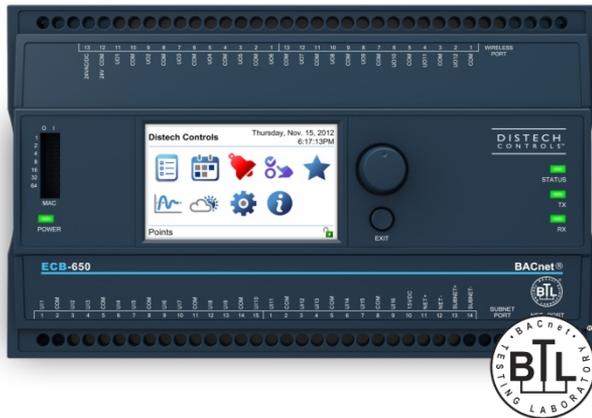


ECB-600 and ECx-400 Series

BACnet B-AAC Programmable Controllers and I/O Extension Modules



Overview

The **ECB-600 Series** are microprocessor-based programmable controllers designed to control various building automation applications such as air handling units, chillers, boilers, pumps, cooling towers, and central plant applications. This series supports up to two ECx modules. These are I/O extension modules that operate off of a separate sub-bus, giving this controller a total of up to 40 universal inputs and 36 universal outputs. This controller uses the BACnet® MS/TP LAN communication protocol and is BTL®-Listed as BACnet Advanced Application Controllers (B-AAC).

This series contains three models as follows: ECB-600, ECB-610, and ECB-650. The ECB-600 series models have universal inputs and outputs that are ideal for controlling a wide range of HVAC equipment. The ECB-650 model has a full-color backlit-display and a jog dial for turn and select navigation to access a wide range of internal controller functions: view and override values, view and modify schedules, tune PID loops with system response graphing, and acknowledge alarms. The ECB-610 model has the convenience of supervised Hand-Off-Auto (HOA) switches and potentiometers for supervised manual override of an output.

All controller models work with a wide range of sensors, such as those in the Allure™ EC-Smart-View series of communicating room sensors that feature a backlit-display and graphical menus. In addition, all controller models are Open-to-Wireless™ ready, and when paired with the Wireless Receiver, they work with a variety of wireless battery-less sensors and switches.

Custom program these controllers using EC-gfxProgram through EC-Net^{AX} Pro which is powered by the Niagara^{AX} Framework®. This allows you to quickly and easily create your own control sequences capable of meeting the most demanding requirements of any engineering specification.

Applications

- Meets the requirements of the following applications:
 - Central Plant
 - Air Handling Units
 - Multi-Zone Applications
 - Chillers
 - Boilers
 - Cooling Towers
 - Roof Top Units
 - Power Measurement
- Improves energy efficiency when combined with:
 - CO₂ sensors as part of a demand-controlled ventilation strategy that adjusts the amount of fresh air intake according to the number of building occupants
 - Variable-frequency drives to adjust motor speed according to the instantaneous demand of the application
- Works with a wide range of wireless battery-less sensors

Features & Benefits

- Use the EC-gfxProgram's state-of-the-art visual programming wizard to create operation sequences that meet specific engineering specifications. EC-gfxProgram is accessible through EC-Net^{AX} Pro which is powered by the Niagara^{AX}-based management platform.
- Accelerate custom programming development by using pre-built HVAC control sequences supplied with EC-gfxProgram.
- Available with an optional Wireless Receiver that supports up to 28 wireless inputs, letting you create wire-free installations and use various wireless battery-less sensors and switches.
- With 16 software configurable universal inputs and 12 software configurable universal outputs, this controller series covers all medium to large-size industry-standard HVAC applications. Four of these inputs also support fast pulse count reading up to 50 Hz frequency for gas, water, and electric meters.
- With up to two extendible I/O modules that operate off of a separate sub-bus, this controller can have a total of up to 40 universal inputs and 36 universal outputs.
- 0-20mA inputs and outputs use an internal jumper that eliminates the need for external resistors.
- Highly accurate universal inputs support thermistors and resistance temperature detectors (RTDs) that range from 0 Ohms to 350 000 Ohms, giving you the freedom of using your preferred or engineer-specified sensors, in addition to any existing ones.
- Supervised HOA switches and potentiometers, allowing you to override control actions for testing purposes or when performing equipment maintenance.
- Rugged hardware Inputs and Outputs eliminate need for external protection components, such as diodes for 12V DC relays.

