QRATE HCC2 Hyperconverged Edge Controller

Fast, functional, more flexible edge control

Key features

+ OPC UA, MQTT spb, Modbus, DNP3, EtherNet/IP protocols
+ Open source Software Development Kit, develop applications with no additional cost
+ IEC 61131-3 programming with Rockwell Automation ISaGRAF Workbench
+ Embedded web browser configuration tool
+ GPS Receiver
+ Optional 4G LTE with Wi-Fi & Bluetooth
+ Embedded analog and digital I/O
+ -40°C to 75°C operating temperature

Combining an edge computer, real-time processor, industrial I/O, GPS, cellular modem, Wi-Fi, and an Ethernet switch into one rugged platform, the QRATE HCC2 edge controller provides analysis and autonomous control for remote equipment.

Delivering unrivalled data management performance, QRATE HCC2 offers premiere software tools and applications. The HCC2 has been carefully designed to provide improved configuration workflows compared to generic edge computers – allowing end users to get up and running faster with a less steep learning curve. HCC2 users can also choose from flexible surveillance options, for IoT or traditional SCADA OT systems.

The HCC2 is a precision-data acquisition and edge controller unit designed for high-speed operation in harsh environments. This unit is suited for applications with wide temperature range and low-power consumption requirements.

The HCC2 can operate as an RTU/PLC, edge device controller and gateway, or as part of a larger integrated network of automation technologies. The data it acquires can be used locally for control or remotely for alarm and event reporting and remote data analytics.

It is equipped with 26 IO points, 6 Serial ports, 4 Ethernet ports and GNSS receiver. Optional wireless communication model includes LTE and WiFi radios installed from the factory.

INTELLIGENT ACTION

QRATE HCC2 applications

+ Data Log Manager
Time series data is logged in the Data Log application. Users can store up to 1GB of data on the Internal Storage. Data can be exported with Unity Edge and converted to .csv files using the HCC2 Data Log Extractor utility.

+ Event & Alarm Manager
Registered events and alarms have configurable attributes based on the alarm type (analog or digital). The application enables latching, bypassing and acknowledgement of alarms. Current status and history can be viewed through Unity Edge.

+ Unity Edge
A web server hosted on the HCC2 that provides online user interface to:
- Configure IO, Networks and Applications
- Deploy changes to runtime
- Configure protocol translation
- Manage User Security
- Monitor real-time data remotely
- View diagnostics data and logs
- Backup, Restore and Export log files

+ Avalon Gateway
Avalon Gateway enables the HCC2 to talk directly to the Avalon platform in the Cloud or on-premise. It utilizes secure MQTT protocol, data buffering, and automatic backfill after communications loss.

+ DNP3 Outstations
Enables two TCP outstations. Implements DNP3 Level 3 and supports Secure Authentication with SAV2 and SAV5. Supports class 0,1,2,3 with a 50,000 event buffer. Implements remote SCADA time syncronization and unsolicited polling.

+ EtherNet/IP
Implements scheduled communication for IO connection on Ethernet Ports 3 & 4. Unscheduled messaging can be implemented on Ethernet Ports 1 & 2, and WiFi, for communication with Rockwell Automation Logix Controllers.

+ OPC UA Driver
Server and Client protocols supported natively. Security options for users, signed and encrypted connections.

+ MQTT
MQTT implements Sparkplug B protocol, data buffering and optional TLS encrypted data transmission.

+ Modbus
Modbus Client and Modbus Server over TCP and Serial provides highly configurable Modbus TCP/RTU functionality, enabling integration with legacy SCADA or field devices.

I/O and programming
Embedded I/O is configured by Unity Edge and can be used by HCC2 Docker applications, ISaGRAF programs and Modbus communications. There are 26 I/O points available: 8 AI with HART, 8 standard AI, 8 DIO, 8 DI, 2AO.

Expansion I/O can be added via Rockwell Automation Flex IO, Flex5000 IO or PowerFlex VFD.

Software tools
In addition to the device configuration support provided by Unity Edge, the following software enables custom programming and remote device management.

+ Edge Package Manager
Update HCC2 operating system images and firmware over an Ethernet connection. View logs, manage docker containers, connect to remote Edge Device Management Servers.

+ ISaGRAF Workbench
Rockwell Automation ISaGRAF enables IEC 61131-3 compatible programming. Users can write custom logic for process control in four languages; Ladder, Function Block, Structured Text, and Sequential Function Chart. ISaGRAF allows online editing and debugging of running programs.

+ Software Development Kit
Developers can add custom analytics and reporting applications to the HCC2 using languages such as C# or Python, or by open source containers directly from Docker Hub. The SDK also supports integrating application data with HCC2 data points via REST API and OPC UA client communications.

