

# MODUL-CONNECT

Modular, digital wiring and control system

## Owner's Manual

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For safe and optimum performance, Modul-Connect must be used properly. Carefully read and follow all instructions and guidelines in this manual, and give special attention to the CAUTION and WARNING statements.

## **PLEASE KEEP THIS MANUAL FOR FUTURE REFERENCE**

### **Disclaimer**

While every precaution has been taken to ensure the accuracy of the contents of this manual, Modul-System assumes no responsibility for errors or omissions. Note as well that specifications and product functionality may change without notice.

### **Important**

Please be sure to read and save the entire manual before using your modular digital wiring and control system. Misuse may result in damage to the unit and/or cause harm or serious injury. Read manual in its entirety before using the unit and save manual for future reference.

# Overview

Modul-Connect is a modular, digital wiring and control system, specifically designed for the easy installation and control of auxiliary vehicle equipment such as beacons, interior lighting and work lamps.

The Plug & Play modular construction of Modul-Connect allows for the customisation and addition of other system features including inverters, hand wash units, cabin lights and auxiliary power sockets.

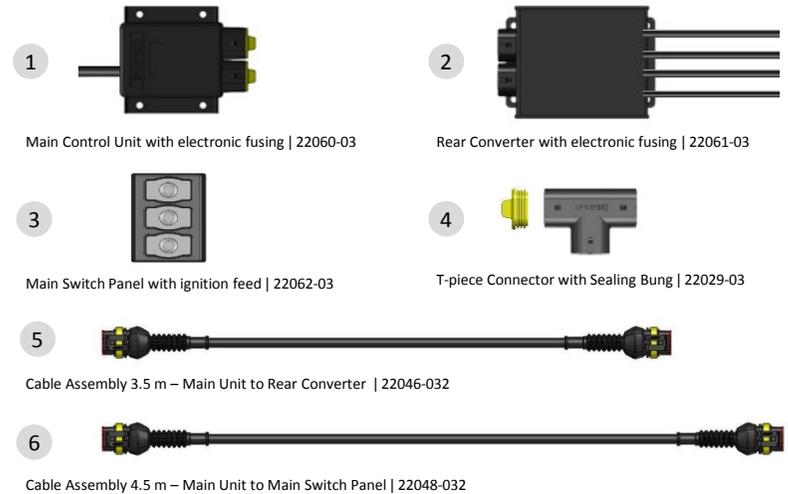
Modul-Connect also includes a battery management feature to help prevent excessive discharge from the battery when using auxiliary equipment while the vehicle engine is not running.

This manual covers installation of the standard Modul-Connect system, and optional features that can be added at point of installation, or at any time through the life of the vehicle.

# Base Kit Contents

The Modul-Connect Base Kit includes all items to assemble an electrical system for the switched control and powering of beacons, interior lamps and work lamps. Base kit 22000-03 comprises of:

Item	Description	Part number
1	Main Control Unit	22060-03
2	Rear Converter	22061-03
3	Main Switch Panel (Beacon / Interior light / Work light)	22062-03
4	T-piece with Sealing Bung	22029-03
5	Cable Assembly 3.5 m	22046-032
6	Cable Assembly 4.5 m	22048-032



## Main Control Unit Installation

The Modul-Connect Control Unit is designed to be connected directly to the vehicle battery, or a customer connection point (if available). The Modul-Connect Control Unit has a main internal, electronic fuse. For extra protection, an additional fuse holder is supplied to crimp onto the (red) power feed wire, before connecting to the power source, if the cable runs through a fixed bulkhead. Always cut the twin core power cable on the Control Unit (Part 22060-03) to a suitable length.

It is advisable to install the control unit away from sources of excessive heat and/or direct water spray.

## Main Switch Panel Installation

Modul-Connect Switch Panels are easily installed by using the T-pieces and cable assembly for connection to the system. For fastening to the switch bracket, or vehicle, a high-tack self-adhesive pad is included. To fit, remove the backing tape and take care to position correctly, applying pressure for a few seconds to ensure adhesion.

In operation, an LED light is illuminated to identify the function is in operation. When the function is not in operation the LED light will not illuminate.

In the Modul-Connect system, the main switch panel features a black ignition input wire. For base systems only, this wire is not required to be connected. It is advisable to insulate this wire if not required. However, when adding optional items such as auxiliary sockets or hand wash control, this wire must be connected to an ignition feed within the vehicle as this acts as a trigger for these devices.