ECB-600 Series Controllers



Model	ECB-600	ECB-610	ECB-650
Points	28-Point Controller	28-Point Controller with HOA	28-Point Controller with Color Display
Universal hardware inputs	16 ¹	16 ¹	16 ¹
Allure EC-Smart-Vue sensor ²	12	12	12
Wireless inputs ³	28	28	28
15 Vdc Power Supply	■	■	■
Universal outputs	12	12	12
HOA switch & potentiometer		■	
Operator interface: interactive color display to monitor and override controller parameters			■
Number of ECx Modules Supported	2	2	2

1. The first four inputs are software configurable for pulse counting up to 50 Hz and are compatible with an SO rated (optically-isolated) output.
2. A controller can support a maximum of two Allure EC-Smart-Vue models equipped with a CO₂ sensor. The remaining connected Allure EC-Smart-Vue models must be without a CO₂ sensor.
3. All controllers are Open-to-Wireless ready. Available when an optional Wireless Receiver is connected to the controller. Some wireless sensors may use more than one wireless input from the controller.

Recommended Applications

Model	ECB-600	ECB-610	ECB-650
Air Handling Units	■	■	■
Multi-Zone Application	■	■	■
Chiller	■	■	■
Boiler	■	■	■
Cooling Tower	■	■	■
Central Plant	■	■	■

BACnet Objects List

BACnet Calendar Objects	2
BACnet Schedule Objects	10
BACnet PID Loop Objects	30
BACnet Input Objects (AI, BI, MSI) ¹	68 ²
BACnet Output Objects (AO, BO) ¹	12 ³
BACnet BV Objects	
- Commandable ¹	20
- Non-Commandable	55
BACnet MSV Objects	
- Commandable ¹	20
- Non-Commandable	55
BACnet AV Objects	
- Commandable ¹	35
- Non-Commandable	115
BACnet Alarm Notification Classes	5

1. Supports object internally-generated alarms (intrinsic reporting) which are dynamically instantiated upon object creation.
2. This consists of Hardware Inputs, Allure EC-Smart-Vue inputs, and Open-To-Wireless inputs. Each ECx-400, ECx-410, or ECx-420 adds 12 input objects.
3. This consists of Hardware Outputs. Each ECx-400 or ECx-410 adds 12 output objects.

ECx-400 Series I/O Extension Modules



Model	ECx-400	ECx-410	ECx-420
Additional Points	24-Point I/O Extension Module	24-Point I/O Extension Module	12-Point I/O Extension Module
Universal hardware inputs	12	12	12
15 Vdc Power Supply	■	■	■
Universal outputs	12	12	0
HOA switch		■	

Additional Features & Benefits

HOA Switches & Potentiometers



Supervised Hand-Off-Auto (HOA) switches and potentiometers that provide feedback of an operator's manual override of an output to the controller's code. HOA switches are ideal for testing purposes or when performing equipment commissioning and maintenance.

Operator Interface



A large color backlit-display that allows an operator to have immediate access to internal controller data.

- View and override values. The status is color coded to show if the value is in alarm or overridden.
- Visually tune PID loops with system response graphing.
- View active alarm list including details and acknowledge alarms.
- View and modify schedules and calendars through a graphic interface. Also create or delete schedule events, special events, and calendar entries.
- Create a list of favorites to provide quick access to commonly-used values.
- Multi-User access management.
- Multilingual interface: English, French, German, etc.

Open-to-Wireless Series – Wireless Receiver Add-on



To reduce the cost of installation, and minimize the impact on pre-existing partition walls, the Wireless Receiver enables these controllers to communicate with a line of wireless battery-less room sensors and switches. These Wireless Receivers are available in EnOcean 315MHz and 868.3MHz versions.



Note that controllers have one wireless port to support a single Wireless Receiver.

For more information about the EnOcean and Open-to-Wireless technologies, refer to the Open-to-Wireless Solution Guide. For more information about the Wireless Receiver module, refer to the [Wireless Receiver Datasheet](#). These documents can be found on our web site.

