## Cat<sup>®</sup> Energy Control System 300





Image shown may not reflect actual configuration.

## FEATURES

#### **General Description**

The Cat<sup>®</sup> ECS 300 is designed for industrial/ commercial installations. The Cat ECS 300 integrates a variety of traditional and renewable energy sources within a microgrid by providing optimized monitoring and control for up to 4 Distributed Energy Resource (DER) assets.

#### Panel

- · Rugged metal enclosure
- NEMA 1 wall mountable
- 396 mm (15.6") industrial color touch-screen display
- Cat A6L3 electronic control module
- · Ethernet router included
- Input Circuit Breaker Protection (Single phase 120/240 VAC 50/60 Hz)
- Best Battery Diode (BBD) for backup
- Cat PLE702 telematics device
- Router for Internet connection to telematics with Ethernet connection
- Operating temperature -20°C to 40°C (0 to 95% relative humidity)
- Voltage & lightning protection

#### **User Interface**

Provides graphical human machine interface (HMI) to all control elements to simplify operator interactions with DER assets. Includes system visualization and user interface for manual or automatic control of the DERs.

# Cat<sup>®</sup> Energy Control System (ECS) 300

The Cat<sup>®</sup> ECS 300 integrates advanced site controls for both traditional and hybrid microgrid systems. The Cat ECS ensures precise management of generation assets with operational reliability and optimized cost effectiveness. The system features a user-friendly and intuitive 396 mm (15.6") color touchscreen interface.

**Distributed Energy Resources (DER) Dispatch** 

The DERs, including but not limited to generator sets, battery energy storage system (BESS) and other renewable sources are controlled from the Cat ECS 300 for:

- Energy contribution from each of the DERs to maximize penetration from renewable energy sources and system reliability. Priority for distributed resource use can be changed from the Cat ECS 300 user interface.
- Optimizing asset performance according to preprogrammed 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, user configurable schedules for charging and discharging and grid export/import, charging batteries from PV only or maximizing system reliability.

#### **Grid Import/Export Control**

The Cat ECS 300 will regulate the amount of real and reactive power exported from DER's to the utility based on a programmable set point.

#### **Cat Engineering Services Custom Solutions**

The Cat ECS provides the option to have Cat Engineering Services customize solutions to meet large site requirements worldwide.



## **Technical Specification**

The Cat ECS 300 is used in a variety of microgrids where the Cat ECS 300 is configurable to meet applicable sitespecific asset requirements. The following are four common examples, with more possible configurations available.

	Site Power System Configuration - any combination up to four (4) assets						
Asset Type <sup>(1)</sup>	Off Grid ***	Grid Connected					
	(island)	PV with Genset(s)	PV Only	PV/BESS with Genset(s)			
Photovoltaic (PV) Inverter	•	•	•	•			
Battery Energy Storage System (BESS) Inverter	•	-	-	•			
Generator set (G)	•	•	-	•			
(ATS)	N/A	•	-	-			
Power Meter at Grid PCC	N/A	•	•	•			
Grid Connection Points of Common Coupling (PCC)	N/A	•	•	•			
Diagrams	Split bus can be customized	through Engineering Services w	ithin microgrid				
Typical Single Line Diagrams (SLD's) <sup>(2)</sup> Benefits	<ul> <li>G2</li> <li>G1</li> <li>B</li> <li>B</li> <li>B</li> <li>B</li> <li>B</li> <li>B</li> <li>B</li> <li>C</li> <li>Energy Storage</li> <li>V</li> <li>PV</li> <li>Carling</li> <li>Consumption during genset operation</li> <li>Any PV energy reduces fuel consumption during genset operation</li> <li>Any PV energy exceeding load can charge BESS</li> <li>BESS can provide reserve power, enabling shutdown of one or more generators, reducing fuel consumption</li> <li>BESS can be grid-forming, allowing all gensets to shut down for zero fuel consumption or "economy mode" operation.</li> <li>BESS in addition to other non- intermittent DERs can participate in "load smoothing" operation</li> <li>BESS supports genset response to block- loads, enabling gas genset island- mode</li> <li>Provides State of Charge (SoC) management for the BESS</li> </ul>	<ul> <li>Grid PCC, and and and provide grid export of Commo Coupling * PV energy reduces fuel consumption during standby genset operation * ATS shown can be replaced by non-grid-paralleling switchgear island-mode</li> </ul>	Grid PCC <sub>1</sub> Utility and PCC <sub>2</sub> Utility B B B C Solar PV C Solar PV C C Solar PV C C C Solar PV C C C C C C C C C C C C C C C C C C	<ul> <li>Grid PCC, Utility and PCC, Utility and PCC, Utility</li> <li>G2</li> <li>G1</li> <li>B</li> <li>B</li> <li>B</li> <li>B</li> <li>B</li> <li>B</li> <li>Coad, 4</li> <li>PV</li> <li>Storage</li> <li>Load, 4</li> <li>PV</li> <li>Storage</li> <li>Load, 4</li> <li>Coad, 4&lt;</li></ul>			

