APEX

Microgrid Controller

Installation Manual

The APEX Microgrid Control System (MCS) is designed to manage all available power sources in a microgrid according to the site requirements including operational requirements, utility requirements, grid and other conditions. It can optimize for backup today, PV self consumption tomorrow and perform tariff arbitrage after that.

- Ideal for on or off -grid applications.
- Monitor and control your Apex MCS on any compatible browser.
- Manage power flow between diesel generators, grid-tied PV inverters, PCSs and commercial batteries

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1. INTRODUCTION

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Microgrid control for medium and large commercial applications.

- Ideal for on or off-grid applications.
- Monitor and control your Apex MCS on any compatible browser.
- Manage power flow between diesel generators, grid-tied PV inverters, PCSs and commercial batteries.

1.1 DEVICE DOCUMENTATION

Apex MCS documentation includes this manual, its datasheet and the warranty terms.
All latest version documents can be downloaded from: **www.ApexSolar.Tech**

1.2 ABOUT THIS MANUAL

This manual describes the correct use and features of the Apex MCS Microgrid Controller. It includes technical data as well as user instructions and specifications to provide information about its correct functioning.

This document is subject to regular updates.

The contents of this manual might change partially or completely, and it is the responsibility of the user to make sure that they are using the latest version which is available at: **www.ApexSolar.Tech**

Apex reserves the right to modify the manual without prior notice.

2 SAFETY WARNINGS

Please read and follow all the below safety instructions and precautions before installation and use of the Apex MCS.

2.1 SYMBOLS

The following symbols are used in this manual to highlight and emphasize important information.
The general meanings of the symbols used in the manual, and those present on the device, are as follows:


General Caution


Prohibited


General Electrical Hazard


Direct Current


Information


Reinforced Insulation

2.2 PURPOSE

These safety instructions are intended to highlight risks and dangers of improper installation, commissioning and use of the Edge Device.

2.3 TRANSPORT DAMAGE CHECK

Immediately after receiving the package, make sure that the packaging and the device have no signs of damage. If the packaging shows any sign of damage or impact, damage of the MCS should be suspected and it should not be installed. If this occurs, please contact Apex customer service.

2.4 STAFF

This system should be installed, handled and replaced solely by qualified personnel.

Qualification of the staff mentioned herein must meet all the safety-related standards, regulations, and legislation applicable to the installation and operation of this system in the country concerned.

2.5 GENERAL HAZARDS RESULTING FROM NON-COMPLIANCE WITH SAFETY STANDARDS

The technology employed in the manufacturing of the Apex MCS ensures safe handling and operation.

Nonetheless, the system might pose hazards if it is used by unqualified staff or handled in a way that is not specified in this user manual.

Any person in charge of the installation, commissioning, maintenance, or replacement of an Apex MCS must first read and understand this user manual, especially the safety recommendations and shall be trained to do so.

2.6 SPECIAL HAZARDS

The Apex MCS is designed to form part of a commercial electrical installation. Applicable safety measures must be observed, and any additional safety requirements should be specified by the company who has installed or configured the system.

The responsibility to select qualified staff lies with the company that the staff work for. It is also the responsibility of the company to assess the ability of the worker to carry out any kind of work and ensure their safety. Staff must The responsibility to select qualified staff lies with the company that the staff work for. It is also the responsibility of the company to assess the ability of the worker to carry out any kind of work and ensure their safety. Staff must comply with workplace health and safety regulations. It is the responsibility of the company to provide their staff with the training necessary for handling electrical devices and to make sure that they familiarize themselves with the contents of this user manual. the training necessary for handling electrical devices and to make sure that they familiarize themselves with the contents of this user manual.

Dangerous voltages may be present in the system and any physical contact could cause serious injury or death. Please ensure that all covers are securely fastened and that only qualified staff service the Apex MCS. Ensure that the system is switched off and disconnected during handling.

2.7 LEGAL / COMPLIANCE

ALTERATIONS

It is strictly prohibited to carry out any alteration or modification to the Apex MCS or any of its accessories.