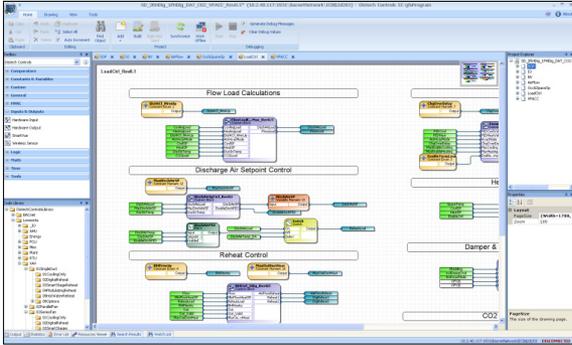
Supported Platforms



EC-Net^{AX} Solution

The EC-Net^{AX} multi-protocol integration solution is web-enabled and powered by the Niagara^{AX} Framework, establishing a fully Internet-enabled, distributed architecture for real-time access, automation and control of devices. The EC-Net^{AX} open framework solution creates a common development and management environment for integration of LONWORKS®, BACnet® and other protocols. Regardless of manufacturer and protocol, the EC-Net^{AX} system provides a unified modeling of diverse systems and data, providing one common platform for development, management and enterprise applications.

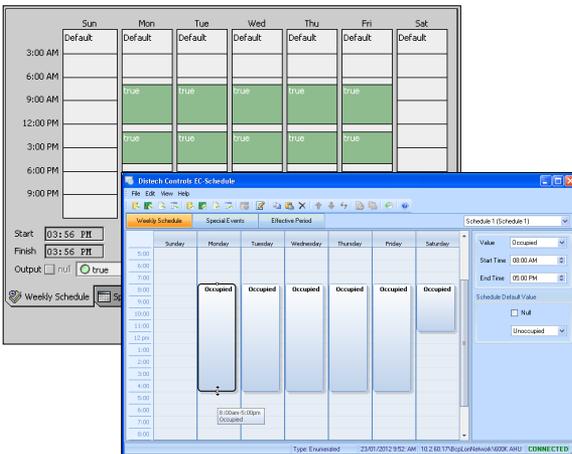
EC-gfxProgram Graphical Programming Interface (GPI)



Distech Controls' EC-gfxProgram is a programming tool that allows you to quickly create control sequences by "dragging and dropping" block objects and then linking the objects with a simple "click, select and release". Select objects from an extensive library of over 100 commonly used functions as well as create your own custom blocks. With a user-friendly interface and intuitive programming environment, HVAC programming could not be easier. Refer to the EC-gfxProgram datasheet for more information.

- Program both ECP and ECL Series LONWORKS and ECB Series BACnet controllers with the same tool.
- Supplied as freeware – there are no associated licensing costs.
- Live debugging allows user to view code execution, input/output values and to detect errors in real-time.
- A code library for managing your favorite or most commonly used code or code sections or use *gfxApplications* which allows you to fine-tune the code to meet engineering-specific requirements, while providing full integration of ready-to-use Px graphics pages from *dc gfxApplications*.

EC-Net^{AX} Scheduling / EC-gfxProgram EC-Schedule



Configure the controller's built-in schedules and holidays from the EC-Net^{AX} solution (ECB and ECL series controllers), or directly from within EC-gfxProgram (ECB and ECL series controllers) with an easy-to-use point, drag, and click interface. It features a weekly schedule for regular, repeating, events by "time-of-day" and "day-of-week", while a holiday schedule is available to define events for specific days.

- Easily configure schedules using a graphical slider.
- Allows you to easily copy and paste entries. Duplicate a schedule entry for Monday to Friday.
- Special events allow you to set exceptions such as holidays to a schedule.
- Holidays can be set for recurring events such as the 9th day, or the 3rd Thursday of a given month.
- A schedule has an effective period during which it is active.
- Schedule provides Next State and Time to Next State that are ideal for use with programming functions such as Optimum Start or Morning Warm Up.

Complementary Products

Temperature Sensors

Allure EC-Smart-Vue Series



Line of communicating room temperature sensors with communication jack, a backlit-display and configurable graphic menus that allow occupants to set occupancy, setpoint adjustment, fan speed, or any other system parameters. Models are available with any combination of the following options: humidity sensor, motion sensor, and CO₂ sensor. The ECO-Vue™ icon (🌿) shows how environmentally-friendly the zone's energy consumption is in real time.

Allure EC-Sensor Series



Line of discrete temperature sensors. Models are available with the following options: communication jack, occupancy override button, setpoint adjustment, and fan speed selection.

Open-to-Wireless Sensors and Switches

Allure Wireless Battery-less ECW-Sensor Series



Line of wireless, battery-less room temperature sensors. Models are available with the following options: occupancy override button, setpoint adjustment, and fan speed selection.

These sensors are available in EnOcean 315MHz and 868.3MHz versions. The controller must be equipped with a [Wireless Receiver](#).