+ Data Log Extrator
Opens and processes HCC2 data log and system log files exported from the HCC2. Select the type of log to process, along with start and end times and then create a CSV with the designed data.

Communication

The controller has 6 serial ports: (1x) RS232 full-duplex, (1x) RS485 full-duplex, (4x) RS485 half-duplex. Each port will support Modbus client or server. (2x) Gigabit/s Ethernet ports enable communication with the edge controller for local and remote surveillance, control, and configuration, additionally (2x) 10/100 Mb/s ports are designed to function as a two-port Ethernet switch, this enables two functions. First, a Device Level Ring (DLR) can be connected by adding other DLR compatible devices. Second, Ethernet/IP protocol is enabled so that Rockwell Automation I/O and VFDs can be connected.

HCC2 Ethernet/IP device library supports FlexIO, Flex 5000, PowerMonitor 5000 and PowerFlex drives.

Every HCC2 comes with an embedded GPS module. This can be used for location services or real-time clock synchronization.

QRATE HCC2 is available in a hardware configuration that includes a Wi-Fi, Bluetooth and LTE modem. The Wi-Fi can be used for local site communication and the 4G LTE modem will provide Internet connectivity for remote surveillance, including Avalon cloud systems.

HCC2 profile

Top
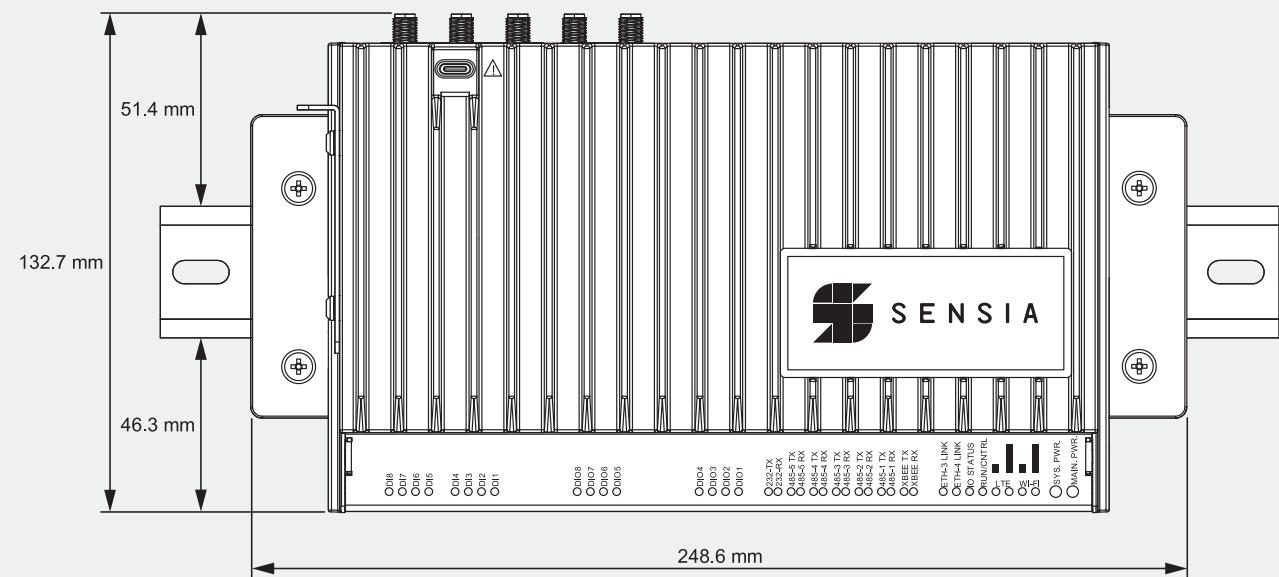
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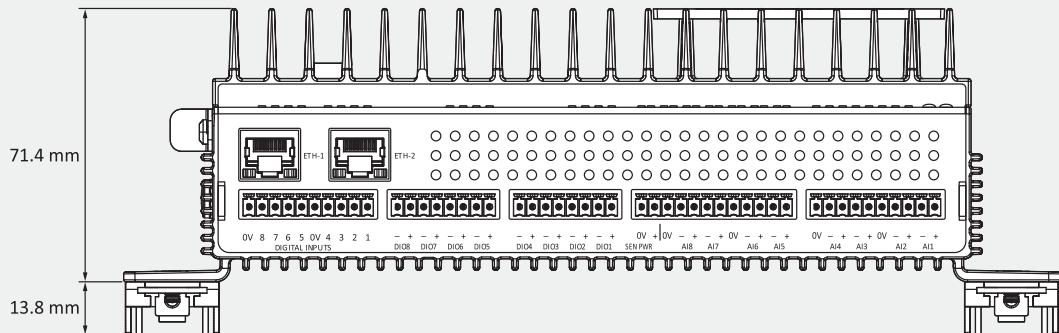
HCC2 Models

