Model BC5311-01F - EtherCAT Coupler and Automation Controller

- ➢ *Standalone EtherCAT Coupler and fully programmable Automation Controller*
- ➢ *EtherCAT Technology Group Compliant*
- ➢ *Compatible with CTC and other EtherCAT Masters*
- ➢ *Supports High Density Digital I/O, Analog I/O and Motion modules in a small package*
- ➢ *Communications:*
  - ▪ *two Ethernet ports*
 - ▪ *two EtherCAT® Slave ports (IN/OUT)*
  - ▪ *one USB port and four serial ports[1]*

Specifications

System resources

Processor type	200 MHz 32-bit ARM
Number of processors	1
Operating system	Industrial real-time deterministic
Real-time clock	Yes
Flash file system memory Internal	32 MB 4 MB

Active program resources

QuickBuilder	
Simultaneous programs	1
Program runtime memory	4 MB
Max simultaneous tasks	96
Non-volatile variables (typ)	5000
Volatile variables (typ)	600
Max array size	> 240 columns x 2048 rows
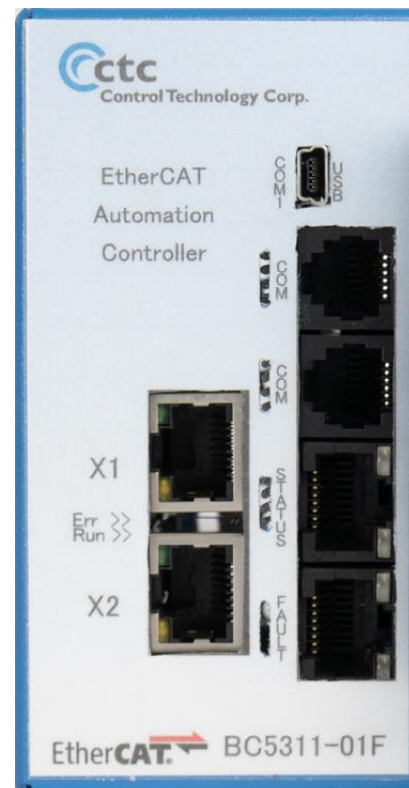
Note

1. *Each serial port supports two independent RS-232 channels. The COM splitter cable (PN 000-288050) is required to access the second channel.*
2. *Document No. 950-530000-004*

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Specifications

System resources[1]

Max number of I/O modules per rack	8
Max number of I/O per system	256
Max number of motion axes	16
Max PID Loops	32
Data logging storage	> 350,000 values

Environmental

Operating temperature
    Horizontal installation
    Vertical installation
	-25 to 50°C
	-25 to 45°C

Storage temperature	-40 to 85°C
Humidity	5 – 95% non-condensing
Protection	IP20

Operating vibration[2]
    Random (IEC 60068-2-64)
    Sinusoidal (IEC 60069-2-6)
	10 – 500 Hz, 2g rms
	10 – 500 Hz, 2g rms

Operating shock[2] (IEC 660068-2-27)	15 g

Ethernet communications

Number of ports[3]	2
Speed	10/100 base T
Type	Full duplex with DMA and flow control
Connector type	RJ-45
Network support	Wired and wireless
Firmware support	FTP, UDP, TCP/IP, raw socket
SNTP	Yes, supports automatic time synch
DHCP	Yes, automates IP address assignment
Modbus	Client / Server (ASCII and RTU)

Serial communications

| Number of channels	4
Channel type	RS-232
Max speed	115K Baud
Connector type	RJ-11
Modbus	Client / Server (ASCII and RTU)

Note
1. Capacities are not mutually inclusive.
2. Test results based on DIN rail mounting; all screws torqued to 5.2 in-lb.
3. Internal Ethernet switch.
4. Factory default IP address is 192.168.1.53

EtherCAT Slave

Number of ports	2
Speed	100 base T
Connector Type	RJ-45

Ⓒ Control Technology Corporation

Connector Pinouts:

USB COM1 pinouts
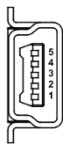
Pin #	Signal
1	USB Power
2	USB DM
3	USB DP
4	NC
5	GND