Wireless Sensors and Switches



A wide range of self-powered wireless sensors and switches, including the following: motion detector and light sensor, 2-/4-channel wireless light switches (North American and European models), outdoor temperature sensor, surface temperature contact sensor, duct temperature sensor, and more.

These sensors are available in EnOcean 315MHz and 868.3MHz versions. The controller must be equipped with a [Wireless Receiver](#).

For more information about the available wireless sensors and switches, refer to the [Open-to-Wireless Solution Guide](#) which can be found on our web site.

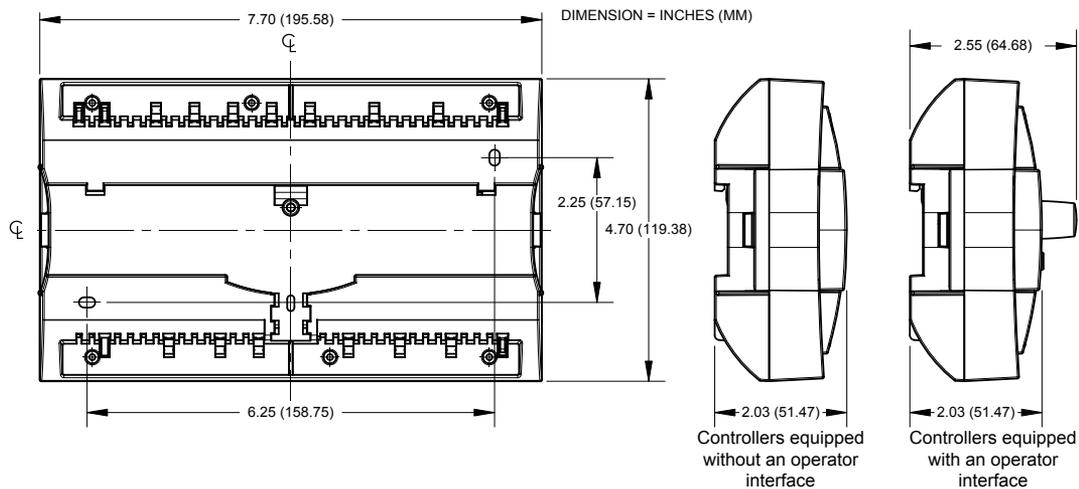
Relay and Relay Base



A SPDT (NO/NC) dry contact relay with a 12VDC coil. This relay's low-power coil allows a controller's universal output to control high-power loads. Optional hardware available includes a din-rail mountable socket base and a red LED for relay status indication.

For more information on these or other Distech Controls products, refer to our web site.