Part number	QRATE HCC2 Hyperconverged Edge Controller model number list
50365260-2001	Assembly, base model, QRATE HCC2 Hyperconverged Edge Controller, Gen 02 RTU only
50365260-2002	Assembly, base model, QRATE HCC2 Hyperconverged Edge Controller, Gen 02, RTU plus app enablement
50369741-2001	Assembly, QRATE HCC2 Hyperconverged Edge Controller, Wi-Fi, LTE, Gen 02 RTU only
50369741-2002	Assembly. QRATE HCC2 Hyperconverged Edge Controller, Wi-Fi. LTE. Gen 02. RTU plus app enablement
Edge-Ena-Lic	License, QRATE HCC2 upgrade to RTU plus app enablement

Environmental specifications

Attribute	Value
Operating Altitude	+ 0 to 2000 m (0 to 6600 ft)
Thermal Management	+ Cooled by natural convection and thermal conduction through the enclosure + The HCC2 requires 2 inches of separation from other devices.
Operating Temperature	+ -40°C to +75°C (-40°F to +167°F) + As per IEC 60068-2-2 (Test Db, Operating Dry Heat)
Storage Temperature	+ -40°C to +85°C (-40°F to +185°F)
Humidity Range	+ Up to 95% noncondensing + As per IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)
EMC (Directive 2014/30/EU)	+ EN 61326-1 + EN 301 489-1 + EN 301 489-17 + EN 301 489-19 + EN 301 489-52 + FCC 47 CFR PART 15 SUBPART B + ICES-Gen Issue 1 + ICES-001 Issue 5 + ICES-003 Issue 7

Wireless (FCC/ EU)	+ RF Exposure
	+ FCC PART 1 SUBPART I
	  · FCC PART 2 SUBPART J
	  · RSS 102 Issue 5
	  · EN 62311
	+ BLE/BT/2.4GHz WLAN
	  · ETSI EN 300 328
	+ 5.2 - 5.6GHz WLAN
	  · ETSI EN 301 893
	+ 5.8GHz WLAN
	  · ENSI EN 300 440
	+ BLE/BT/2.4/5GHz WLAN
	  · FCC PART 15 SUBPART C
	  · FCC PART 15 SUBPART E
	  · ISED RSS-Gen Issue 5
	  · ISED RSS-247 Issue 2
	+ WWAN (FCC)
	  · FCC PART 22
	  · FCC PART 24
	  · FCC PART 27
	  · ISED RSS-130 Issue 2
	  · ISED RSS-132 Issue 3
	  · ISED RSS-133 Issue 6+A1
	  · ISED RSS-139 Issue 4
	  · ISED RSS-199 Issue 3
	  · ISED RSS-247 Issue 2

Wireless (FCC/ EU) (Continued)	+ WWAN (ETSI)
	  ▪ ETSI TS 151 010-1
	  ▪ ETSI EN 301 511
	  ▪ ETSI EN 301 908-1
	  ▪ ETSI EN 301 908-2
	  ▪ ETSI EN 301 908-13
	+ GNSS
	  ▪ ETSI EN 300 328
	  ▪ ETSI EN 303 413
	+ PCS Type Certification Review Board (PTCRB)
	  ▪ ETSI TS 102.230
	  ▪ ETSI TS 36.124
	+ AT&T Approval

US/ CANADA	+ UL 121201 + UL 61010-1 + UL 61010-2-201 + CAN/CSA C22.2 No. 61010-1 + Class I, Division 2, Groups A, B, C, D, T4 + Suitable for Class I, Zone 2, Groups II C, T4 + Ordinary Location (US and Canada)
ATEX (Directive 2014/34/EU) / IECEx	+ EN 60079-0; Explosive atmospheres – Part 0: Equipment – General requirements + EN 60079-7; Explosive atmospheres – Part 7: Equipment protection by increased safety "e" + IECEx, Ex ec IIC T4 Gc + ATEX Marking: ⟨Ex⟩ II 3 G Ex ec IIC T4 Gc -40 °F < Ta < 167 °F (-40 °C < Ta < 75 °C) + Certificate Number: UL 22 ATEX 2730X + Certificate Number: IECEx UL 22.0023X
RoHS (Directive 2015/863/EU)	+ RoHS-EU (see Certifications by Country below for link to country-specific RoHS approvals)
Electrical Safety	+ EN 61010-1; Safety requirements for electrical equipment for measurement, control, and laboratory use
Radio Equipment Directive (RED) (Directive 2014/53/EU)	+ Article 3.1(a) Safety Standards + Article 3.1(b) EMC Standards + Article 3.2 Radio Standards
Certifications by Country	+ See Sensia Knowledge Article https://sensiacustomerserviceportal.powerappsportals.com/knowledgebase/article/KA-04680/en-us