An additional fuse (1 to 3 amp, available separately) must be added at the point of connection if the supply is un-fused.

## Rear Converter Installation

The rear converter provides four outputs for auxiliary lighting functions as shown below.

Output	Red	Black	Yellow	Peak power	Cable length
Beacon (front)	Positive (+)	Negative (-)	Sync with rear beacon	6 AMP	1 m
Beacon (rear)	Positive (+)	Negative (-)	Sync with front beacon		5 m
Interior light	Positive (+)	Negative (-)		3 AMP	3.5 m
Work light	Positive (+)	Negative (-)		3 AMP	4 m

All outputs from the rear converter are electronically fused. There is no need to fit additional fusing at this point.

In the event of a short circuit, or a connected lamp that exceeds the maximum current limit, then that output will shut down protecting and maintaining operation of the rest of the system. Modul-Connect will automatically check the affected output until any fault is rectified, at which point that output will re-enable for use again.

Beacon synchronisation – Should the beacons in use feature a sync wire, this can be connected to the yellow wire on the beacon output and will provide synchronization for all lamps connected.

# System Expansion

Modul-Connect allows for additional items to be connected to the system to enable extra features. These features include additional switch panels and converters, for example to control an Inverter or Hand Wash System.

As standard the base system has two spare connection ports available for these items. Should you wish to add more, this is achieved by simply adding additional cables and T-pieces to provide additional connection ports.

A handbrake input switch is also available; when connected to the system, Interior lamps and Work lamps switch off automatically when the hand brake is released.

Product converters are rated at 2A max current (4A for auxiliary sockets), so for items such as hand wash, or auxiliary sockets a relay can be connected to these converters to provide high current switching.

For system assembly guidelines, please refer to the technical specification on page 11.

## Products with high power draw

The main control unit can handle maximum 25A load via its main internal electronic fuse, and the rear converter maximum 20A load. Verify that the total power draw of all accessories connected to the rear converter box are 20A or lower before installing the Modul-Connect system. If you want to connect products with a higher power draw, these have to be powered directly from the battery. The products can still be operated by the switches and connected additional relay, so then covered by the battery guard. Always verify each product's power draw before installing it.

### *Inverters*

When installing an inverter, the power must come directly from the battery. Make sure all installation criteria stated in the inverter installation guide are met.

### *Hand wash units*

When installing a hand wash unit, the power must come directly from the battery. A 30A relay is required, which is available separately.

# Battery Guard Operation

As standard all Modul-Connect systems feature a battery management system to prevent excessive discharge of the vehicle battery by auxiliary equipment.

In the event of a low battery, Modul-Connect will automatically shut down connected auxiliary equipment to prevent further discharge. Re-starting the vehicle engine to raise battery voltage will automatically re-enable auxiliary equipment.

As a safety feature, beacons are exempt from battery guard control regardless of battery voltage. An optional buzzer can be fitted to the system, which will warn the operator prior to shutting down.

## **Battery Guard Activation:**

When battery voltage drops below 12V the warning buzzer (if fitted) will sound to warn the operator that battery voltage is dropping; equipment will continue to function.