Applicable

<sup>(1)</sup> – Refer to Table (a) Connected Asset Compatibility for list of approved assets.

N/A - Not Applicable

(2) – Detailed SLD's are available to meet application requirements. Contact your local Cat® dealer for more information. \* - Genset paralleling applications require paralleling controls (such as EMCP4.4 or Cat ECS 200).



## Table (a) – Connected Assets Compatibility

Cat ECS 300 may be configured with up to 4 DER's. The table below includes a current list of compatible assets.

Preconfigured Asset Compatibility <sup>(3)</sup>				
PV Inverters	SMA: Sunny Tri, Sunny Tri 2, Sunny Peak Yaskawa:XGI1000, XGI1500			
Energy Storage Inverter	BDP1000			
Genset Controls Exclusive	Paralleling	Group - A	Cat ECS 200 - Advanced Paralleling Control Data Link (APCDL),	
Groups <sup>(4)</sup>		Group - B	GCCP 1.5	
		Group - C	EMCP 4.4, Multi-gen data link (MGDL)	
		Group - D	Other Genset Controls: ComAp: InteliGen NTC BaseBox (IG-NTC-BB) Deep Sea: DSE8600 DEIF: AGC 4, AGC 150 Woodward: easYgen-5003, easYgen-5010, 5100 and 5101	
	Standby	Group - E	EMCP 4.3, 4.2B, 3.3, 3.2 (RS485 to Ethernet Protocol convertor – Standby Only), GCCP 1.1, GCCP 1.2	
Power Meters/Utility Protection Devices	SEL735, PXM4K/6K/8K, PXM2000, ION7550/7650, ION 9000, PQM II, Bitronics Legacy, SEL751A, SEL751, AGC 4, AGC 150, Cat remote sensing and breaker control			
Automatic Transfer Switch (ATS)	A single "ATS Run Signal" port is hardwired as a normally open, discrete DC input. When multiple ATS's are wired in parallel, the standard Cat ECS site control is unable to log which ATS sends the signal.			
Switchgear	Various switchgear via configurable protocol translator. Contact your local Cat dealer for more information.			

#### **Standard Features**

Applicable Codes and Standards	<ul> <li>UL 508A <sup>(5)</sup> (pending)</li> <li>NEMA Type 1</li> <li>SunSpec Compliant</li> </ul>
Standard Components	<ul> <li>Best Battery Diode (BBD) for backup power supply.</li> <li>Managed switch that offers configurable site communication and enhanced security provision to assure network integrity. One ethernet (4-Wire) port connection for customer networking of DER's.</li> <li>Telematics PLE702 (See LEHE22212) allows data logging of 300 channels for 1.5 days (requires subscription for visualization).</li> </ul>

<sup>&</sup>lt;sup>(3)</sup> 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 Cat ECS 300 to manage the power system.

<sup>&</sup>lt;sup>(4)</sup> Genset asset compatibility is exclusive to a single controls group. Group D requires a single genset control platform.

<sup>&</sup>lt;sup>(5)</sup> Note: Codes may not be available in all model configurations. Please consult your local Cat dealer for availability.



