. The value of this Parameter decides how fast the Powersine Combi detects a signal fail at the AC input. The lower settings are resulting in a slower AC input source → inverter transfer time, while the higher settings result in the fastest transfer times. The settings Low and Very Low can be used when the AC input signal is distorted or unstable, which could be the case when a small generator is used. The settings High and Very High can be used when the Powersine Combi is connected to a solid grid or quality generator. The factory setting Normal is a good compromise, which still results in a fast AC input source → inverter transfer time of less than 5ms, while being reasonably immune against distorted AC input signals.
Configurable by	Dashboard
Parameter	Battery type / Charge program
Value	AGM
Description	The default charge program AGM is compatible with typical AGM type batteries, but can be used for other types of lead-acid batteries as well. <u>Please make sure that you always check if the Powersine Combi charge program settings, are compatible with the used battery!</u> The AGM charge program absorption voltage is 14.3V (28.6V@24V) and the float voltage is 13.3V (26.6V@24V). Other selectable charge programs are Flooded, GEL and Custom. For further charge program information, please see



	chapters 3.3 and 5.1.
Configurable by	DIP switch (DIP 5 and 6) and Dashboard
Parameter	Charge current limit
Value	100%
Description	This parameter sets the maximum charge current in percent. This value can be set from 10% to 100% by Dashboard or the optional Universal Remote Control. You can set this parameter to a lower value when the connected battery is too small and cannot handle the maximum charge current, or when you wish to (temporarily) reduce the charger current share, in the total amount of current flowing through the AC input of the Powersine Combi.
Configurable by	Dashboard and Universal Remote Control

3.3 DIP switch settings overview

During step 3 of the installation guide, you can alter the factory settings of the DIP switches to change the functionality of the Powersine Combi on a few points. For additional information about the settings, see the previous chapter (3.2). The following settings can be made :

	Setting description
 <p>Factory setting = OFF</p>	<p><u>Local / External Programming</u></p> <p>ON (External) : DIP switches 2 to 7 or 9 are ignored and the Powersine Combi will always load the parameter settings as configured in TBS Dashboard.</p> <p>OFF (Local) : The local DIP switch settings are used. All other parameters are set to the factory default settings.</p>
 <p>Factory setting = OFF</p>	<p><u>Inverter output frequency</u></p> <p>ON : Output frequency is 60Hz</p> <p>OFF : Output frequency is 50Hz</p>
 <p>Factory setting = ON</p>	<p><u>Low battery protect</u></p> <p>ON : Low battery protect is on</p> <p>OFF : Low battery protect is off (immediate inverter shutdown when the battery voltage is < 8.0V)</p>

 <p>Factory setting = OFF</p>	<p><u>ASB mode</u> ON : ASB mode on OFF : ASB mode off</p>
 <p>Factory setting 5 = OFF Factory setting 6 = ON</p>	<p><u>Battery type / Charge program¹⁾</u> 5 = OFF : Battery type = Flooded 6 = OFF Absorption voltage = 14.4V or 28.8V Float voltage = 13.5V or 27.0V 5 = ON : Battery type = GEL 6 = OFF Absorption voltage = 14.2V or 28.4V Float voltage = 13.5V or 27.0V 5 = OFF : Battery type = AGM 6 = ON Absorption voltage = 14.3V or 28.6V Float voltage = 13.3V or 26.6V 5 = ON : Battery type = Custom (created by Dashboard) 6 = ON Absorption voltage = set by Dashboard Float voltage = set by Dashboard</p>
 <p>Factory setting = OFF</p>	<p><u>AC Input Power Boost</u> ON : AC Input Power Boost on OFF : AC Input Power Boost off</p>
 <p>Factory setting = ON</p>	<p><u>Models : PSC1600-1800.</u> <u>Bypass remote switch (Bypasses the remote switch connection when no remote switch is connected)</u> ON : Remote switch connection terminals are bypassed OFF : remote switch connection terminals are open. A remote switch must be connected and switched ON in order to activate the Powersine Combi. The local on/off switch on the frontpanel always overrides the remote switch. So in order to use the remote switch, the local on/off switch must be in the 'on' or 'charger only' position.</p> <p><u>Models : PSC2000-3500.</u> <u>Ground switch/relay</u> ON : Ground switch is enabled OFF : Ground switch is disabled</p>

 <p>Factory setting = OFF</p>	<p><u>Models : PSC2000-3500 only.</u> Reserved</p>
 <p>Factory setting = ON</p>	<p><u>Models : PSC2000-3500 only.</u> <u>Bypass remote switch (Bypasses the remote switch connection when no remote switch is connected)</u> ON : Remote switch connection terminals are bypassed OFF : remote switch connection terminals are open. A remote switch must be connected and switched ON in order to activate the Powersine Combi. The local on/off switch on the frontpanel always overrides the remote switch. So in order to use the remote switch, the local on/off switch must be in the 'on' or 'charger only' position.</p>

! CAUTION

¹⁾ Invalid battery type settings can cause serious damage to your batteries and/or connected battery loads. Always consult your battery's documentation for the correct charge voltage settings.