Mechanical Specifications

Attribute	Value
Mount Style (See HCC2 Installation)	+ Panel Mount + DIN Rail clips for: TS35 'Top Hat' Section (EN 50022 - 35 x 7.5)
General Dimensions (WxDxH) (See HCC2 Dimension)	+ Panel Mount: 248.6 mm x 132.7 mm x 71.4 mm (9.8 in. x 5.2 in. x 2.8 in.) + DIN Rail Mount 248.6 mm x 132.7 mm x 85.2 mm (9.8 in. x 5.2 in. x 3.4 in.)
Weight	+ Base unit: 1.59 kg (3.5 lb) + Unit including packaging: 2.94 kg (4.5 lb)
Enclosure Type Rating	+ Metal Enclosure meets IP20

Input/Output Specification

Attribute	Value
Power Supply Input	+ Input Range 11 to 30 Vdc, 21W Class 2 or LPS + Dual redundant power feeds (each monitored with values available to the application logic) + Transient overvoltage protection: 51.70 Vdc max. + Overcurrent protection: 400 A max. surge current
Sensor Power	+ 11.1 Vdc @ 5 mA + Transient overvoltage protection: 15.90 Vdc max. + Overcurrent protection: 150 mA trip current

Analog Inputs		+ Eight analog input channels (either differential inputs or single-ended inputs) + HART modem (Ch1 to Ch4) + Measurement resolution: 18-bit + Calibrated measurement accuracy: 0.1% FS @ 25 °C, 0.25% over full operating temperature range
	Voltage	+ Single-ended voltage input mode: 0 to 10 Vdc,0 to 5 Vdc + Differential voltage input mode: -10 to 10 Vdc + Low-level voltage input mode (Ch 7 & 8): 0 to 100 mVdc + Low-level voltage mode input calibrated accuracy: 0.1% FS @ 25 °C, 0.25% FS over full operating temperature range + Input Impedance in voltage mode: 1.9 MΩ + Input Impedance in low-level voltage mode: 94 kΩ + Transient overvoltage protection: 13.50 Vdc max.
	Current	+ Current input mode: 0 to 20 mA, 4 to 20 mA + Input Impedance in current mode: 280 Ω + Overcurrent protection: 90 mA trip current
Digital Inputs		+ Eight opto-isolated digital input channels + 10-30 Vdc input, 20 mA max. + Pulse counter on all digital input channels + Maximum input frequency 10 kHz + IEC 61131-2 Type 1 Input + Transient overvoltage protection: 44.20 Vdc max + Over current protection: 60 mA trip current
Digital Input/Outputs		+ Eight opto-isolated configurable digital input or output channels + Transient Overvoltage Protection: 44.20 Vdc max + Overcurrent protection: 1.10 A trip current
	Digital Inputs	+ 10-30 Vdc input, 10 mA max. + Input rating: 12 Vdc at 0.75 mA, 24 Vdc at 3.3 mA + Input minimum on threshold: 10 V + Input maximum off threshold: 7.5 V + Pulse counter on all digital input channels + Maximum input frequency: 10 kHz
	Digital Outputs	+ 10-30 Vdc, 100 mA Class 2 or LPS + Solid-state relay type output + PWM output on all digital output channels (500 Hz max. frequency) + Function: resistive, general purpose, pilot duty + On Resistance: 2.4Ω max.
Analog Outputs		+ Two analog output channels + Output setting resolution: 12-bit + Calibrated output accuracy: 0.25% FS @ 25 °C, 0.3% FS over full operating temperature
	Voltage	+ Voltage output mode: 0 to 10 Vdc, 0 to 5 Vdc + Minimum load impedance in voltage mode: 2 kΩ (Note: Output is short-circuit protected, 90 mA trip current) + Transient overvoltage protection: 31.90 Vdc max. current mode, 15.90 Vdc max. voltage mode
	Current	+ Current output mode: 4 to 20 mA + Current mode output type: current sourcing + Maximum load impedance in current mode: 500 Ω (Note: Output is short-circuit protected, 250 mA trip current)