OPERATION

The person in charge of handling the electrical device is responsible for the safety of persons and property.

Insulate all the system's power conducting components which could cause injuries while carrying out any work. Confirm that dangerous areas are clearly marked and access is restricted.

Avoid accidental re-connection of the system using signs, isolating locks and closing or blocking the work site. Accidental reconnection may cause serious injuries or death.

Determine conclusively, using a voltmeter, that there is no voltage in the system before commencing work. Check all the terminals to make sure that there is no voltage in the system.

2.8 OTHER CONSIDERATIONS

This device is exclusively designed to manage power flow between energy sources such as the grid, a solar array or a generator and storage via appropriate, approved PCSs and is to be installed in a commercial setting.

The Apex MCS should only be used for this purpose. Apex is not liable for any damages caused by inappropriate installation, use or maintenance of the system.

To ensure safe use, the Apex MCS must only be used in compliance with the instructions in this manual.

Legal and safety regulations must also be adhered to, to ensure correct use.

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3. DEVICE DESCRIPTION

This device is exclusively designed to manage power flow between energy sources such as the grid, a solar array or a generator and storage via appropriate, approved PCSs and is to be installed in a commercial setting.

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Parameter	Value
Dimensions	230 (L) x 170mm (W) x 50 (H)
Mounting Method	Panel Mounted
Ingress Protection	20
Power Supply	230Vac 50Hz
Signal Inputs	3 x Vac (330V AC Max.)
	3 x Iac (5.8A AC Max.)
	1 x 0 to 10V / 0 to 20 mA input
Digital Inputs	5 Inputs
Digital Outputs	4 Relay Outputs • Rated switching current: 5A (NO) / 3A (NC) • Rated switching voltage: 250 Vac / 30 Vac
Comms	TCIP over Ethernet/wifi
	Modbus over RS485/UART-TTL
Local HMI	Master: 7inch Touch Screen
	Slave: LCD Display
Remote Monitoring & Control	Via MLT Portal

COMPATIBLE EQUIPMENT

Equipment Types	Compatible Products
Generator Controllers*	Deepsea 8610
	ComAp Inteligen
Battery Inverters (PCSs)*	ATESS PCS series
	WECO Hybo series
PV inverters*	Huawei
	Goodwe
	Solis
	SMA
	Sungrow
	Ingeteam
	Schneider
	Deye
	Sunsynk
3rd Party controllers*	Meteocontrol Bluelog
	Solar-Log
Power meters*	Lovato DMG110
	Schneider PM3255
	Socomec Diris A10
	Janitza UMG104

*Other types on request

OVERVIEW AND DESCRIPTION

The front of the Apex MCS has the following features:

- A touch-sensitive colour LCD display which displays various important parameters.
- An information packed user interface to help understand status of the Microgrid's various components.

FUNCTIONALITY

The MCS is designed for management and control of hardware at site level. It provides the logic needed to optimise various elements of a microgrid and ensure safe and effective operation. Multiple modes of operation are available and you can discuss your site requirements with your Apex engineer.
The following table describes some of the primary features and functions

Site Type	Available Logic
Grid and PV only	Zero export
	DNP3 communication to PUC
	VPP participation
Grid, Grid tied PV and Diesel	Zero export
	DNP3 communication to PUC
	PV integration with genset with minimum load presets
	VPP participation
Grid, Grid tied PV, Diesel and Battery	Zero export
	DNP3 communication to PUC
	PV integration with genset with min load presets
	Battery use logic: • Optimise for backup • Energy Arbitrage (TOU tariffs) • Peak load shaving / Demand management • Fuel optimisation • PV self consumption
	Load management
	VPP participation

4. INSTALLATION

CONTENTS OF THE BOX

Inside the box you should find:

- 1x Apex MCS Microgrid controller
- 1x Connection diagram

4.1 TOOLS REQUIRED

Appropriate tool for your choice of fastener to secure the MCS to the selected surface.
Flat screwdriver no wider than 2mm.
Laptop and network cable for troubleshooting.

