

## Data Sheet

# Cube SGC – Smart Grid Controller

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The Cube SGC (smart grid controller) is a scalable communication and automation platform for demanding smart grid applications, ideally suited for enabling transition of legacy control and automation schemes into more complex data intensive future platforms.

The Cube SGC has a modular hardware design to allow varied configurations of field input and output (I/O) and communication modules to manage multiple application scenarios. The Cube can range from 1 to 4 cells with 2 modules per cell.

Cube SGC modules options are listed in Table 1.

The powerful software platform is built on multi-tasking real-time operating system. It can handle various communication protocols and I/O modules to provide wide ranging communication and automation solutions.

Wide-ranging communication protocols are part of the applications library available on the Cube applications platform. Cloud interface options are based on standard JSON data format and MQTT exchange.

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### Key Features

- Comprehensive communication protocols software library
- 32-bit ARM Processor based
- Variable configurations from 1 to 4 cells, 2 modules per cell
- 2 Configurable 100 Base-T Ethernet Ports (HSR, PRP)
- Integrated 1 RS-232 or 1 RS-485 serial port
- 2 RS-232/RS-485 (independently selectable) module
- 1 Cellular/LTE communication module
- Digital, analogue I/O and other extension modules
- Redundant power supply module

### Key Benefits

- Flexible integration platform
- Interfaces legacy data communication platforms and protocols
- Distributed or stand-alone automation capabilities
- Smart grid control and management ready
- Easy to use cloud data interface
- Designed for easy retrofit in the field
- Modular, scalable, flexible design

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**Table 1: Cube SGC Modules**

	Name	Description	Placement
Base Modules	CPU	Main processor module, with: 32-bit ARM processor, 2 x Ethernet 100 Base T ports, 1 x SD card holder, Realtime clock Optional: 1 x RS-485 2-wire or RS-232 TX/RX card	Default Cube SGC module
	PSU	12V, 48V or 110V power supply with different input voltage ranges	Default Cube SGC module (Redundant configuration with an additional power supply module)
Extension Options	2SER	Serial port extension module with 2 ports for RS-232 and/or RS-485	Up to 1 per Cube SGC
	DI8	8 digital input channels module for 24V, 48V or 110V inputs	Up to 2 per Cube SGC
	3DO-1CO	3 relay output channels with 1 changeover digital output	Up to 2 per Cube SGC
	DI4-2DO	Combined 4 digital input channels for 24V, 48V or 110V inputs and relay output channels	Up to 2 per Cube SGC
	4AI	4 DC analogue input channels for $\pm 20$ mA loops or $\pm 10$ V DC source	Up to 2 per Cube SGC
	CELL	Cellular/LTE modem module	Up to 1 per Cube SGC

## 1 Default Features

Base Cube SGC configuration consists of a CPU module, a power supply module, integrated Application Data Hub (ADH) software and one application licence for IEC 60870-101/103/104 (client and server) or DNP 3.0 (client and server) or Modbus.

The CPU module contains two configurable Ethernet ports provide a powerful network connectivity platform. Configuration options are:

- 2 x Ethernet ports with independent MACs
- HSR (High-availability Seamless Redundancy) Ethernet ring
- PRP (Parallel Redundant Protocol) Ethernet configuration

For local IED integration one electrically isolated RS-232 or RS-485 serial communication port is provided.

## 2 Integrated Software

The Cube SGC includes fully integrated Application Data Hub (ADH) software which is a flexible and complete data communication and process automation package. The ADH includes support for communication protocols IEC 61850, IEC 60870-5-101/103/104, DNP3, Modbus, JSON/MQTT and local I/O and extension cards.

Infoteam's OpenPCS programmable logic controller (PLC) application can be integrated as an option. The PLC application is fully compliant with the IEC 61131 standard and can be programmed using all 5 programming languages defined in the standard allowing the user to develop project specific automation logic.

Other application specific software modules such as data type converter or COMTRADE file reader are also available.