ECB-600 Series Controller Dimensions



ECB-600 Series Product Specifications

Power		Inputs	
Voltage	24VAC/DC; $\pm 15\%$; 50/60Hz; Class 2	Input Types	Universal; software configurable
Protection	3.0A user-replaceable fuse	-Voltage	- 0 to 10VDC (40k Ω input impedance) - 0 to 5VDC (high input impedance)
Power Consumption	- ECB-600/ECB-610 22 VA typical plus all external loads ¹ , 65 VA max. - ECB-650 25 VA typical plus all external loads ¹ , 68 VA max.	-Current	0 to 20mA with 249 Ω jumper configurable internal resistor
Interoperability		-Digital	Dry contact
Communication Bus	BACnet MS/TP	-Pulse	UI1 to UI4: 50Hz maximum; Min 10ms On/10ms Off - SO output compatible
BACnet Profile	B-AAC ¹	-Resistor	UI5 to UI16: 1Hz maximum; Min 500ms On/500ms Off - Dry contact
EOL Resistor	Built-in, jumper selectable		0 to 350 K Ω . All thermistor types that operate in this range are supported. The following temperature sensors are pre-configured:
Baud Rates	9600, 19 200, 38 400, or 76 800 bps	<i>Thermistor</i>	10K Ω Type 2, 3 (10K Ω @ 77°F; 25°C)
Hardware		<i>Platinum</i>	Pt1000 (1K Ω @ 32°F; 0°C)
Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit	<i>Nickel</i>	RTD Ni1000 (1K Ω @ 32°F; 0°C) RTD Ni1000 (1K Ω @ 69.8°F; 21°C)
CPU Speed	72 MHz	Input Resolution	16-bit analog / digital converter
Memory	1 MB Non-volatile Flash (applications) 2 MB Non-volatile Flash (storage) 96 kB RAM	Power Supply	15VDC; maximum 320mA (16 inputs \times 20mA each)
Real Time Clock (RTC)	Built-in Real Time Clock with rechargeable battery Network time synchronization is initially required	Output	
RTC Battery	20 hours charge time, 20 days discharge time Up to 500 charge / discharge cycles	Outputs	
Status Indicator	Green LEDs: power status & LAN Tx Orange LEDs: controller status & LAN Rx	Universal	0-10VDC linear, digital 0-12VDC (on/off), floating PWM, or 0-20mA (jumper configurable); software configurable. Built-in snubbing diode to protect against back-EMF, for example when used with a 12VDC relay.
Communication Jack	BACnet 1/8" (3.5mm) stereo audio jack		- PWM control: adjustable period from 2 to 65sec.
Environmental			- Floating control: - Min pulse on/off: 500msec. - Adjustable drive time period
Operating Temperature	32°F to 122°F; 0°C to 50°C		- HOA: Hand-Off-Auto switch (when equipped) - Hand position potentiometer range: 0-12.5VDC
Storage Temperature	-4°F to 122°F; -20°C to 50°C		- 60mA max. @ 12VDC (60°C; 140°F)
Relative Humidity	0 to 90% Non-condensing	Load resistance	- Minimum 200 Ω for 0-10VDC and 0-12VDC outputs - Maximum 500 Ω for 0-20mA output
Enclosure		Auto-reset fuse	- 60mA @ 140°F; 60°C - 100mA @ 68°F; 20°C
Material	FR/ABS	Output Resolution	10-bit digital / analog converter
Color	Black & blue casing & grey connectors		
Dimensions			
- ECB-600/ECB-610	7.7 W \times 4.7 H \times 2.03" D (195.58 \times 119.38 \times 51.47mm)		
- ECB-650	7.7 W \times 4.7 H \times 2.55" D (195.58 \times 119.38 \times 64.68mm)		
Shipping Weight			
- ECB-600/ECB-610	1.17lbs (0.53kg)		
- ECB-650	1.28lbs (0.58kg)		

1. External loads must include the power consumption of any connected modules such as an Allure EC-Smart-View sensor. Refer to the respective module's datasheet for related power consumption information.

ECB-600 Series Product Specifications (continued)

Wireless Receiver²

Communication	EnOcean wireless standard
Number of wireless inputs ³	28
Supported Wireless Receivers	Wireless Receiver (315)
Receivers	Wireless Receiver (868)
Cable	Telephone cord
- Connector	4P4C modular jack
- Length (maximum)	6.5ft; 2m

Standards and Regulation

CE -Emission	EN61000-6-3: 2007; Generic standards for residential, commercial and light-industrial environments
-Immunity	EN61000-6-1: 2007; Generic standards for residential, commercial and light-industrial environments
FCC	This device complies with FCC rules part 15, subpart B, class B



UL Listed (CDN & US) Material ⁴	UL916 Energy management equipment Plastic housing, UL94-5VB flammability rating Plenum rating per UL1995
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CEC Appliance Database Appliance Efficiency Program⁵

1. Refer to Distech Controls' Protocol Implementation Conformity Statement for BACnet.
2. Available when an optional external Wireless Receiver module is connected to the controller. Refer to the Open-to-Wireless Solution Guide for a list of supported EnOcean wireless modules.
3. Some wireless modules may use more than one wireless input from the controller.
4. All materials and manufacturing processes comply with the RoHS directive  and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive .
5. California Energy Commission's Appliance Efficiency Program: The manufacturer has certified this product to the California Energy Commission in accordance with California law.

ECB-650 Display

Display Type	Backlit-color LCD
Display Resolution	400 W × 240 H pixels (WQVGA)
Effective Viewing Area	2.4 W × 1.4" H (61.2 × 36.7mm) 2.8" (71mm) diagonal
Menu Navigation	Turn-and-select pushbutton navigation wheel,

Allure EC-Smart-Vue Sensor

Communication	RS-485
Number of sensors per controller	Up to 12, in daisy-chain configuration
Cable	Cat 5e, 8 conductor twisted pair
Connector	RJ-45