4.2 PLANNING THE INSTALLATION

LOCATION

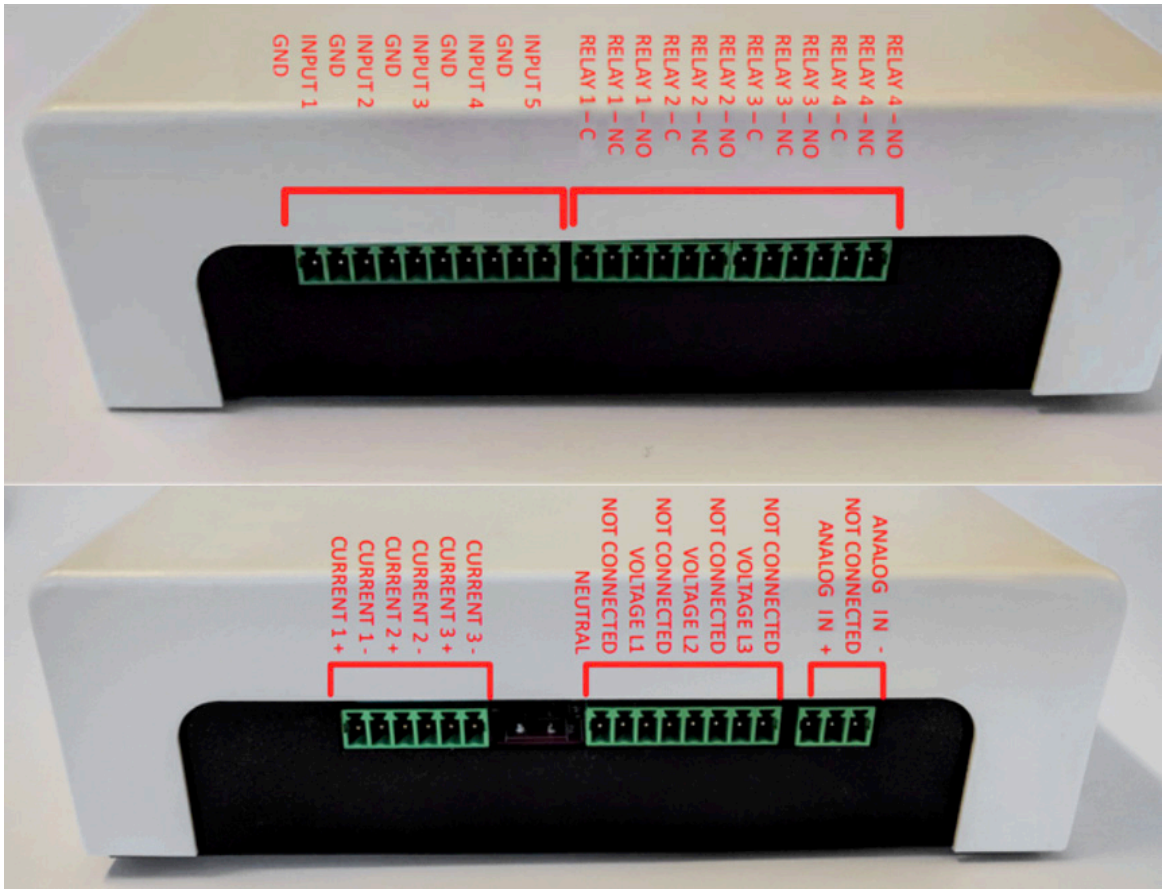
The Apex MCS may only be installed indoors and must be protected from moisture, excessive dust, corrosion and humidity. It should never be installed in any location where a potential water leak could occur.

MOUNTING THE MCS

The MCS enclosure provides four mounting tabs with holes of 4mm diameter for your choice of mounting screws or bolts. The MCS should be fixed onto a firm surface.

WIRING OF THE MCS

Each side of the MCS has a row of connectors. These are used for connecting both the measurement signals and the communications, as follows:



METERING:
A full onboard power meter is included. The meter can measure 3 currents using 5A secondary CTs and can measure 3 mains AC voltages.