4. GENERAL OPERATION

4.1 Operating the Powersine Combi

The main switch on the Powersine Combi has three positions : On, Off and Charger only (see image in chapter 4.2).

When switched to On, the Powersine Combi will perform all tasks automatically. It will power up in inverter mode, supplying power to the connected load. When a grid or generator is connected to the AC input, the Powersine Combi will analyse this signal. If the voltage and frequency of this signal are both within the required limits, the Powersine Combi will synchronize to the input signal and activates the AC transfer switch automatically. Now the connected loads are being powered from the AC input source and the Powersine Combi will also start charging the battery. As soon as the voltage or the frequency of the AC input signal are exceeding the required limits (for example when the AC input signal disappears), the Powersine Combi will immediately stop charging, release the AC transfer switch and activate the inverter again. All this happens so fast, that the connected load will not be disturbed.

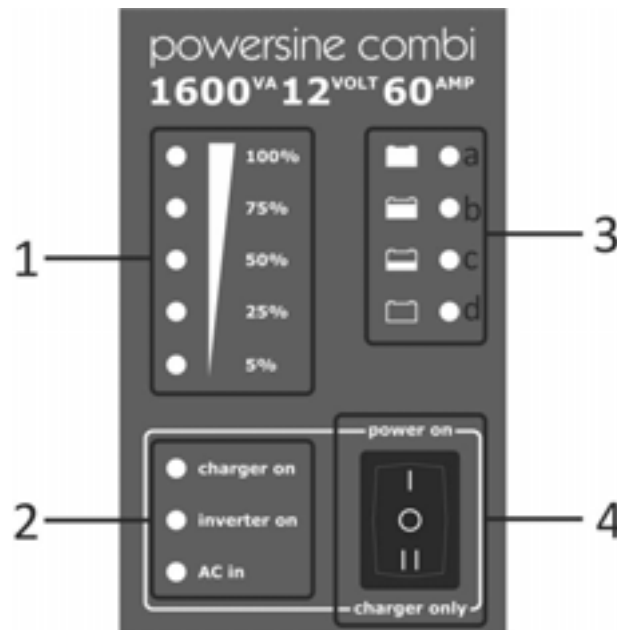
When switched to Off, the Powersine Combi is completely shut down and cannot be activated by a remote switch or the Universal Remote Control either. In this mode, the Powersine Combi will draw no current from the battery.

When switched to Charger only, the Powersine Combi will disable the inverter mode and will only work as a stand alone battery charger. As soon as a usable AC input signal is available, the Powersine Combi will activate the AC transfer switch and starts charging the battery. When the AC input signal fails, the AC transfer switch will be released again and the charger stops charging. No AC signal will be present at the Powersine Combi output when there is no AC input signal either.

Information about the LED indicators on the frontpanel and the different error mode codes, can be found in the next chapter.

4.2 Powersine Combi LED indicators and error modes

Please see the next image for an overview of all LED indicators on the Powersine Combi frontpanel, as well as the location of the main switch.



The frontpanel can be divided into four sections :

1. Dual function level bar. Indicates the percentage of delivered output power in inverter mode (turns red if more than nominal output power is being delivered to the load). In charger mode, this level bar indicates the percentage of delivered charging current.
2. Mode indicators. Indicate the operating mode of the Powersine Combi, as well as the status of each different mode (see explanation below) :

‘charger on’ LED

Off	:	not charging
On (green)	:	charging
On (blinking red)	:	error (see chapter 4.2.1)
On (red)	:	charger disabled

‘inverter on’ LED

Off	:	not inverting
On (green)	:	inverting or power boosting
On (blinking red)	:	error (see chapter 4.2.1)
On (red)	:	inverter disabled

‘AC in’ LED

Off	:	No AC input present, transfer switch open
On (blinking green)	:	AC input present and within range, Powersine Combi is synchronizing
On (green)	:	AC input approved, transfer switch closed
On (blinking red)	:	AC input present but out of range
On (red)	:	AC transfer switch disabled

3. Charge status bar. Gives a rough indication of the charging progress, see below :

LED 3a : 100% full (ready)
LED 3b : 80% full
LED 3c : 50% full
LED 3d : empty

4. Power on, off, charger only switch. See chapter 4.1 for more explanations.

4.2.1. Error indications

When the so called mode indicator LEDs are blinking red, an error has been detected. Each mode indicator LED can either blink red individually, or combined along with one or more other mode indicator LEDs. There are five different error indications, each with their own blinking pattern :

- One flash in a row : Battery related error (too low or too high battery voltage, too low or too high battery temperature, too high battery ripple voltage, battery defect)
- Two flashes in a row : AC overload error (AC load requires too much power from the inverter, AC output short circuit)
- Three flashes in a row : High temperature error (Powersine Combi shuts down on high temperature)
- Four flashes in a row : Device error (an error has occurred inside the Powersine Combi. Please return for service)
- Five flashes in a row : Charge program error (only for 'charger on' indicator LED). Charge program selection set to Custom, while custom made charge program contains an error or time-out.

