Picture shown may not reflect actual configuration

Cat® Microgrid Master Controller-Small (MMC-S)

Caterpillar is leading the renewable microgrid market with hybrid power solutions engineered to deliver unmatched performance, reliability, durability, and cost effectiveness. The MMC-S control panel provides the supervisory control and monitoring of power generation assets within a microgrid system.

FEATURES

General Description

The Cat® MMC-S is designed for industrial/ commercial installations. The MMC-S integrates a variety of traditional and renewable energy sources within a microgrid by providing optimized monitoring and control.

Panel

- Rugged metal enclosure.
- Wall mountable.
- 13” industrial color touch-screen display.
- Cat A5:M6 electronic control module (ECM).
- Configurable protocol translator.
- Industrial PC for data management.
- Router-for customer connection-Ethernet port (2 fiber ports and 2 copper ports for LAN and WAN).
- Digital I/O module for interfacing with ATS and other relays (ioLogik E1212, 8x DI, 8x DIO, Sink).
- Input Circuit Breaker Protection (Single phase 120/240 VAC 50/60 Hz total full load amps 6.25/3.13 A).
- Lightening Arrestor & Surge Protector.
- Fan and heater for temperature regulation with thermal and humidity control.
- Uninterruptible Power Supply (UPS) for backup.
- Space and prewired connections to accept PLR809 router (sold separately), for internet connection to Cat Connect.
- Operating temperature -40°C to 50°C (-40°F to 122°F) at 0%-100% relative humidity.

User Interface

Provides graphical user interface (GUI) to all control elements to simplify operator interactions with the distributed energy resources. Includes system visualization and user interface for manual or automatic control of the distributed energy resources.

Distributed Energy Resource Dispatch

The distributed energy resources, including the photovoltaic (PV) system, energy storage system (ESS) and generator sets are controlled from the MMC-S for:

- Energy contribution from each of the distributed energy resources to maximize penetration from renewable energy sources and system reliability. Priority for distributed resource use can be changed from the MMC user interface.
- Optimized asset overall performance according to pre-programmed routines that can be adjusted via user-selectable criteria. The optimization routines can be based on several different parameters, such as minimizing fuel cost, optimizing engine operation, charging batteries from PV only or maximizing system reliability.
- Providing a minimum level of spinning reserve online to respond to sudden load transients.

Grid Import/Export Control

The MMC-S will regulate the amount of real and reactive power exported from PV to the utility based on a programmable set point.

Software Modules

- Individual software modules control each type of asset.
- Up to five software modules may be installed to match the site power system configuration.

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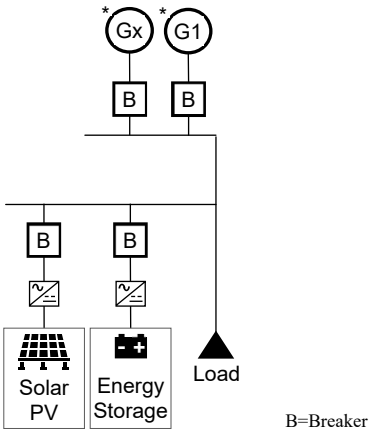
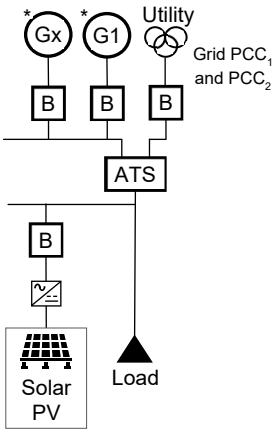
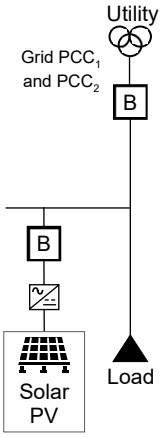
Technical Specifications

The MMC-S is used in Microgrids with the following configurations:

Asset Type [1]		(qty)	Site Power System Configuration: Off Grid	Grid Connected: PV with Standby Genset(s)	Grid Connected: PV Only
Photovoltaic (PV) Inverter		20	●	●	●
Energy Storage System (ESS) Inverter		5	●	N/A	N/A
Generator set (G)		5	●	●	N/A
Automatic Transfer Switch (ATS)	PV on Load circuit	Unlimited [2]	N/A	●	N/A
	ESS on Load circuit	N/A	N/A	N/A	N/A
Power Meter at Grid PCC		2	N/A	●	●
Grid Connection Points of Common Coupling (PCC)		1 or 2	N/A	●	●
Software Modules [The appropriate Software Enabled Attachments SEA's must be installed, depending on site power system configuration]					
Photovoltaic (PV)			●	●	●
Energy Storage System (ESS)			●	N/A	N/A
Generator set with Cat EMCP Controls			● [3]	● [3]	N/A
Generator set with Other Controls see Table-(a)					N/A
Automatic Transfer Switch (ATS)			N/A	●	N/A
Diagrams			Split bus not allowed – no tiebreakers allowed within microgrid		
Typical Single Line Diagrams (SLD's) [4]					
Benefits			✓ PV can operate whenever Genset or grid forming ESS is online ✓ PV energy reduces fuel consumption during genset operation ✓ Any PV energy exceeding load can charge ESS ✓ ESS can provide reserve power, enabling shutdown of one or more generators, reducing fuel consumption ✓ ESS can be grid-forming, allowing all gensets to shut down for zero fuel consumption or "silent mode" operation. ✓ ESS supports genset response to block-loads, enabling gas genset island-mode ✓ Provides State of Charge management for the ESS	✓ PV reduces grid import and may provide grid export ✓ Limits grid export to zero or user-set value ✓ One or two grid Points of Common Coupling ✓ PV energy reduces fuel consumption during standby genset operation ✓ Power output from gensets can be combined ✓ ATS shown can be replaced by non-grid-paralleling switchgear	✓ PV reduces grid import and may provide grid export ✓ Limits grid export to zero or user-set value ✓ One or two grid Points of Common Coupling

● – Applicable
N/A – Not Applicable

1 – Refer to Table (a) Connected Asset Compatibility for list of approved assets.
2 – PV will operate only when all ATS are in the same position (Normal-grid or Emergency-genset).
3 – The generator set SEA's cannot be combined – one selection [Cat] or [other than Cat].
4 – Detailed SLD's are available to meet application requirements. Contact your local Cat® dealer for more information.
* – Paralleling Genset controllers (such as EMCP4.4) or Paralleling Switchgear Required.

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Table (a) - Connected Asset Compatibility

The MMC-S is only compatible with the assets in the list below:

*Preconfigured Asset Compatibility	
PV Inverters	SMA Sunny Tripower, Sunny High Power, Peak 3, Sunny Boy, CORE1 (Not compatible with SMA CORE2)
Energy Storage Inverter	BDP1000
EMCP Genset Controls	EMCP 4.3, 4.4 EMCP 4.2, 4.2B (both require configurable protocol translator)
Other Genset Controls	ComAp: InteliGen NTC BaseBox (IG-NTC-BB), IG 200, IG 500 Deep Sea: DSE8920, DSE8610 MKII DEIF: AGC-4, AGC 150, AGC 200 Woodward: easYgen-2000, easYgen-3000
Power Meters	Bitronics M871, PowerPlex II
Switchgear	Various switchgear via configurable protocol translator. Contact your local Cat dealer for more information.

*This list is updated frequently – other assets will be considered upon request. “Assets” are defined as system components that are controlled or monitored by the MMC to manage the power system.

Applicable Standards and Certifications

- UL Listed to the following standards (cULus certification and mark)
  - UL508A Type 1 (indoor rated)
  - CSA C22.2 NO. 14-18
- Optional protective screen cover is required in outdoor installations to achieve UL listing for:
  - UL 508A Type 4 (outdoor rated)
  - CSA C22.2 No. 94; Type 4
- CE Declaration of Conformity:
  - IEC 60204-1 (pending)
- Designed to:
  - IP54 / NEMA 3R

Standard Components

- Industrial Personal Computer (IPC) used for data management. The CPU has 8GB RAM, 512GB storage and MS Windows OS. This provides local storage of battery system data and enables transfer of battery data to any installed telematics device in the MMC.
- Uninterruptible Power Supply (UPS) with sealed lead acid (SLA) battery, when fully charged, provides backup for a minimum of 10 minutes with a DC load of 150 watts.
- Configurable Protocol Converter is a modbus translator used to communicate with system assets like genset controls and power meters.