DEVICE POWER:
The MCS is powered from 230V via the "Voltage L1" and "Neutral" terminals on the right side of the device (see image above). Commonly available 1.5mm² is recommended.

CAN BUS:
The device is fitted with 1 CAN interface and is designed to communicate with compatible sub components in the system via CAN bus. It can be terminated by bridging the CAN H and TERM pins.

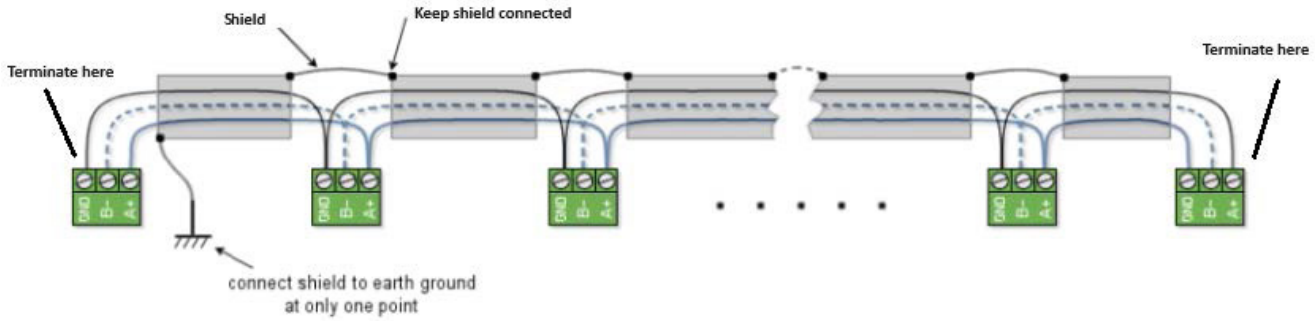
NETWORK:
The device can connect to a standard 100 base-T Ethernet network for communication with MODBUS TCP equipped slave devices and for remote system monitoring, using a standard RJ45 connector.
For remote monitoring, the network requires transparent internet connectivity and a DHCP server.

RS485:
For field equipment requiring Modbus RS485 communications, the MCS is equipped with 1 RS485 interface. This port is terminated using an onboard jumper, so the device should be installed at the end of the bus. If a different configuration cannot be avoided, please contact support to guide you through removal of the jumper.

I/O:
Terminals on the left side of the device provide programmable I/O interfaces. These interfaces are used where binary input or output signals are required. 5 inputs and 4 volt-free relay contacts are provided as outputs.

COMMUNICATIONS WIRING:
RS485 and CAN connections must be done with a high quality shielded twisted pair communications cable.

Please follow this diagram to ensure that your RS485 and CAN busses are correctly laid out and terminated.



Always terminate both ends of the bus and never terminate elsewhere. Incorrect bus wiring will result in the device failing to communicate or communicating erratically.

5. COMMISSIONING AND OPERATION

5.1 POWERING UP FOR THE FIRST TIME

Check your work.

Ensure the device is connected to internet via ethernet.