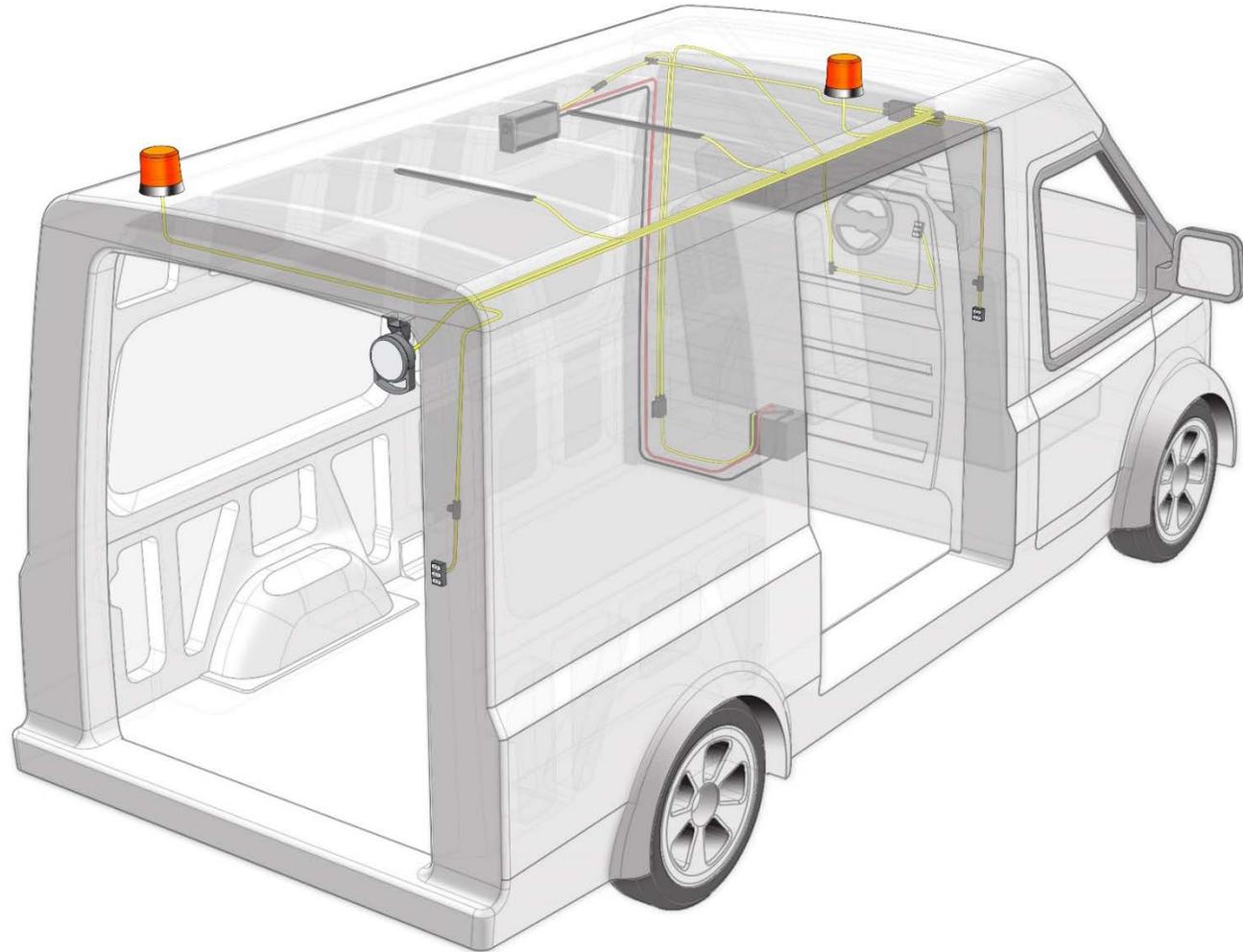
When battery voltage drops below 11.7V for two minutes or more, the battery guard will activate and shut down all Modul-Connect equipment apart from beacons.

## **Battery Guard De-Activation:**

To de-activate battery guard, the battery must be re-charged, usually by starting the vehicle engine. When battery voltage rises above 12.2V for more than 15 seconds the battery guard will automatically de-activate and auxiliary equipment will be available for use.

# Cable run schematic

Modul-Connect base kit with beacons, interior lights and a work light, additional switch panels by the side and rear doors and a power inverter.

