

TC Modular Series



Figure 1. TC Modular.

Description

The TC Modular is an integral part of the TALON® Automation System. It is a high performance, modular Direct Digital Control (DDC) supervisory field panel.

The field panel operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher level processor. Up to 1000 TC Modular field panels communicate on a peer-to-peer BACnet/IP network.

With the addition of an Expansion Module, the TC Modular also provides central monitoring and control for distributed Field Level Network (FLN) devices on BACnet MS/TP.

Features

- Classified as BACnet Building Controllers (B-BC) using the BACnet/IP protocol and BACnet MS/TP.
- Modular hardware components match initial control requirements while providing for future expansion.
- DIN rail mounting and removable terminal blocks simplify installation and servicing.
- Proven program sequences to match equipment control applications.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control, and monitoring functions.
- HMI RS-232 and USB ports provide connectivity to a laptop computer for local operation and engineering.
- Support for peer-to-peer BACnet/IP communications over industry-standard 10Base-T/100Base-TX Ethernet networks.
- Persistent database back-up and restore within controller.
- Back-up battery protection eliminating the need for time-consuming program and database re-entry in the event of an extended power failure.
- The TC Modular illuminates a “battery low” status LED and can send an alarm message to selected printers or terminals.
- Optional wireless FLN support.

Hardware

- The TC Modular is a microprocessor-based multi-tasking platform for program execution and communication with other field panels. It scans field data, optimizes control parameters, and manages operator requests for data in seconds.
- The program and database information stored in the TC Modular memory is protected with a battery backup. This eliminates the need for time-consuming program and database re-entry in the event of an extended power failure. When battery replacement is necessary, the TC Modular illuminates a "battery low status LED and can send an alarm message to selected printers or terminals.
- The TC Modular firmware, including the operating system, is stored in non-volatile flash memory.
- HMI RS-232 and USB ports provide connectivity to a laptop computer for local operation and engineering.
- LEDs provide instant visual indication of overall operation, network communication, and low battery warning.
- A self-forming bus to the left of the TC Modular supports hardware connection to subsystems through Expansion Modules.

Global Information Access

An RS-232 operator terminal port provides a quick-connect phone jack (RJ-45) to support operator devices, such as a local user interface or simple CRT terminal, and a phone modem for TALON dial-in service capability. Devices connected to the operator terminal port gain global information access

Multiple Operator Access

Multiple operators can access the network simultaneously. Multiple operator access ensures that alarms are reported to an alarm printer while an operator accesses information from a local terminal.

TC Modular Expansion Module

The TC Modular Expansion Module (see Figure 2) provides the hardware connection for Field Level Network (FLN) devices. Using the Expansion Module, the TC Modular supports one BACnet MS/TP network of up to 96 BACnet MS/TP FLN devices.



Figure 2. RS-485 Expansion Module.



Figure 3. RS-485 Expansion Module and TC Modular.

Modular Control Panels with Custom Application Flexibility

The TC Modular is a high performance controller with extensive flexibility.

The control program for each TC Modular is customized to exactly match the application. Proven Powers Process Control Language (PPCL), a text-based programming structure like BASIC, provides direct digital control and energy management sequences to precisely control equipment and optimize energy usage.

Menu Prompted, English Language Operator Interface

The TC Modular field panel includes a simple yet powerful menu-driven English Language Operator Interface that provides, among other things:

- Point monitoring and display
- Point commanding
- Historical trend collection and display for multiple points
- Event scheduling
- Program editing and modification via Powers Process Control Language (PPCL)
- Alarm reporting and acknowledgment
- Continual display of dynamic information

Built-in Direct Digital Control Routines

The TC Modular provides stand-alone Direct Digital Control (DDC) to deliver precise HVAC control and comprehensive information about system operation. The controller receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available in the TC Modular:

- Closed Loop Proportional, Integral and Derivative (PID) control
- Logical sequencing
- Alarm detection and reporting
- Reset schedules

Built-in Energy Management Applications

The following applications are programmed in the TC Modular and require simple parameter input for implementation:

- Automatic Daylight Saving Time switchover
- Calendar-based scheduling
- Economizer control
- Equipment scheduling, optimization and sequencing
- Event scheduling
- Holiday scheduling
- Night setback control
- Peak Demand Limiting (PDL)
- Start-Stop Time Optimization (SSTO)
- Temperature-compensated duty cycling
- Temporary schedule override