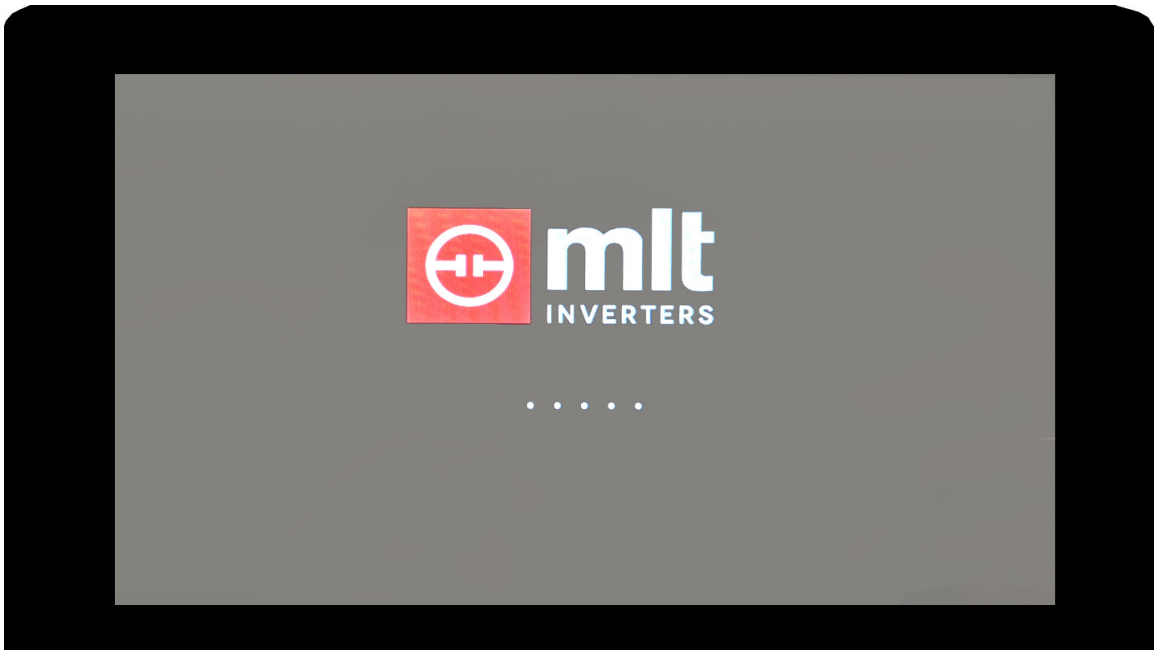
Check that all DIP switches are set to O, except DIP switch 1 must be set to 1.

Apply power.

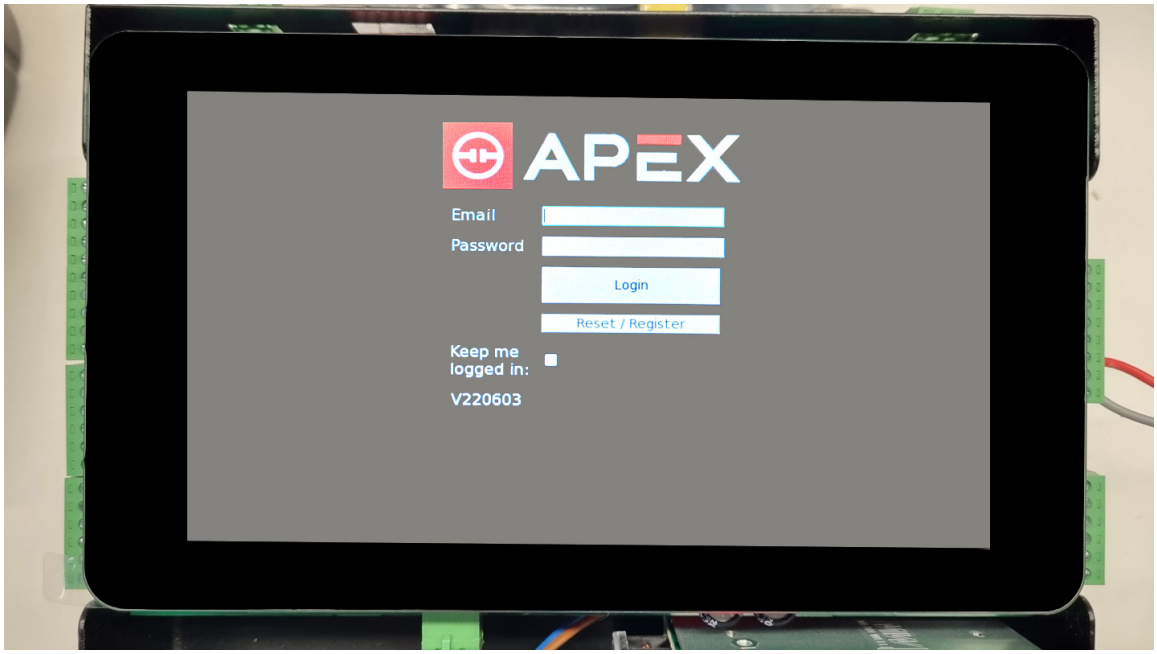
5.2 STARTUP SEQUENCE

On first start-up, you should see the following sequence on the MCS screen. Wait for it to complete.