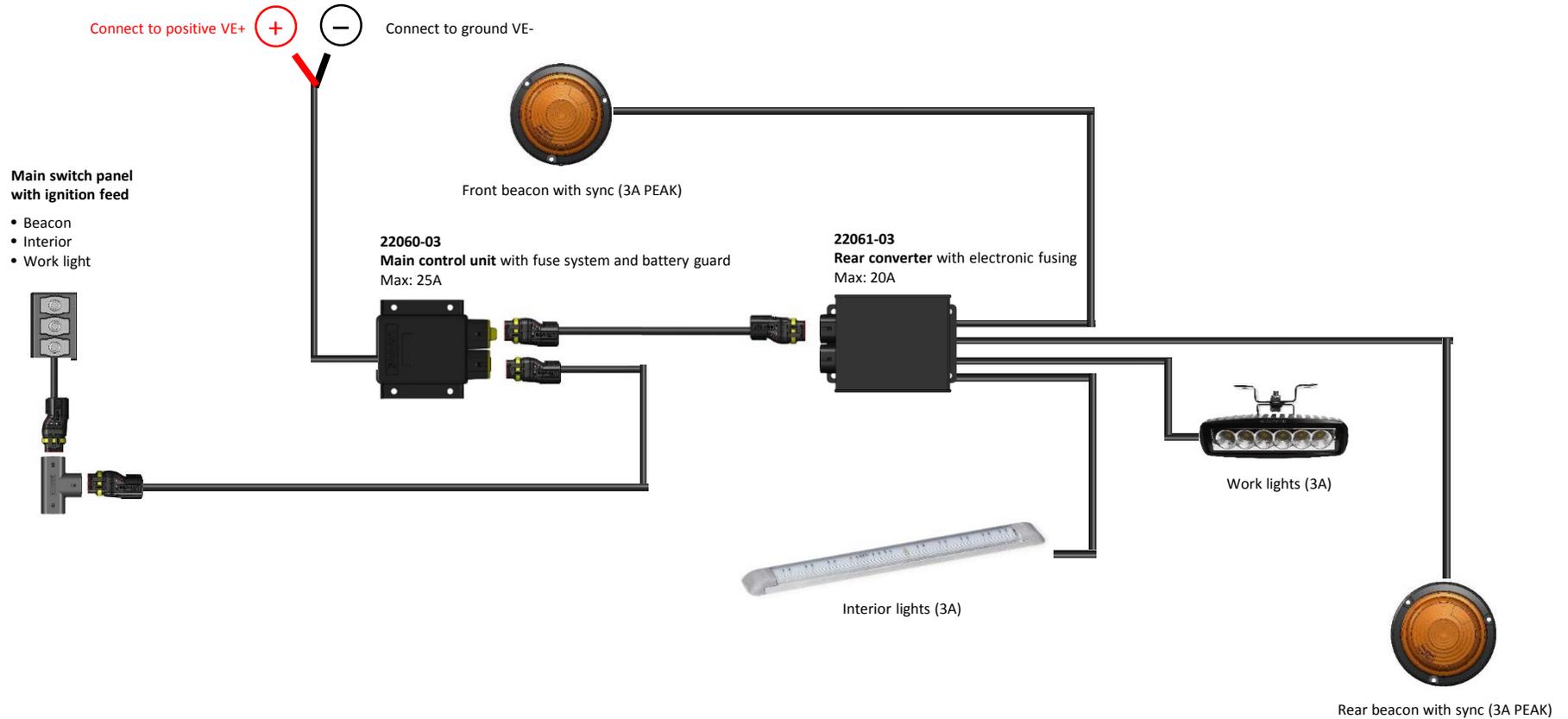


● Modul-Connect cable

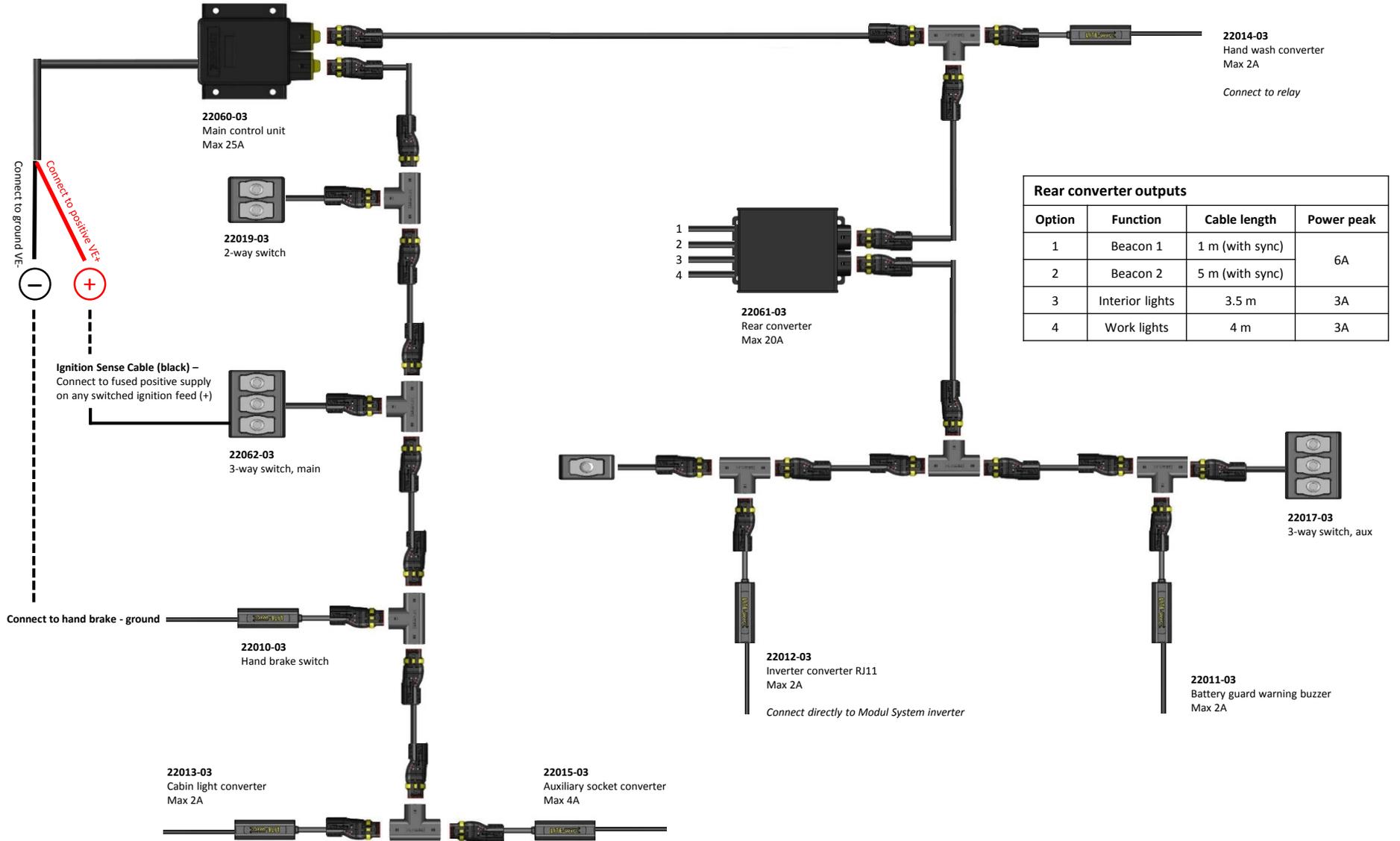
● Battery cable (+)

● Battery cable (-)

# Overview – Base System



# Expanded System - Example



# System Options & Configuration

Part number	Description	Max current	Ignition feed required	Function disabled on handbrake release	Notes
22005-03	Work light converter (4A)	4A	No	Yes	Additional output for work lights (maximum 20 amp rear converter load, 25amp system load).
22007-03	Beacon converter (4A)	4A	No	No	Additional output for beacons and strobe lights (maximum 20 amp rear converter load, 25amp system load).
22008-03	Interior light converter (4A)	4A	No	Yes	Additional output for interior lights (maximum 20 amp rear converter load, 25amp system load).
22010-03	Handbrake switch converter	N/A	No	N/A	Switches off interior lights and work lights when handbrake is released.
22011-03	Battery guard warning buzzer	2A	No	No	Buzzer sounds to warn when battery is discharged to 12 volts (battery guard system will shut down at 11.7 volts).
22012-03	Inverter converter	N/A	No	No	For use only with Modul-System 400W, 600W, 1000W and 2000W inverters. Requires additional switch (see below).
22013-03	Cabin light converter	2A	No	No	Requires additional switch (see below).