The Powersine Combi will mostly recover from an error mode automatically when the cause of the error has been resolved. However, when an error has occurred due to a high battery ripple voltage or an AC transfer switch overcurrent, the Powersine Combi needs to be switched off and on again manually (manual restart). The Powersine Combi also needs to be restarted manually, when too many battery or overload errors have occurred within a short period of time.

4.3 Programmable Alarm relay

The Powersine Combi is equipped with one or two (depending on model) programmable potential free alarm relays. Standard, this relay (or relay 1 on PSC2000-3500 models) will be activated when the unit shuts down and jumps to an error mode. The alarm relay de-activates again when the error has been resolved and the Powersine Combi is running in normal operating mode again.

Relay 2 on the PSC2000-3500 models will be activated only after the AC supply has become available. In case of battery operation, Relay 2 will deactivate immediately. This can be used to switch less critical AC loads (i.e. electric boiler, aircon) on and off that are allowed to be supplied by the mains or generator only.

Using SAMLEX Dashboard, it is also possible to configure the programmable relays to perform a different task, like starting a generator when the battery voltage has reached a certain low voltage level.

Both normally closed and normally open contacts of these relays are available. For the PSC1600-1800 models, the maximum relay contact ratings are 30Vdc/1A or 60Vdc/0.3A. For the PSC2000-3500 models, the maximum relay contact ratings are 30Vdc/16A or 250Vac/16A.

4.4 Trigger input

The trigger input offers a way of externally controlling the behaviour of the Powersine Combi. The trigger input can be connected to an external switch or a potential free relay contact. By closing this external switch or contact, a user programmable 'action' will be performed. Such an action could for example be to release the AC transfer switch, temporarily disable the AC input Power Boost feature or force the Powersine Combi to switch to inverter mode. All this can be configured in SAMLEX Dashboard. The PSC1600-1800 models are equipped with one trigger input, while the PSC2000-3500 models are equipped with two trigger inputs.

4.5 Load requirements in inverter mode

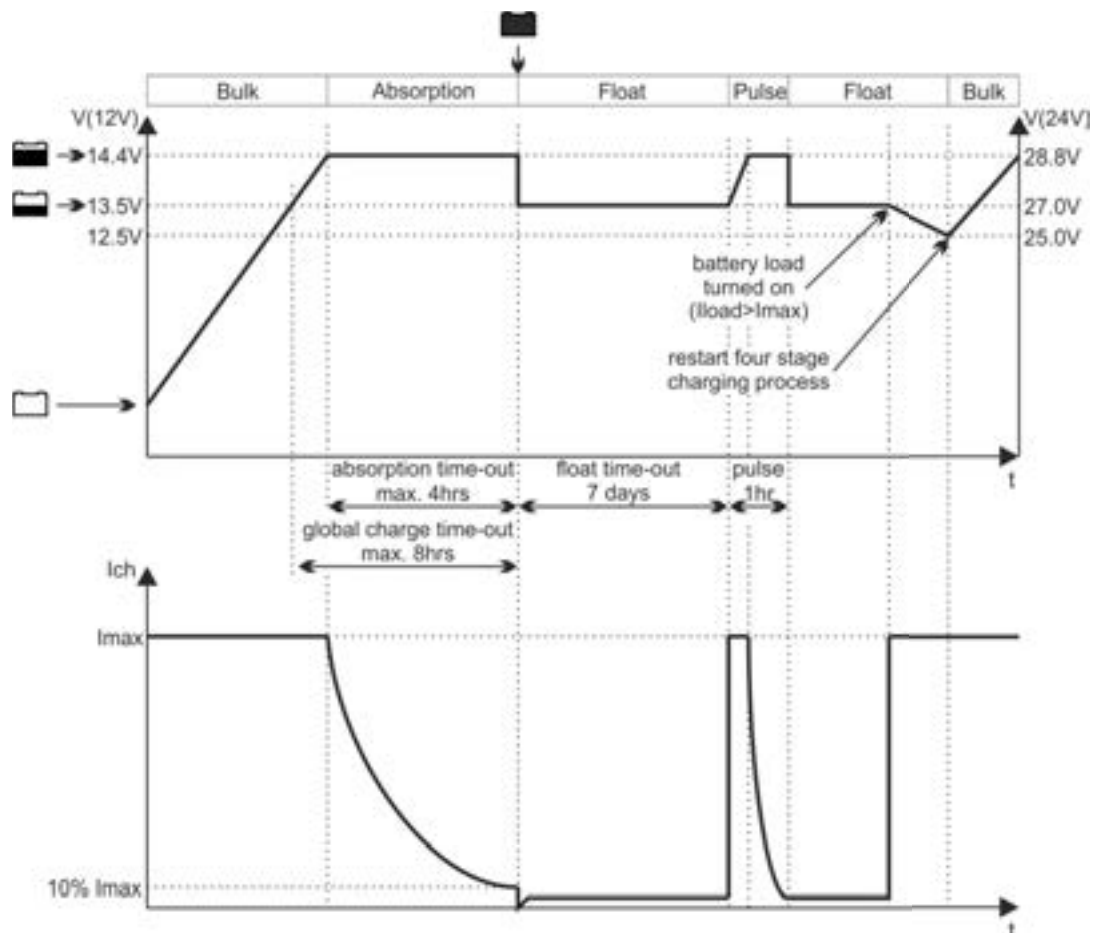
Before you connect your appliance(s) to the Powersine Combi AC output, always check it's maximum power consumption. Do not connect appliances to the AC output requiring more than the nominal power rating of the inverter continuously. Unless these appliances are switched on only when the AC transfer switch is activated, and power is drawn from an external source with a larger capacity than the inverter.