## Standard Features (continued)

	Auto			
	Grid Connected			
	Sub-modes (16)			
	Unplanned Islanding or Emergency standby			
	- Closed transition (with soft unload) or Open transition			
	Planned Islanding or Intentional islanding			
	Load sense/load demand			
	- Based on asset priority or engine-hour balancing			
	- Automatically matches on-line asset capacity to the loads			
	• Load shed/load add			
	- Automatic or manual load shed up to four (4) stages			
	• Utility parallel, import power from grid			
	- Minimum import kW setpoint is maintained			
	Utility parallel, export power to grid			
	- Target export setpoint is maintained			
	Utility parallel, base load operations			
	Economy mode			
	- All Gensets and non-renewable "fuel consuming" assets OFF			
	Reliability mode			
	<ul> <li>At least one high priority "fuel consuming" asset ON</li> </ul>			
	Scheduling			
	- 5 schedules and 6 segments-BESS dispatch scheduling based on year, month, time, day and segment of day			
	- 5 schedules and 6 segments -Import and export scheduling for active and reactive power based on time, day and			
	segment of day			
	• Load smootning mode			
	- Non-stable load dispatch using available assets for specified durations of time			
Control Modes	• 5 Flexible enciency modes 1, 2 and 3 that may be set up based on asset group priorities			
	PTO-active add and drop     Ability to monuply bring additional gapages onling in antigination of bringing on large loads			
	- Ability to manually billing additional generes online in anticipation of billinging on large loads.			
	offling			
	Grid Reactive Control mode			
	- there are 4 available reactive power control settings- Constant VAr, Constant PF, Volt-VAr curve, Watt-VAr curve			
	Off-Grid (Island)			
	Sub-modes (7)			
	Economy mode			
	<ul> <li>All Gensets and non-renewable "fuel consuming" assets OFF</li> </ul>			
	Reliability mode			
	<ul> <li>At least one high priority "fuel consuming" asset ON</li> </ul>			
	Load smoothing mode			
	- Non-stable load dispatch using available assets for specified durations of time			
	• 3 Flexible efficiency modes 1, 2, and 3 that may be set up based on asset group priorities			
	Pro-active add and drop			
	- Ability to manually bring additional gensets online in anticipation of bringing on large loads.			
	- Manually turning off gensets instead of waiting for LSLD drop when the customer knows large loads are being taken			
	onnine			
	Manual			
	Communications, power allocation test mode for site commissioning. Manually control assets and the microgrid system.			
	Idle			
	Monitoring only - Cat ECS 300 relinquish control to another site controller.			
	Off			



## Options

Options are available to meet application requirements. Contact your local Cat dealer for more information.





## **Options (**continued)

#### **Cat Engineering Services**

Global team delivering advanced solutions to meet customer specifications including:

- Custom Cat ECS control solutions
- Cat ECS hardware integrated with distribution switchgear
- · Customer specified sequence of operations
- Test reports per Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
- Integrated Automatic Transfer Switch (ATS) solutions including remote start signal integrity and report generation
- Expanded performance capability:
  - Multi-bus sites
  - Advanced utility protections
  - Greater than 8-stage Load Shed Load Add (LS/LA) functionality
  - Redundant PLC configurations
  - Weather-rated packaging (IP54 / NEMA 3R or IP52 / NEMA 12).
  - Larger HMIs
  - Up to 250 Distributed Energy Resources (DER's)
- Off Package HMI:

The Cat ECS 400 supports a full function HMI display with the addition of an unmanaged Ethernet switch. The interactive 396 mm (15.6") color touchscreen graphical interface serves to display system alarm conditions, status indications and annunciation.

(Ship loose HMI display without panel box).

Contact your local Cat dealer for more information.











### **Dimensions & Display**





Image shown may not reflect actual configuration.

High-Resolution LCD		Dimensions					
Colors	16.7 million	Control Box	А	В	C (7)	Weight	
Backlight	Thin-film-transistor (TFT)	Units	mm (in)	mm (in)	mm (in)	kg (lbs)	
Resolution 15"	1920 x 1080	Cat ECS 300	1007 (39.63)	800 (31.50)	309 (12.18)	75 (165)	

 $^{(7)}$  – Dimension including connectors on the door.

#### Worldwide Product Support

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

Materials and specifications are subject to change without notice. The International System of Units (SI) is used in this publication.

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