22014-03	Hand wash converter	2A	Yes	No	Switches on/off with ignition. Manual override possible when used with 22018-03 and/or 22022-03 switches. Connect to relay (supplied separately).
22015-03	Auxiliary socket converter	4A	Yes	No	Switches on with ignition, turns off 30 minutes after ignition off. Connect to relay if more than 4 amps required.
22016-03	3-way switch - main beacon / inverter / hand wash	N/A	Yes	No	For use with 22012-03, 22014-03. Replaces 22062-03.
22016-032	3-way switch - main beacon / inverter / hand wash (unplugged)	N/A	Yes	No	For use with 22012-03, 22014-03. Replaces 22062-03.
22017-03	3-way switch, aux beacon / interior light / work light	N/A	No	Yes (interior lights / work lights)	To replicate the function of main dash switch (22062-03) .
22017-032	3-way switch, aux beacon / interior light / work light (unplugged)	N/A	No	Yes (interior lights / work lights)	To replicate the function of main dash switch (22062-03) .
22018-03	3-way switch inverter / cabin light / hand wash	N/A	Yes	No	For use with 22012-03, 22013-03, 22014-03.
22018-032	3-way switch inverter / cabin light / hand wash (unplugged)	N/A	Yes	No	For use with 22012-03, 22013-03, 22014-03.
22019-03	2-way switch Inverter / cabin light	N/A	No	No	For use with 22012-03, 22013-03.
22019-032	2-way switch Inverter / cabin light (unplugged)	N/A	No	No	For use with 22012-03, 22013-03.