TC Modular Series Specifications

Dimensions (L x W x D)

TC Modular Series	7.56" x 3.54" x 2.76" (192 mm x 90 mm x 70 mm)
Expansion Module with one MS/TP FLN connection	1.26" x 3.54" x 2.76" (32 mm x 90 mm x 70 mm)

Processor, Battery, and Memory

Processor	MPC885 (PowerPC®)
Processor Clock Speed	133 MHz
Memory	72 MB (64 MB SDRAM, 8 MB Flash ROM)
Secure Digital Input/Output (SDIO) card (for future use)	Expandable or removable non-volatile memory
Battery backup of SDRAM	30 days (accumulated), AA (LR6) 1.5 Volt Alkaline (non-rechargeable)
Battery backup of Real Time Clock	12 months (accumulated) Cell coin 3 Volt lithium

Communication

BACnet/IP Automation Level Network (ALN)	10Base-T or 100Base-TX compliant
BACnet MS/TP Automation Level Network (ALN)	9600 bps to 115.2 Kbps
BACnet MS/TP Field Level Network (FLN) on the Expansion Module	9600 bps to 76.8 Kbps
Human-Machine Interface (HMI)	RS-232 compliant, 1200 bps to 115.2 Kbps
USB Device port	Standard 1.1 and 2.0 USB device port, full speed 12 Mbps, low speed 1.5 Mbps, Type B female connector.
USB Host port	Standard 1.1 and 2.0 USB host port, full speed 12 Mbps, low speed 1.5 Mbps, Type A female connector.

Electrical Rating

Power Requirements	24 Vac +/-20% input @ 50 or 60 Hz
Power Consumption	24 VA @ 24 Vac
AC Power	NEC Class 2
Communication	NEC Class 2

Operating Environment

Ambient operating temperature	32°F to 122°F (0°C to 50°C)
Ambient operating environment	Operate in a dry location, which is protected from exposure to salt spray or other corrosive elements. Exposure to flammable or explosive vapors must be prevented.
Shipping and storage environment	-13°F to 158°F (-25°C to 70°C) 5% to 95% rh, non-condensing
Mounting Surface	Building wall or structural member

Agency Listings

UL	UL 864 UUKL Smoke Control Equipment UL 864 UUKL7 Smoke Control Equipment CAN/ULC-S527-M8 UL 916 PAZX UL 916 PAZX7
Agency Compliance	FCC Compliance Australian EMC Framework European EMC Directive (CE) - with enclosure

Ordering Information

TC Modular Series

Product Number	Description
TC1000-E96.T	TC Modular Series, BACnet/IP ALN, TALON Firmware
PXX-485.3	Expansion Module with one BACnet MS/TP FLN connection

Documentation

Document Number	Description
588-781	TC Modular Series Owner's Manual
588-583	Powers Process Control Language (PPCL) User's Manual

BACnet Protocol Implementation Conformance Statement

Products

Product	Model Number	Protocol Revision	Software Version	Firmware Version
BACnet TC Modular Series	TC1000-E96.T PXX-485.3	135-2004	N/A	3.1

Vendor Information

Siemens Building Technologies
 1000 Deerfield Parkway
 Buffalo Grove, IL 60089
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Product Description

An integral member of the TALON product family, the TC Modular for BACnet Networks is a high performance, modular Direct Digital Control (DDC) supervisory equipment and primary building controller. The TC Modular operates stand-alone or networked to perform complex control, monitoring and energy management functions without relying on a higher-level processor. The TC Modular communicates on a 10/100 MB Ethernet BACnet/IP or BACnet MS/TP network and optionally supervises BACnet MS/TP devices.

BACnet Standardized Device Profile (Annex L)

Supported	Device Profile
	BACnet Operator Workstation (B-OWS)
•	BACnet Building Controller (B-BC)
	BACnet Advanced Application Controller (B-AAC)
	BACnet Application Specific Controller (B-ASC)
	BACnet Smart Actuator (B-SA)
	BACnet Smart Sensor (B-SS)

Supported BACnet Interoperability Building Blocks (BIBBs)