Some appliances like motors or pumps, draw large inrush currents at startup. It is possible that the startup current exceeds the overcurrent trip level of the inverter. In this case the output voltage will shortly decrease to limit the output current of the inverter. If the overcurrent trip level is continuously exceeded, the inverter will shut down and automatically restart within 20 seconds. In this case it is advisable to disconnect this appliance from the inverter, since it requires too much power to be driven by this unit. The Powersine Combi needs to be restarted manually when it has shut down due to overloads for four times in a row. Note that at higher ambient temperature levels, the overload capacity of the Powersine Combi will be reduced.

5. CHARGER OPERATION

5.1 Charge programs

All standard selectable charge programs (using DIP switches 5 and 6), perform a four stage IUoUoP charging process comprising of a “Bulk”, an “Absorption”, a “Float” and a “Pulse” stage. The image below visualizes the four stage charging process :



In the Bulk stage, the charger delivers full output current and typically returns approximately 80% of charge back into the battery once the absorption voltage is reached. During this stage, the battery empty and battery 50% full indicators will be lit depending on the Bulk charge progress. When the absorption voltage has been reached, the Absorption stage will be entered and the battery 80% full indicator will be lit. This stage will return the final 20% of charge to the battery. The output voltage is kept at a constant level and the charge current decreases as a function of the battery's state of charge. When the charge current has dropped below a certain value or when the maximum absorption timer has been expired, the Float stage will be entered. The battery full Indicator will be lit and an acoustical message will sound, indicating that the battery is full. In this stage the battery voltage will be held constant at a safe level for the battery. It will maintain the battery in optimal condition for as long as the battery remains connected to the activated charger. Connected battery loads will be directly powered by the charger up to the charger's maximum output current level. When even more current is drawn, the battery must supply this which results in a

declining battery voltage. At a certain battery voltage level, the charger jumps back to the Bulk stage and will finalize a complete charging process again, once the battery load consumption has dropped below the charger's maximum output current level.

The fourth stage called "Pulse", will perform a short refresh charge of approximately 1 hour each 7 days while the charger operates in the Float stage. This will keep the battery in optimal condition while prolonging it's lifetime. The battery can remain connected to the activated charger continuously, without risk of overcharging.

When the battery temperature sensor is installed, the charger automatically compensates the charge voltages against battery temperature. This means that the charge voltages are slightly increased at lower temperatures and decreased at higher temperatures (-30mV/°C at 12V chargers and -60mV/°C at 24V chargers). This way, overcharging is prevented which prolongs your battery's lifetime.

When the standard selectable charging programs do not satisfy your requirements, or when different voltage- and current levels are needed, you can edit or create your own charge programs using SAMLEX Dashboard. Up to 8 different stages can be linked together and all individual stages can be configured extensively.

5.2 Equalizing a flooded battery

If you are using a flooded lead acid battery, an occasional equalization charge cycle may be recommended by the manufacturer. This might also be true when the flooded battery has been very deeply discharged or often charged inadequately. During equalization, the battery will be charged up to 15.5V (or 31V for 24V models) at a reduced output current level. Before starting an equalization charge cycle, the following caution statements must be read carefully :

CAUTION

Equalization should only be performed on a flooded (wet) lead acid battery. Therefore the Powersine Combi only allows equalization when the battery type DIP switches are set to Flooded. Other battery types like GEL or AGM will be damaged by this process.