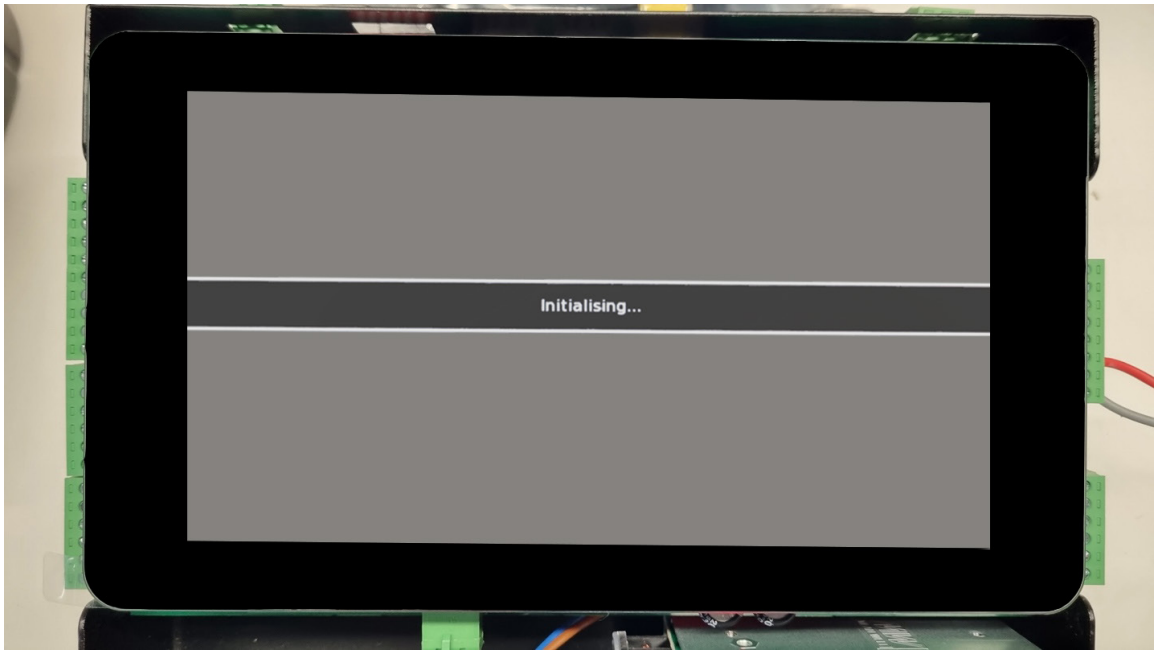
MLT logo appears.