## 3 Configuration and Programming Tools

The Cube SGC can be configured using eNode Designer. The IEC 61131 compliant development tool OpenPCS is linked to the configuration tool.

By linking the ICD Designer tool to the eNode Designer, implementing IEC 61850 capability becomes a simple and easily achievable engineering task.

## 4 Specifications

### 4.1 Technical Specification

Processor	Texas Instrument AM335x @ 800 MHz
Memory	4 GB EMMC Flash and 512 MB RAM Up to 32 GB SD Flash Memory Card
Ethernet Ports	2 x RJ-45 100 Base-T Ethernet ports; configurable PRP, HSR or independent MAC Optional 3 port ethernet switch module
Serial Ports	1 x RS-232 (TX/RX) or 1 x RS-485 2-wire 2 x RS-232/RS485 (selectable) module 2.5kV isolated
I/O Modules	8 x Digital Inputs 5kV isolated 4 x Digital Inputs, 2 x Relay Outputs 5&4kV isolated 4 x Relay Outputs 4kV isolated 4 x DC Analogue 20mA/10V Inputs 3kV isolated
Scalable Configuration	Up to 4 cells on backplane system to accommodate up to 8 modules including power supply and main processor module
Power Supplies	Single or redundant power supply modules with input ranges: 9 – 30 Vdc 18 – 72 Vdc 78 – 140 Vdc
Power Consumption	Max 30 Watts (fuse) Typical 20 Watts
Dimensions	80/150/220/290 x 85 x 140 mm (L x W x H)
Weight	300 to 900 grams
Temperature Range	-20 °C to + 65 °C

## 5 Compliances<sup>1</sup>

Immunity	
<b>IEC 61000-4-2</b>	Electrostatic discharge Test Level 3
<b>IEC 61000-4-3</b>	Radiated radiofrequency, electromagnetic field immunity Test Level 3
<b>IEC 61000-4-4</b>	Electrical fast transient, burst immunity Test Level 3&4
<b>IEC 61000-4-5</b>	Surge Immunity Test Level 3 and Level 4
<b>IEC 61000-4-6</b>	Immunity to conducted disturbance induced by radio-frequency fields Test Level 3
<b>IEC 61000-4-16</b>	Immunity to conducted asymmetric disturbances Test Level 4
<b>IEC 61000-4-17</b>	Immunity to ripple on DC input ports Test Level 3
<b>IEC 61000-4-18</b>	Immunity to damped oscillatory waves Test Level 2&3
<b>IEC 61000-4-29</b>	Voltage dips, short interruptions, and voltage variations immunity test

Emission	
<b>CISPR 22</b>	Radiated disturbance, electric field strength Limit Class A

Environmental	
<b>IEC 680068-2-2</b>	Dry Heat Operational +65 °C
<b>IEC 680068-2-2</b>	Dry Cold Operation – 20 °C

<b>IEC 680068-2-2</b>	Dry Heat Maximum Storage Temperature +75 °C
<b>IEC 680068-2-2</b>	Dry Cold Minimum Storage Temperature: –35 °C
<b>IEC 680068-2-14</b>	Change of Temperature: –20 °C to + 65 °C
<b>IEC 680068-2-78</b>	Damp Heat Steady Operational 93 % Humidity at 23 °C 1 cycle 10 days
<b>IEC 680068-2-30</b>	Damp Heat Cyclic Operational @ 93% Humidity 25 °C to 40 °C2 cycles 25 hours
<b>IEC 680068-2-2</b>	Dry Heat Operational +65 °C
<b>IEC 680068-2-2</b>	Dry Cold Operation – 20 °C
Pre- and Post-Condition Testing: Dielectric Test 2kV ac for 1 minute and Insulation Resistance @500 Vdc/100 MΩ	

Safety	
<b>IEC 60255-27</b>	Clearance, creepage 4kV and 5kV digital signal inputs and outputs Clearance, creepage 1.5kV and 3kV communication modules, power supply and analogue input modules

<sup>1</sup> Tested in accordance with IEC 61850-3 test standard.

## Fundamentals

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