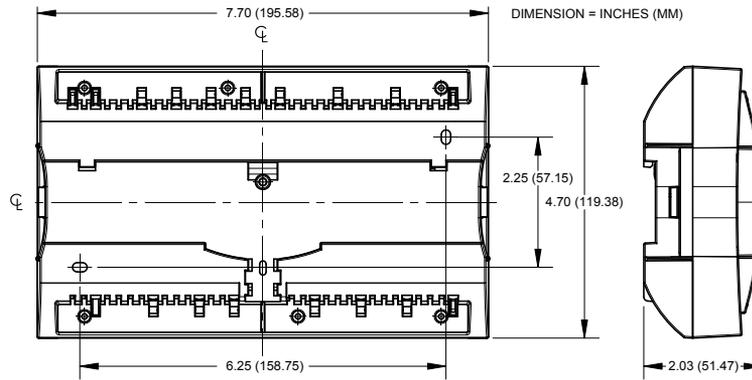
I/O Extension Modules (ECx Series)

Communication	RS-485
Number of I/O Extension Modules per controller	Up to 2, in daisy-chain configuration

Communication Protocols



ECx-400 Series Extendible I/O Module Dimensions



ECx-400 Series Extendible I/O Module Specifications

Power

Voltage	24VAC/DC; $\pm 15\%$; 50/60Hz; Class 2
Protection	3.0A user-replaceable fuse
Power Consumption;	22 VA typical plus all output loads
ECx-400/ECx-410	50 VA maximum
Power Consumption;	10 VA typical
ECx-420	16 VA maximum

Communication

Communication Bus	RS-485
Baud Rate	38 400 bps
Addressing	Dip Switch

Hardware

Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit; 64 MHz
Memory	64 kB Non-volatile Flash (applications and storage) 20 kB RAM
Status Indicator	Green LEDs: power status & LAN Tx Orange LEDs: module status & LAN Rx

Environmental

Operating Temperature	32°F to 122°F; 0°C to 50°C
Storage Temperature	-4°F to 122°F; -20°C to 50°C
Relative Humidity	0 to 90% Non-condensing

Enclosure

Material	FR/ABS
Color	Black & blue casing & grey connectors
Dimensions	7.7 W \times 4.7 H \times 2.03" D (195.58 \times 119.38 \times 51.47mm)
Shipping Weight	1.17lbs (0.53kg)

Standards and Regulation

CE -Emission	EN61000-6-3: 2007; Generic standards for residential, commercial and light-industrial environments
-Immunity	EN61000-6-1: 2007; Generic standards for residential, commercial and light-industrial environments
FCC	This device complies with FCC rules part 15, subpart B, class B



UL Listed (CDN & US)	UL916 Energy management equipment
Material ¹	Plastic housing, UL94-5VB flammability rating Plenum rating per UL1995



- All materials and manufacturing processes comply with the RoHS directive  and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive .

Inputs

Input Types	Universal; software configurable
-Voltage	- 0 to 10VDC (40k Ω input impedance) - 0 to 5VDC (high input impedance)
-Current	0 to 20mA with 249 Ω jumper configurable internal resistor
-Digital	Dry contact
-Pulse	1Hz maximum, 500ms On/500ms Off - Dry contact
-Resistor	0 to 350 K Ω . All thermistor types that operate in this range are supported. The following temperature sensors are pre-configured:
<i>Thermistor</i>	10K Ω Type 2, 3 (10K Ω @ 77°F; 25°C)
<i>Platinum</i>	Pt1000 (1K Ω @ 32°F; 0°C)
<i>Nickel</i>	RTD Ni1000 (1K Ω @ 32°F; 0°C) RTD Ni1000 (1K Ω @ 69.8°F; 21°C)
Input Resolution	16-bit analog / digital converter
Power Supply Output	15VDC; maximum 240mA (12 inputs \times 20mA each)

Outputs

Universal	0-10VDC linear, digital 0-12VDC (on/off), floating PWM, or 0-20mA (jumper configurable); software configurable. Built-in snubbing diode to protect against back-EMF, for example when used with a 12VDC relay.
	- PWM control: adjustable period from 2 to 65sec.
	- Floating control:
	- Min pulse on/off: 500msec.
	- Adjustable drive time period
	- HOA: Hand-Off-Auto switch (when equipped) - Hand position potentiometer range: 0-12.5VDC
	- 60mA max. @ 12VDC (140°F; 60°C)
Load resistance	- Minimum 200 Ω for 0-10VDC and 0-12VDC outputs - Maximum 500 Ω for 0-20mA output
Auto-reset fuse	- 60mA @ 140°F; 60°C - 100mA @ 68°F; 20°C
Output Resolution	10-bit digital / analog converter

Total Quality Commitment

All Distech Controls product lines are built to meet rigorous quality standards. Distech Controls is an ISO 9001 registered company.

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