Always follow the battery manufacturer's instructions when equalizing flooded batteries.

During equalization, the battery generates explosive gasses. Follow all the battery safety precautions enclosed with your Powersine Combi. Ventilate the area around the battery sufficiently and ensure that there are no sources of flames or sparks in the vicinity.

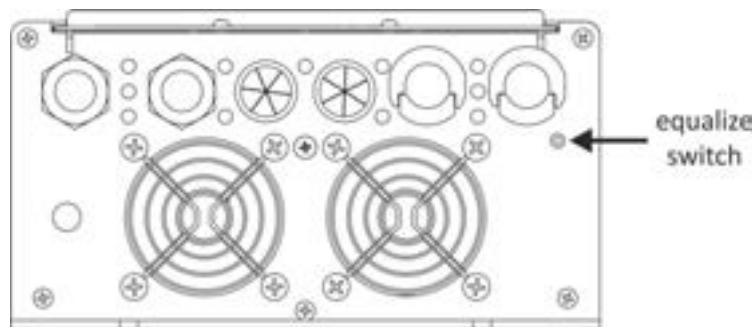
Disconnect all loads connected to the battery during equalization. The voltage applied to the battery during this process may be above safe levels for some loads.

The Powersine Combi cannot automatically determine when to stop the equalization of a battery. The user must monitor the battery's specific gravity throughout this process to determine the end of the equalization cycle. The internal 2 hours time-out timer of your charger is only intended as a safety feature, but may not be sufficiently short to prevent

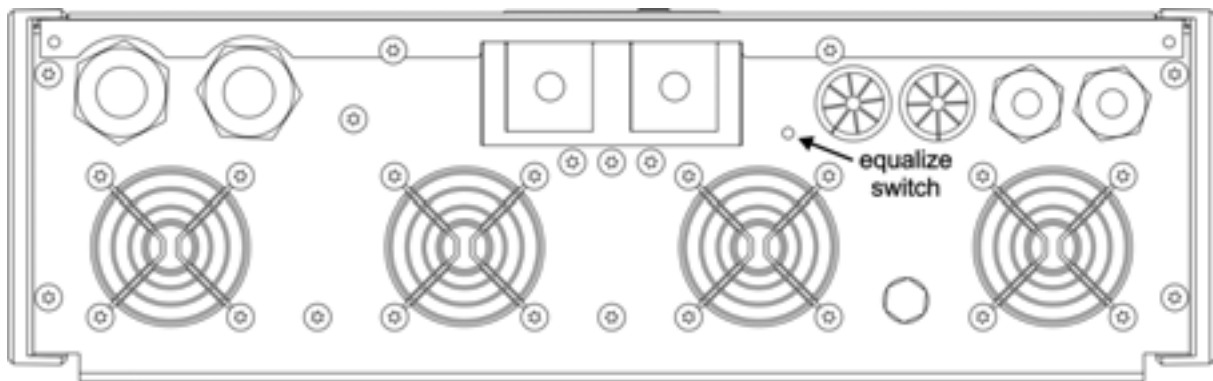
battery damage. Therefore, equalizing a battery is always a process that must continuously be supervised by the user.

Since equalization is only allowed for flooded (wet-) lead acid batteries, the Powersine Combi will only allow this function to be available when the “Flooded” charging program is selected (see chapter 3.3). Besides this, the charger also needs to have a full charge cycle completed and must operate in the Float stage. When these two conditions are met, the equalization charge mode can be activated by pressing the recessed pushbutton on the bottom side of the unit (see images below) for 3 seconds, until all charge status indicators start flashing.

Models : PSC1600-1800 :



Models : PSC2000-3500 :



The Powersine Combi will allow a maximum equalization time of 2 hours before it automatically jumps back to the Float stage. If the specific gravity of each cell does not match the battery manufacturer's specifications yet, you can initiate a new 2 hours equalization cycle by pressing the pushbutton for 3 seconds again. Always keep on checking the specific gravity of each cell repeatedly during the equalization process. When these values are correct, you can manually exit the equalization process by pressing the recessed pushbutton once. The Powersine Combi will then return to the Float stage.

6. TROUBLESHOOTING GUIDELINE

Please see the table below if you experience any problems with the Powersine Combi and/or the installation.