Attachments (Optional)

- Protective Screen Cover:
  - Required for outdoor installations
  - The protective screen cover provides easy access to the color touch-screen display installed behind the viewing area that is conveniently sized to allow direct mounting in the usable door area of the MMC enclosure.
  - Painted mild steel frame
  - Quarter-turn latches for quick access with optional field installed key-lock handle.
  - 0.25-in. (6-mm) thick, clear polycarbonate windows for easy viewing
  - 2.5-in. (64-mm) deep to allow for deep controls
  - Built-in gasket compression stop on back of window frame to allow for easy installation.
  - Includes mounting template and mounting hardware.
  - Frame dimensions inches (mm): Height 16.14 (410) x Length 22.19 (564) x Width 2.73 (69).
  - Window dimensions inches (mm): Height 11.31 (287) x Length 18.70 (475).
  - Meets:
    - UL 508A Type 4 (outdoor rated)
    - CSA C22.2 No. 94; Type 4
- Key Lock Handle for Protective Screen Cover

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Ship-loose Attachments (Optional)

- Additional 13” HMI touch-screen (9-32 VDC 17-36 watt) display and human-machine interface (HMI) for use within the customer WAN. It provides the same functionality as the HMI mounted in the MMC-S enclosure. This remote HMI does not replace the HMI mounted in the MMC-S enclosure.

- Ethernet Switch provides 8-RJ45 ports that allows connection of additional user assets to hybrid LAN. Unmanaged switch for ease of system integration.

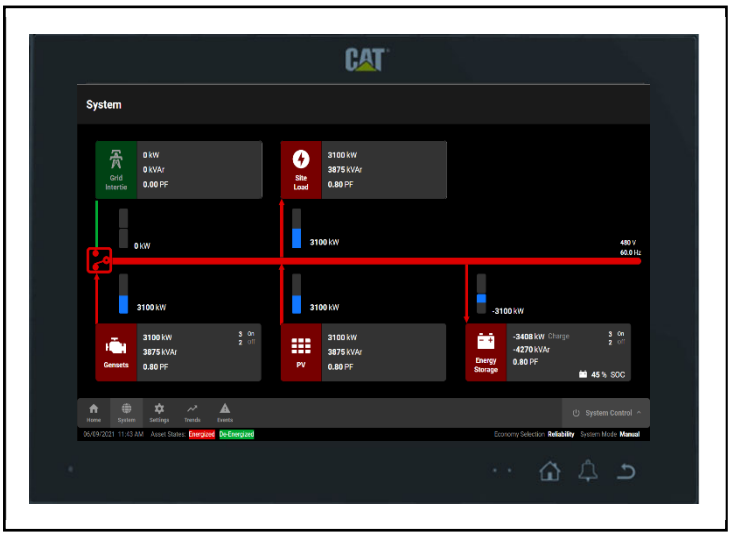
Remote Monitoring (Optional)

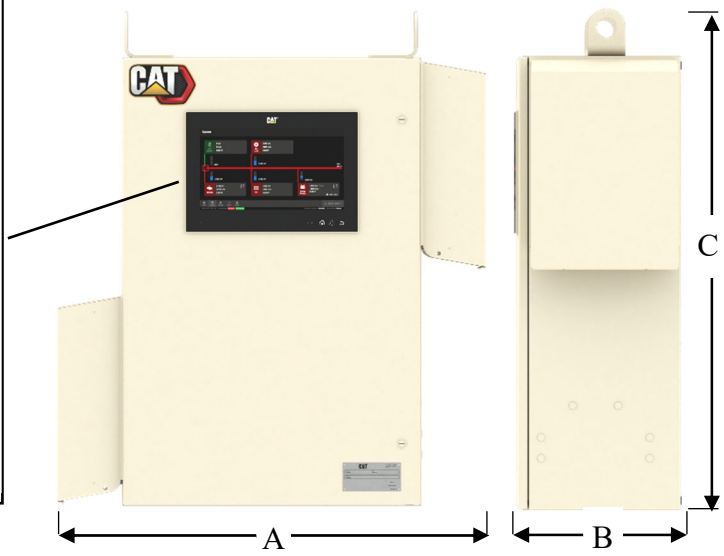
The complete system may be monitored remotely using Cat Connect Technology telematic device (PLR809 router) to provide real time monitoring of the performance and health of the installation. If an issue is detected, local technicians can be dispatched to resolve the problem.

Worldwide Product Support

- Cat dealers provide extensive post-sale support including maintenance and repair agreements.
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries.

System Screen





High-Resolution LCD	
Colors	16.7 million
Backlight	Thin-film-transistor (TFT)
Resolution 13.3”	1920 x 1080

Dimensions			
A	B	C	Weight
mm (in)	mm (in)	mm (in)	kg (lbs)
873 (34.4)	323 (12.7)	1014 (40.0)	75 (165)

Materials and specifications are subject to change without notice.
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