Process and Memory Specification

Attribute	Value
CPU Board Processor Core	+ 1.5 GHz, Intel Atom® x6000E Series, Quad Core
CPU Board Processor Architecture	+ Intel Architecture, 64-bit, Multi-Chip Processor
I/O Processor Core	+ ARM Cortex-M7
I/O Processor Architecture	+ 32-bit RISC ARM Harvard

FLASH Memory (Non-Volatile)	+ 32GB (on CPU board) – eMMC + 2MB (I/O processor internal) + 128MB (on I/O board) – NAND flash + 32KB (on I/O board) – FRAM
Memory (Volatile)	+ 8GB DDR4 (on CPU board) + 384KB (I/O processor internal) + 8MB (on I/O board) – PSRAM
micro-SD Card	+ Capacity: 2GB to 1TB + Operating temperature range: -40 °C to 85 °C + SLC or pSLC NAND memory + Minimum write speed: 10 MB/s, Class 10, UHS-1
micro-SIM Card	+ Micro SIM Form Factor + Supplied by Sensia

Real-time Clock Specifications

Attribute	Value
Clock capabilities	+ Day, month, year, hour, minute, second
Clock accuracy	+ ±20 ppm @ 25 °C (10.5 minutes/year) + GNSS time synchronization + NTP synchronization
Backup time (at 25 °C)	+ 2 years without primary power via lithium coin cell (not user-replaceable)

Communication Ports Specification

Attribute	Value

Ethernet (Eth-1 to Eth-4)	+ RJ-45 Connector
	+ Auto-negotiation to automatically select the highest available link-up speed
	+ Speed:
	  · Eth-1 & Eth-2 10/100/1000 Mbps
	  · Eth-3 & Eth-4 10/100 Mbps
	+ Auto half/full duplex modes
	+ Auto MDI/MDI-X to detect straight-through and crossover cable connections
	+ LED speed and activity indication on Eth-1 & Eth-2
	+ ETH-3 & ETH-4 DLR capable
	+ Protocols Supported (Port Specific): Ethernet/IP, CIP, Modbus TCP (Client/Server), Modbus Over TCP (Client/Server), Unity Edge Access, NTP Client, OPC UA, and MQTT-Sparkplug B, DNP3 Protocol

USB 1 & 2	+ USB A female connector + Supports USB 2.0 full speed (12 MBit/s)
USB-C: Maintenance Port (Not intended for normal use)	+ USB-C female connector + Access port for Unity Edge interface or applications management utility (EPM) connection
Micro USB-B: Console Port (Not intended for normal use)	+ Micro USB-B female connector + BIOS console port
RS232	+ Wire terminal connections + 5 wire full duplex (Tx, Rx, RTS, CTS & 0V) + Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 + Parity modes: none, even and odd + Stop bits: 1 or 2 + Flow control: hardware, none + Default data format: 8 data bits and 1 stop bit hardware flow control + Supports Modbus RTU in Client and Server modes + Transmit and receive link activity status indicators

RS485-1	+ Wire terminal connections + 5 wire full duplex + Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 + Parity modes: none, even and odd + Stop bits: 1 or 2 + Default data format: 8 data bits and 1 stop bit + Supports Modbus RTU in Client and Server modes + Transmit and receive link activity status indicators
RS485-2 & RS485-3	+ Wire terminal connections + 3 wire half-duplex + Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 + Parity modes: none, even and odd + Stop bits: 1 or 2 + Default data format: 8 data bits and 1 stop bit + Supports Modbus RTU in Client and Server modes + Transmit and receive link activity status indicators
RS485-4 & RS485-5	+ Wire terminal connections + 3 wire half-duplex + Baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 + Parity modes: none, even and odd + Stop bits: 1, 1.5, or 2 + Default data format: 8 data bits and 1 stop bit + Software configurable 120 Ω end-of-line termination resistor + Supports Modbus RTU in Client mode + Transmit and receive link activity status indicators

Display Specification

Attribute	Value
Diaplay	+ HDMI 1.1 output
Resolution	+ 1920 x 1080P (max)

Radio and GNSS Specification

Attribute	Value
GNSS	+ Integrated GNSS module on CPU Board + GPS & GLONASS constellation support + Utilize 1.575, 1.602 GHz
Wi-FI & Bluetooth	+ Optional module on CPU Board (Intel 9260NGW) + Wi-Fi - 2.4/ 5.0 GHz + 802.11 AC
LTE	+ Optional module on CPU Board (Quectel EG21G) + GSM bands - 850, 900 + WCDMA bands - 2, 4, 5 + LTE - 2, 4, 5, 7, 12, 13, 25, 26, 38, 41