Problem	Possible cause	Remedy
Powersine Combi is not working at all.	Main switch in Off (0) position.	Push the power switch in the 'I' or 'II' position.
	Remote switch or Universal Remote Control have deactivated the Powersine Combi.	Activate the Powersine Combi remotely or check DIP switch 8 or 10 for correct setting.
	Poor contact between the Powersine Combi battery wires and the battery terminals.	Clean battery terminals or Powersine Combi wire contacts. Tighten battery terminal screws.
	Blown DC fuse.	Check battery fuse or internal Powersine Combi fuse (PSC1600-1800 only).
	Very poor battery condition.	Replace battery.
The charger mode is not working (AC transfer switch does not activate either).	The AC input voltage or frequency are out of range or too unstable.	Make sure that the AC input voltage is between 185V - 270V and the frequency between 45Hz – 65Hz (assuming standard settings)
	Charger mode and/or the AC transfer switch are disabled during setup using Dashboard.	Enable Charger mode and the AC transfer switch using Dashboard.
The battery is not being charged up to it's maximum capacity.	Incorrect absorption charge voltage setting.	Check DIP switch 5 and 6 for correct settings. Or adjust the absorption voltage using SAMLEX Dashboard.
	Incorrect charge current setting.	Adjust the charge current using the Universal Remote Control or SAMLEX Dashboard. Typically, the charge current should be set to 10%-20% of the total battery capacity
	Too much voltage loss in battery cables and/or connections.	Make sure that the battery cables have a large enough diameter. Check if all DC connections are solidly made.

	Additional battery loads are consuming too much current during charging.	Turn-off or disconnect all battery loads.
Charge current is too low.	High ambient temperature.	Try to lower the ambient temperature around the Powersine Combi.
	Charger is operating in the absorption charging stage.	Do nothing. The battery is almost fully charged and consumes less current by itself.
Mode indicator LEDs 'inverter on', 'charger on' and 'AC in' are blinking red once per second (battery error).	Battery voltage is too low (< 8V@12V or <16V@24V).	Battery is damaged, replace it. Or battery has been discharged too extremely, let it slowly recover to above 8.5V so that the transfer switch and charger can startup to recharge the battery.
	Battery voltage is too high (>16.5V or >33V@24V).	Check the DC system for an external source that pushes the battery voltage too high.
	Too high ripple voltage on DC input. (manual restart needed)	Check battery wire connections. Decrease battery cable length. Increase battery and/or cable size. Make sure that no other equipment on the same battery is generating a high ripple voltage.
Only mode indicator LED 'inverter on' blinks red once per second.	Battery voltage is too low (<10V@12V or <20V@24V).	Apply mains voltage to the AC input and start charging the battery. When another turn off voltage is desired in 'Battery protect On' mode, please use Dashboard
Only mode indicator LED 'inverter on' blinks red twice per second.	Inverter is overloaded.	Make sure that the total power rating of the AC output load is lower than the nominal inverter power rating.
	Connected AC output load causes a short circuit.	Make sure that the AC output load is not defective. Check if the AC output wiring and connections are not creating a short circuit.

	Connected AC output load causes a too large inrush current.	Try to power-up connected equipment successively, and not simultaneously. Otherwise stop using the connected load, it's not suitable to power it with this inverter.
Mode indicator LEDs 'inverter on' and 'charger on' are blinking red three times per second.	The Powersine Combi has shut down due to a too high temperature.	Reduce the AC output load in inverter mode. Try to reduce the ambient temperature around the Powersine Combi. Make sure that there is a clearance of at least 10cm around the unit. Do not obstruct the airflow, place no items on or over the unit. Keep the Powersine Combi away from direct sunlight or heat producing equipment.
Mode indicator LED 'AC in' blinks red once per second.	AC input signal is present but not within required voltage and frequency borders.	Make sure that the AC input voltage falls within 185V-270V and 45Hz-65Hz.
All mode indicator LEDs 'inverter on', 'charger on' and 'AC in' are blinking red twice per second (manual restart needed)	Maximum AC transfer switch current has been exceeded.	Reduce the AC output load
Mode indicator LED 'inverter on' or 'charger on' or 'AC in' is red continuously.	Either the inverter mode, or the charger mode or the AC transfer switch has been disabled using Dashboard.	Enable again using Dashboard if required.
	If only 'inverter on' is red continuously.	Powersine Combi main switch is put into 'charger only' mode, meaning that the inverter is disabled.
Output power bar is red (inverter mode).	The inverter is overloaded and will shut down after a certain time (depending on the amount of overload)	Reduce the AC output load
All mode indicator LEDs 'inverter on', 'charger on' and 'AC in' are blinking red four times.	Device or connection fault.	Powersine Combi is defective, return for service. External AC source is connected to the AC output instead of the AC input.

<p>Mode indicator LED 'charger on' blinks five times.</p>	<p>Charge program error.</p>	<p>User has selected an empty or invalid charge program ('custom' charge program is empty from factory). Advanced user made charge program contains 'go-to error' condition, for example when a charge stage takes too much time.</p>
---	------------------------------	---

If none of the above remedies will help solving the problem you encounter, it's best to contact your local SAMLEX distributor for further help and/or possible repair of your Powersine Combi. Do not disassemble the Powersine Combi yourselves, there are dangerously high voltages present inside and will also void your warranty.