# System Options & Configuration

Part number	Description	Max current	Ignition feed required	Function disabled on handbrake release	Notes
22020-03	1-way switch, inverter	N/A	No	No	For use with 22012-03.
22020-032	1-way switch, inverter (unplugged)	N/A	No	No	For use with 22012-03.
22021-03	1-way switch, cabin light	N/A	No	No	For use with 22013-03.
22021-032	1-way switch, cabin light (unplugged)	N/A	No	No	For use with 22013-03.
22022-03	1-way switch, hand wash	N/A	Yes	No	For use with 22014-03.
22022-032	1-way switch, hand wash (unplugged)	N/A	Yes	No	For use with 22014-03.
22023-03	1-way switch, interior light - A	N/A	No	Yes	Secondary switch for interior light (A) For use with base kit, additional 22008-03 (can be used to switch interior lights together with 22062-03, 22017-03, 22024-03,22025-03, 22031-03).
22023-032	1-way switch, interior light - A (unplugged)	N/A	No	Yes	Secondary switch for interior light (A) For use with base kit, additional 22008-03 (can be used to switch interior lights together with 22062-03, 22017-03, 22024-03,22025-03, 22031-03).
22024-03	1-way switch, interior light - B	N/A	No	Yes	Secondary switch for interior light (B) For use with base kit, additional 22008-03 (can be used to switch interior lights together with 22062-03, 22017-03, 22023-03,22025-03, 22031-03).
22024-032	1-way switch, interior light – B (unplugged)	N/A	No	Yes	Secondary switch for interior light (B) For use with base kit, additional 22008-03 (can be used to switch interior lights together with 22062-03, 22017-03, 22023-03,22025-03, 22031-03).
22025-03	1-way switch, interior light - C	N/A	No	Yes	Secondary switch for interior light (C) For use with base kit, additional 22008-03 (can be used to switch interior lights together with 22062-03, 22017-03, 22024-03,22023-03, 22031-03).
22025-032	1-way switch, interior light – C (unplugged)	N/A	No	Yes	Secondary switch for interior light (C) For use with base kit, additional 22008-03 (can be used to switch interior lights together with 22062-03, 22017-03, 22024-03,22023-03, 22031-03).
22031-03	3-way RF unit beacon / interior light / work light	N/A	No	Yes (interior lights / work lights)	Comprises of RF receiver module & key fob remote. Controls beacon/interior light/work light outputs on rear converter.
22062-03	3-way switch - main (spare part) Beacon / interior light / work light	N/A	Base kit - No Expanded - Yes	Yes (interior lights / work lights)	Main 3-way switch (spare part).

# Troubleshooting

Step	Problem	Check	Symptom	Solution
A1	Modul-Connect will not operate	Do the beacons operate – Yes	Battery guard activated. Supplying battery voltage <11.7V.	Start vehicle. Battery guard will re-set when supplying battery voltage >12.2V for more than 15 seconds.
A2		Do the beacons operate – No	No feed to control unit. System 20A total load exceeded. System reset.	Remove any power socket loads. Check and replace main input fuse. Remove main input voltage – remove and replace main input fuse.
B1	Accessory does not work when switch is pressed	Is the Switch LED illuminated – Yes	Defective accessory.	Rectify/replace accessory. The switch LED illuminates to show the signal has been sent through the system.
B2		Is the Switch LED illuminated – No	Battery guard activated.	Refer to Step A1/A2.
C1	Base system works, expanded items do not work	Ignition Sense Cable (Black) – Connect to fused positive supply on any switched ignition feed (+)	Cable not connected. Fuse blown.	Connect cable to fused switched ignition feed (+). Check the cable run and replace ignition feed input fuse.
C2		Cable assemblies and T-pieces	Switches and accessories work up to a certain point.	Replace any damaged cables or T-pieces.
D1	Buzzer sounds	Normal operation	Battery guard warning buzzer (22011-03) fitted.	Buzzer sounds to warn when battery is discharged to 12V. Battery guard system will shut down all accessories, excluding beacons, at 11.7V. Start vehicle. Battery guard will re-set when supplying battery voltage >12.2V for more than 15 seconds.
E1	Power socket, no power	Cycle the ignition	Normal operation. 30 minute timer on power sockets.	The power sockets are activated with the ignition on. When the ignition is switched off a 30 minute timer starts. After 30 minutes the power sockets will turn off.
E2		Is the socket load >4A	Power socket, no power.	Remove load (automatic fusing will trip out at 4A). Power socket will automatically reset after 1 minute or system reset (refer to step A2/E1).
E3		Cycle the ignition	Power socket, no power.	Refer to step A1, A2 and C1,C2, E2.
<b>Step</b>	<b>Options</b>	<b>Operation</b>	<b>Symptom</b>	<b>Solution</b>
L1	Hand wash switch LED illuminates when ignition is turned on	Normal operation	Hand wash override switch (22018-03, 22022-03) fitted.	Press the switch to turn off the hand wash when not required after ignition cycle.