CPU module

COM1 and COM2 RS232 pinouts
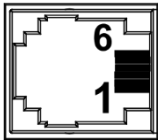
Pin #	Signal
1	TxD COM1
2	TXD COM2
3	Common
4	Common
5	RXD COM2
6	RXD COM1

COM3 and COM4 RS232/RS485 pinouts
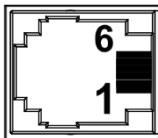
Pin #	Signal
1	TxD COM4
2	TXD COM3/A (+RS485)
3	Common
4	Common
5	RXD COM3/B(RS485)
6	RXD COM4

Ethernet 10 base-T pinouts
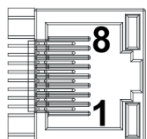
Pin #	Signal
1	TX0+
2	Tx0-
3	RX1+
4	NC[1]
5	NC[1]
6	RX1-
7	NC[1]
8	NC[1]

EtherCAT® Slave X1 IN/X2 OUT
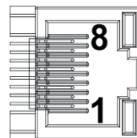
Pin #	Signal
1	TX0+
2	Tx0-
3	RX1+
4	NC[1]
5	NC[1]
6	RX1-
7	NC[1]
8	NC[1]

LED Identification

PWR **(Backplane power)**	Steady Off = backplane rack not powered up Steady On = backplane rack powered up
FLT **(Backplane fault)**	Steady Off = normal operation. No fault on local backplane Solid = hardware fault on local backplane Slow flash = software fault on local backplane Fast flash = DHCP negotiation in progress (CPU only) Blink = flash reprogramming in progress (CPU only)
ST1 – ST2	Off/Off = Normal operation (CPU only) On/Off = Loading program or flashing flash Off/On = Global software fault (CPU only) On/On = Program mode – stopped or if booting awaiting abort boot escape sequence
SL1 – SL3	Fault for local slot when local FLT or global SLT1-3 are in a non-normal operation state. Binary code identifies the affected local slot as follows: Off/Off/Off = Local slot #1 On/Off/Off = Local slot #5 Off/Off/On = Local slot #2 On/Off/On = Local slot #6 Off/On/Off = Local slot #3 On/On/Off = Local slot #7 Off/On/On = Local slot #4 On/On/On = Local slot #8

In compliance with the EtherCAT Technology Group ETG1300 Indicator and labeling specification, whenever a BC5311-01F EtherCAT slave option module is installed two LED's take on a different meaning from that of the normal 5300 controller (ST3/4). The LEDs are labeled RUN and ERR and operate as defined below.

RUN indicator green LED:

Indicator States	Slave State	Description
OFF	Initialization	The Device is in INIT state
Blinking	Pre-Operational	The Device is in Pre-Operational state
Single Flash	Safe-Operational	The Device is in Safe-Operational state
ON	Operational	The Device is in Operational state
Flickering	Initialization or BootStrap	The Device is booting and has not yet entered the INIT state, or: The Device is in Bootstrap state. Firmware download operation in progress

ERR indicator, red LED:

ERR State	Error Name	Description	Further Detail
ON	Application Controller Failure	A critical communications or application controller error has occurred.	Application controller is not responding. (PDI Watchdog Timeout detected)
Double Flash	Process Data Watchdog Timeout / EtherCAT Watchdog Timeout	An application watchdog has occurred.	Sync Manager Watchdog timeout.
Single Flash	Local Error	Slave Device application has changed the EtherCAT state autonomously due to local error.	Device changes its EtherCAT state from Op to SafeOpError due to synchronization error.
Blinking	Invalid Configuration	General Configuration Error	State change commanded by master is impossible due to register or object settings, or invalid hardware configuration.
Flickering	Booting Error	Booting Error was detected. INIT state reached, but Error Indicator bit is set in AL Status Register.	Checksum error in Application controller flash memory.
OFF	No Error	EtherCAT communications is in working condition	

EtherCAT Slave Conformance Testing

The BC5311-01F EtherCAT Coupler and Automation Controller CPU has fully passed testing required by the EtherCAT Technology Group using the Beckhoff "EtherCAT Conformance Test Tool". This is a self-certification process whereby Control Technology Corporation maintains a yearly license for the tool and conducts its own rigorous testing to ensure compliance. CTC also has tested compatibility with its Incentive PC EtherCAT Master as well as the Beckhoff TwinCAT product.