7. TECHNICAL SPECIFICATIONS

Parameter	PSC1600-12-60	PSC1800-24-35
Inverter stage		
Output power ¹⁾	Pnom	1300W
	P10minutes	1600W
	Psurge	2500W
Output voltage / frequency	230Vac ± 2% / 50Hz ± 0.05%	
Output waveform	True sinewave (THD < 5% ¹⁾ @ Pnom)	
Input voltage (± 3% tolerance): Nominal	12V	24V
	Range	10.5 ²⁾ – 16Vdc
		21 ²⁾ – 32Vdc
Maximum efficiency	92%	94%
No load power consumption ³⁾ [ASB]	< 10W [2.0W]	< 12W [2.0W]
Charger stage		
AC input voltage	185 – 270Vac / 45 – 65Hz / PF > 0.95	
Maximum continuous charging current ⁴⁾	60A	35A
Standard charge voltage (bulk / float @ 25°C)	14.3V / 13.3V	28.6V / 26.6V
Charge algorithm or program	IUoUoP, intelligent 4 stage, temp. comp.	
AC Transfer switch		
Maximum continuous current	16Arms	
Transfer time (typical)	0ms (inv. → mains) / < 5ms (mains → inv.)	
General		
SAMLEXLink enabled	Yes	
Protections	high/low battery voltage, high temperature, overload, short circuit, high ripple voltage and low AC input voltage	
DC connections	Two wires, length 1.5 meters, 35mm ²	
AC connections	Screw terminals	
Enclosure body size	351 x 210 x 114mm	
Total weight	10.7kg	
Protection class / Op. temp. / Storage temp.	IP21 / -20°C .. +50°C / -40°C .. +80°C	
Standards	CE marked meeting EMC directive 2004/108/EC and LVD 2006/95/EC complying with EN60335-1, EN60335-2-29 and RoHS 2002/95/EC	

Note : the given specifications are subject to change without notice.

- 1) Measured with resistive load. Power ratings are subject to a tolerance of 10% and are decreasing as temperature rises with a rate of approx. 1.2%/°C starting from 25°C.
- 2) Undervoltage limit is dynamic. This limit decreases with increasing load to compensate the voltage drop across cables and connections.
- 3) Measured at nominal input voltage and 25°C
- 4) At higher ambient temperatures, maximum output current shall be reduced automatically

Parameter	PSC2000-12-80	PSC2500-24-50	
Inverter stage			
Output power ¹⁾	P _{nom}	1800W	2000W
	P _{10minutes}	2100W	2500W
	P _{surge}	4000W	5500W
Output voltage / frequency	230Vac ± 2% / 50Hz ± 0.05%		
Output waveform	True sinewave (THD < 5% ¹⁾ @ P _{nom})		
Input voltage (± 3% tolerance): Nominal	12V		24V
	Range	10.5 ²⁾ – 16Vdc	21 ²⁾ – 32Vdc
Maximum efficiency	92%		93%
No load power consumption ³⁾ [ASB]	< 20W [3.5W]		< 20W [4.0W]
Charger stage			
AC input voltage	185 – 270Vac / 45 – 65Hz / PF > 0.95		
Maximum continuous charging current ⁴⁾ (Sec.)	80A (4A)	50A (4A)	
Standard charge voltage (bulk / float @ 25°C)	14.3V / 13.3V	28.6V / 26.6V	
Charge algorithm or program	IUoUoP, intelligent 4 stage, temp. comp.		
AC Transfer switch			
Maximum continuous current	30Arms		
Transfer time (typical)	0ms (inv. → mains) / < 5ms (mains → inv.)		
General			
SAMLEXLink enabled	Yes		
Protections	high/low battery voltage, high temperature, overload, short circuit, high ripple voltage and low AC input voltage		
DC connections	M10 bolt terminals		
AC connections	Screw terminals		
Enclosure body size	370 x 431 x 132mm		
Total weight	18.5kg		
Protection class / Op. temp. / Storage temp.	IP21 / -20°C .. +50°C / -40°C .. +80°C		
Standards	CE marked meeting EMC directive 2004/108/EC and LVD 2006/95/EC complying with EN60335-1, EN60335-2-29 and RoHS 2002/95/EC		

Note : the given specifications are subject to change without notice.