BIBB	Name	Initiate	Execute
Data Sharing			
DS-RP-A	Data Sharing-ReadProperty-A	•	
DS-RP-B	Data Sharing-ReadProperty-B		•
DS-RPM-A	Data Sharing-ReadPropertyMultiple-A	•	
DS-RPM-B	Data Sharing-ReadPropertyMultiple-B		•
DS-WP-A	Data Sharing-WriteProperty-A	•	
DS-WP-B	Data Sharing-WriteProperty-B		•
DS-WPM-B	Data Sharing-WritePropertyMultiple-B		•
DS-COV-A	Data Sharing-COV-A	•	
DS-COV-B	Data Sharing-COV-B		•
DS-COVU-A	Data Sharing-COV-Unsolicited-A	•	
DS-COVU-B	Data Sharing-COV-Unsolicited-B		•
Scheduling			
SCHED-I-B	Scheduling-Internal-B		•
SCHED-E-B	Scheduling-External-B		•
Alarm and Event Management			
AE-N-A	Alarm and Event-Notification-A	•	
AE-N-I-B	Alarm and Event-Notification Internal-B		•
AE-ACK-A	Alarm and Event-ACK-A	•	
AE-ACK-B	Alarm and Event-ACK-B		•
AE-ASUM-B	Alarm and Event-Alarm Summary-B		•
AE-ESUM-A	Alarm and Event-Enrollment Summary-A	•	
AE-ESUM-B	Alarm and Event-Enrollment Summary-B		•
AE-INFO-A	Alarm and Event-Information-A	•	
AE-INFO-B	Alarm and Event-Information-B		•
Trending			
T-VMT-A	Trending-Viewing and Modifying Trends-A	•	
T-VMT-I-B	Trending-Viewing and Modifying Trends-Internal-B		•
T-VMT-E-B	Trending-Viewing and Modifying Trends-External-B		•
T-ATR-B	Trending-Automated Trend Retrieval-B		•

Network Management			
NM-CE-A	Network Management-Connection Establishment-A	•	
Device Management			
DM-DDB-A	Device Management-Dynamic Device Binding-A	•	
DM-DDB-B	Device Management-Dynamic Device Binding-B		•
DM-DOB-A	Device Management-Dynamic Object Binding-A	•	
DM-DOB-B	Device Management-Dynamic Object Binding-B		•
DM-DCC-B	Device Management-DeviceCommunicationControl-B		•
DM-PT-A	Device Management-Private Transfer-A	•	
DM-PT-B	Device Management-Private Transfer-B		•
DM-TM-A	Device Management-Text Message-A	•	
DM-TM-B	Device Management-Text Message-B		•
DM-TS-B	Device Management-TimeSynchronization-B		•
DM-RD-B	Device Management-ReinitializeDevice-B		•
DM-BR-B	Device Management-Backup and Restore-B		•
DM-LM-B	Device Management-List Manipulation-B		•
DM-OCD-B	Device Management-Object Creation and Deletion-B		•

Standard Object Types Supported

Name	Creatable	Deletable
Analog Input		
Analog Output		
Analog Value		
Binary Input		
Binary Output		
Binary Value		
Calendar	•	•
Command	•	•
Device		
File		
Multi-state Output		
Multi-state Value		
Notification Class	•	•
Schedule	•	•
Trend Log		

Data Link Layer Options

•	BACnet IP, (Annex J)
•	BACnet IP, (Annex J), Foreign Device
	ISO 8802-3, Ethernet (Clause 7)
	ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
	ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) _____
•	MS/TP master (Clause 9), baud rate(s): 9600 bps, 19200 bps, 38400 bps, 76800 bps
	MS/TP slave (Clause 9), baud rate(s): _____
	Point-To-Point, EIA 232 (Clause 10), baud rate(s): _____
	Point-To-Point, modem, (Clause 10), baud rate(s): _____
	LonTalk, (Clause 11), medium: _____
	Other: _____

Segmentation Capability

Able to transmit segmented messages	Yes	Window Size: 32
Able to receive segmented messages	Yes	Window Size: 32

Device Address Binding

Is Static Device Binding supported?	Yes
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Networking Options

•	Router, Clause 6 BACnet/IP (Annex J) to BACnet MS/TP
	Annex H.3, BACnet Tunneling Router over UDP/IP
•	BACnet/IP Broadcast Management Device (BBMD)
Yes	Does the BBMD support registrations by Foreign Devices?

Character Sets

•	ANSI X3.4
	ISO 10646 (UCS-2)
	IBM™/Microsoft™ DBCS
	ISO 10646 (ICS-4)
	ISO 8859-1
	JIS C 6226

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