# Technical Specification

<b>Operation</b>	Digital power and switching of auxiliary electrical equipment for light commercial vehicle applications
<b>Homologation</b>	ECE 10R04   CE   TÜV tested
<b>IP Rating</b>	IP67 - All components and connectors (where fitted) totally protected against dust and the effects of temporary immersion (30 minutes) between 15cm and 1m
<b>System voltage range</b>	9 – 16 Vdc
<b>Standby current</b>	20 mA (Base system - may vary for expanded system)
<b>Rear converter output</b>	12Vdc constant *
<b>Fuse protection</b>	Electronic over current   Short circuit to main control unit & rear converter *
<b>Fuse auto re-activation following short circuit</b>	1 minute or system re-set (for system re-set remove input voltage)
<b>Max (PEAK) Rear converter operating current</b>	Beacon – 6A (Average – 3A)   Interior lights – 3A   Work lights – 3A
<b>System typical operating current</b>	8A per port (16A)
<b>Max current (Peak)</b>	10A per port (20A)
<b>Max operating communication distance</b>	30m (total)
<b>Recommended operational length based on max power</b>	15m per port at 12V *
<b>Vehicle DC power connection</b>	2m cable with bare ends and blade fuse / holder supplied
<b>Connection system (T-piece &amp; link cables)</b>	AMP Superseal 1.5 series with flexible protective shroud
<b>Battery guard activate</b>	< 11.7V stabilization delay of 2 minutes
<b>Battery guard de-activate</b>	> 12.2V stabilization delay of 15 seconds
<b>Operating Temperature</b>	- 40°C to 50°C (- 40°F to 122°F) at full load
<b>Storage Temperature</b>	- 40°C to 100°C (- 40°F to 212°F)
<b>Operating Altitude</b>	Up to 3000 meters (9,843ft) above sea level
<b>Base System Weight</b>	2.44 Kgs (5.38 lbs)
* Rear convertor (part Number: 22061-03) light outputs are designed to give a constant stable voltage output (12Vdc) using digital control technology to stabilise variable input voltages within the normal operating voltage range as specified – see system voltage range.	

# Warranty

## Two Year Limited Warranty

The limited warranty program is the only one that applies to this unit, and it sets forth all the responsibilities of Modul-System. There is no other warranty, other than those described herein. Any implied warranty of merchantability of fitness for a particular purpose on this kit is limited in duration to the duration of this warranty.

This kit is warranted, to the original purchaser only, to be free of defects in materials and workmanship for two years from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users.

Manufacturer will not be responsible for any amount of damage in excess of the retail purchase price of the unit under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This warranty does not apply to damage to units from misuse or incorrect installation/connection. Misuse includes wiring or connecting any non-Modul-Connect product directly to the Superseal T-piece or link cable and connecting to improper polarity power sources. Cutting into or through any control cable unless authorised.

## Limitation:

This warranty does not cover connected accessories, such as beacons and lights, damage or defects result from normal wear and tear (including chips, scratches, abrasions, discoloration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorised use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, fire and flood.

If your problem is not covered by his warranty, contact our Customer Service Department at [info@modul-system.com](mailto:info@modul-system.com) or +46 31 746 87 00 for general information if applicable.