- 1) Measured with resistive load. Power ratings are subject to a tolerance of 10% and are decreasing as temperature rises with a rate of approx. 1.2%/°C starting from 25°C.
- 2) Undervoltage limit is dynamic. This limit decreases with increasing load to compensate the voltage drop across cables and connections.
- 3) Measured at nominal input voltage and 25°C
- 4) At higher ambient temperatures, maximum output current shall be reduced automatically

Parameter	PSC3000-12-120	PSC3500-24-70
Inverter stage		
Output power ¹⁾	Pnom	2600W
	P10minutes	3200W
	Psurge	5000W
Output voltage / frequency	230Vac ± 2% / 50Hz ± 0.05%	
Output waveform	True sinewave (THD < 5% ¹⁾ @ Pnom)	
Input voltage (± 3% tolerance): Nominal	12V	24V
	Range	10.5 ²⁾ – 16Vdc
Maximum efficiency	92%	93%
No load power consumption ³⁾ [ASB]	< 20W [3.5W]	< 20W [4.0W]
Charger stage		
AC input voltage	185 – 270Vac / 45 – 65Hz / PF > 0.95	
Maximum continuous charging current ⁴⁾ (Sec.)	120A (4A)	70A (4A)
Standard charge voltage (bulk / float @ 25°C)	14.3V / 13.3V	28.6V / 26.6V
Charge algorithm or program	IUoUoP, intelligent 4 stage, temp. comp.	
AC Transfer switch		
Maximum continuous current	30Arms	
Transfer time (typical)	0ms (inv. → mains) / < 5ms (mains → inv.)	
General		
SAMLEXLink enabled	Yes	
Protections	high/low battery voltage, high temperature, overload, short circuit, high ripple voltage and low AC input voltage	
DC connections	M10 bolt terminals	
AC connections	Screw terminals	
Enclosure body size	370 x 431 x 132mm	
Total weight	19.0kg	
Protection class / Op. temp. / Storage temp.	IP21 / -20°C .. +50°C / -40°C .. +80°C	
Standards	CE marked meeting EMC directive 2004/108/EC and LVD 2006/95/EC complying with EN60335-1, EN60335-2-29 and RoHS 2002/95/EC	

Note : the given specifications are subject to change without notice.

- 1) Measured with resistive load. Power ratings are subject to a tolerance of 10% and are decreasing as temperature rises with a rate of approx. 1.2%/°C starting from 25°C.
- 2) Undervoltage limit is dynamic. This limit decreases with increasing load to compensate the voltage drop across cables and connections.
- 3) Measured at nominal input voltage and 25°C
- 4) At higher ambient temperatures, maximum output current shall be reduced automatically

8. WARRANTY CONDITIONS

Samlex Europe (SAMLEX) warrants this product to be free from defects in workmanship or materials for 24 months from the date of purchase. During this period SAMLEX will repair the defective product free of charge. SAMLEX is not responsible for any costs of the transport of this product.

This warranty is void if the product has suffered any physical damage or alteration, either internally or externally, and does not cover damage arising from improper use, or from use in an unsuitable environment.

This warranty will not apply where the product has been misused, neglected, improperly installed or repaired by anyone other than SAMLEX. SAMLEX is not responsible for any loss, damage or costs arising from improper use, use in an unsuitable environment, improper installing of the product and product malfunctioning.

Since SAMLEX cannot control the use and installation (according to local regulations) of their products, the customer is always responsible for the actual use of these products. SAMLEX products are not designed for use as critical components in life support devices or systems, that can potentially harm humans and/or the environment. The customer is always responsible when implementing SAMLEX products in these kind of applications. SAMLEX does not accept any responsibility for any violation of patents or other rights of third parties, resulting from the use of the SAMLEX product. SAMLEX keeps the right to change product specifications without previous notice.

Examples of improper use are :

- Too high AC input voltage applied
- Reverse connection of battery polarity
- Connecting wrong batteries (too high battery voltages)
- Mechanical stressed enclosure or internals due to harsh handling or incorrect packaging
- Contact with any liquids or oxidation caused by condensation

9. DECLARATION OF CONFORMITY

IMPORTER : Samlex Europe B.V.
ADDRESS : Aris van Broekweg 15
1507 BA ZAANDAM
The Netherlands

Declares that the following products :

PRODUCT TYPE : Professional inverter / charger combination
MODELS : PSC1600-12-60, PSC1800-24-35, PSC2000-12-80, PSC2500-24-50,
PSC3000-12-120, PSC3500-24-70

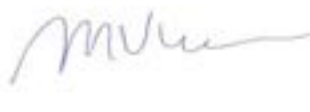
Conforms to the requirements of the following Directives of the European Union :

EMC Directive 2004/108/EC

The above product is in conformity with the following harmonized standards :

Low Voltage Directive 2006/95/EC
EN61000-6-3 : 2001 EMC - Generic Emissions Standard
EN61000-6-2 : 2005 EMC - Generic Immunity Standard
EN60335-1 : 1999 Generic safety standard
EN60335-2-29 : 2004 Safety requirements for battery chargers

Zaandam, February 2014



M. van Veen



www.samlex.com
www.samlex-solar.com