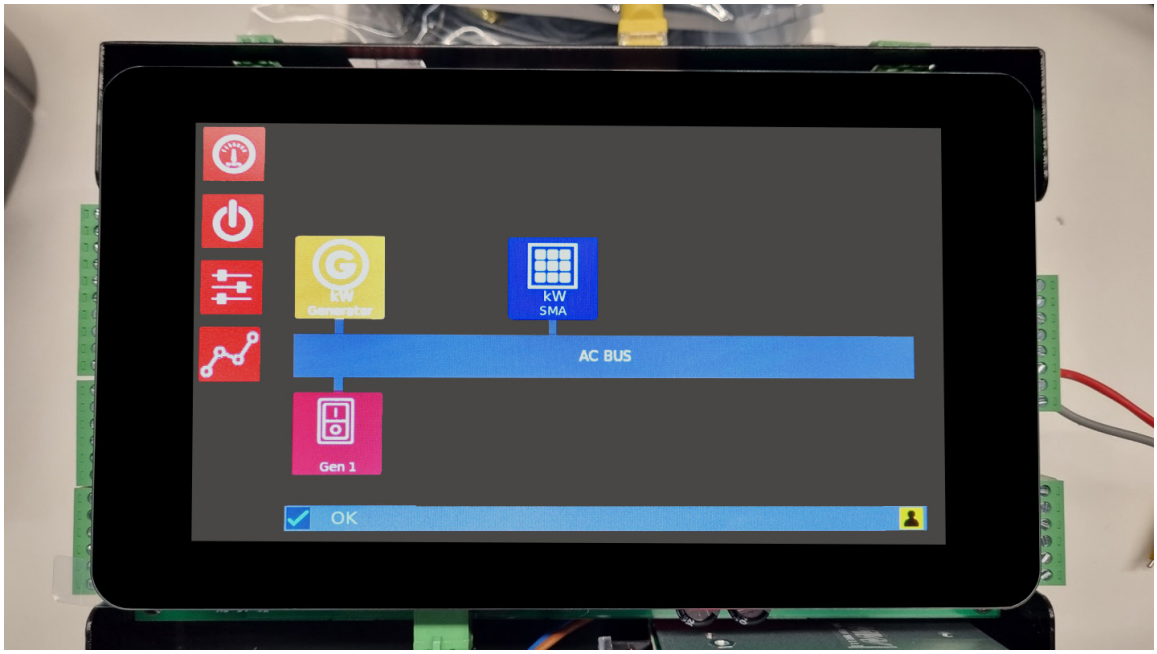
Login screen opens.



System logs in automatically.



UI loads.



The MCS requires our engineers to configure the device for you, once it has been connected into your site and has a transparent internet connection. With this in place, you may now proceed to commissioning with remote support from Rubicon. When ready, please contact the Rubicon engineer assigned to your project.

6. CLEANING AND MAINTENANCE

Cleaning and maintenance should only be carried out with the Apex MCS disconnected from any supplies.
Before taking any action, make sure that the system has been correctly isolated by opening the electrical isolators.
To clean the MCS, wipe the exterior surface with a damp (not wet) soft, non-abrasive cloth. Pay attention to the cooling slots and any dust build-up thereon which may affect the ability of the MCS to dissipate heat generated.

Do not try to repair the device yourself in case of any malfunction. If the need arises, contact Apex customer service. The system does not require any special maintenance, except for standard physical cleaning to ensure good air flow and the maintenance required by any electrical device connected with terminals that need to be tightened.

7. ORDERING INFORMATION

Part Number	Description
FG-ED-00	APEX Edge Monitoring and Control Device
FG-ED-LT	APEX LTE add-on module
FG-MG-AA	APEX MCS Diesel / PV controller – any size
FG-MG-xx	APEX DNP3 add-on license for MCS
FG-MG-AB	APEX Diesel / PV / Battery – up to 250kw AC
FG-MG-AE	APEX Diesel / PV / Battery – 251kw AC and up
FG-MG-AC	APEX DNP3 controller
FG-MG-AF	APEX Diesel / PV controller "LITE" up to 250kw

8. WARRANTY

The Apex Edge Device is warranted to be free from defects for a period of 2 years from purchase, subject to Apex's Warranty terms and conditions, a copy of which is available at: **www.apexsolar.tech**

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9. SUPPORT

You can contact our support centre for technical assistance with this product or the associated services.

9.1 PRODUCT SUPPORT

When contacting Product Support via telephone or email please provide the following information for the fastest possible service:

- Type of Inverter
- Serial number
- Battery type
- Battery bank capacity
- Battery bank voltage
- Communications type used
- A description of the event or problem
- MCS serial number (available on product label)

9.2 CONTACT DETAILS

Telephone:	+27 (0) 80 782 4266
Online:	https://www.rubiconsa.com/pages/support
Email:	support@rubiconsa.com
Address:	Rubicon SA 1B Hansen Close, Richmond Park, Cape Town, South Africa

You can reach technical support by telephone directly Monday to Friday between 08h00 and 17h00 (GMT +2 hours). Queries outside of these hours should be directed to support@rubiconsa.com and will be answered at the earliest opportunity. When contacting technical support, please ensure that you have the above listed information available.