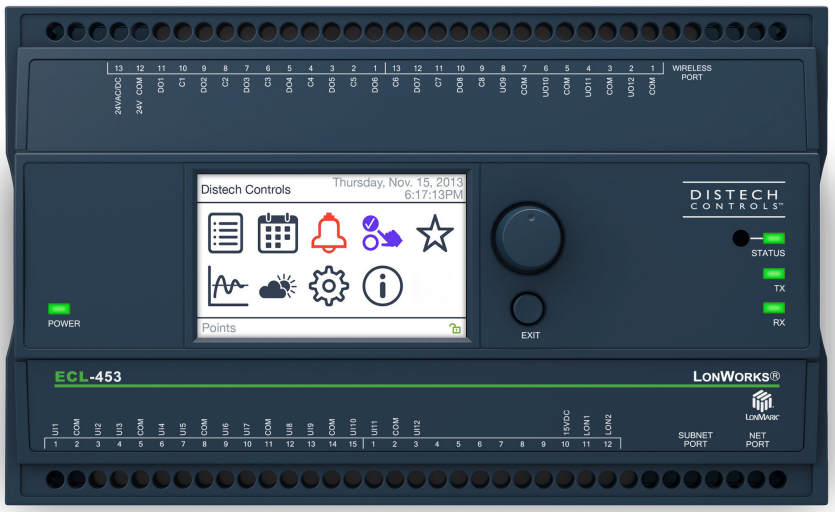
ECL-400 Series

LonMark® Certified 24-Point Programmable Controllers



Overview

The ECL-400 Series controllers are microprocessor-based programmable controllers designed to control various building automation applications such as air handling units, multi-zone applications, chillers, boilers, pumps, cooling towers, and roof top units.

The ECL-400 Series can also be used for lighting control applications. These controllers use the LonTalk® communication protocol and are LonMark certified as a Static Programmable Device, guaranteeing compatibility and interoperability with other manufacturers' LonMark certified controllers.

Applications

These controllers meet the requirements of the following applications:

- Air Handling Units
- Multi-Zone Applications
- Chillers
- Boilers
- Cooling Towers
- Roof Top Units

Features & Benefits

Universal Inputs and Outputs

This controller has various software configurable universal inputs and software configurable universal outputs, and covers all medium to large-size industry-standard HVAC applications.

Highly Accurate Universal Inputs

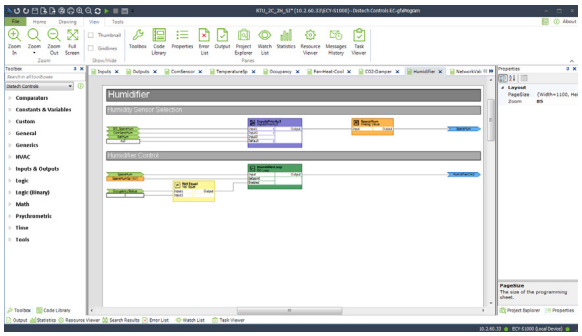
Highly accurate universal inputs support thermistors and resistance temperature detectors (RTDs) that range from 0 Ohms to 350,000 Ohms, as well as support for inputs requiring 0 to 10VDC or a pulse count. 0-20mA inputs and outputs have a jumper that eliminates the need for external resistors. This provides the freedom of using your preferred or engineer-specified sensors, in addition to any existing ones. The first four universal inputs support fast pulse count reading up to 50 Hz for gas, water, and electric meters and are compatible with an SO rated (optically-isolated) output.

Rugged Inputs/Outputs

Rugged hardware inputs and outputs eliminate need for external protection components, such as diodes for 12V DC relays.

Programmability

Supports Distech Controls' EC-*gfx*Program, which makes Building Automation System (BAS) programming effortless by allowing you to visually assemble building blocks together to create a custom control sequence for any HVAC / building automation application.



Increased Energy Efficiency

Improves energy efficiency when combined with:

- CO_2 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.

Open-to-Wireless™ Solution

Open-to-Wireless™

The controllers are Open-to-Wireless™ ready, and when paired with the Wireless Receiver, work with a variety of wireless battery-less sensors and switches, to reduce the cost of installation and minimize the impact on existing partition walls. For supported frequencies in your area, refer to the Open-to-Wireless Solution Guide.

Available with an optional Wireless Receiver that supports up to 28 wireless inputs to create wire-free installations.

HOA Switches & Potentiometers

Certain models have the convenience of supervised Hand-Off-Auto (HOA) switches and potentiometers that provide feedback on 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.

Allure™ Series Communicating Sensor Support

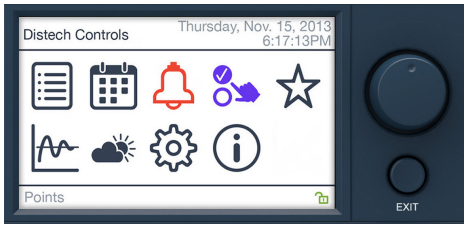
These controllers work with a wide range of sensors, such as the Allure Series Communicating Sensors that are designed to provide intelligent sensing and control devices for increased user experience and energy efficiency.

- Allure EC-Smart-Vue sensors feature a backlit-display and graphical menus that provide precise environmental zone control, with any combination of the following: temperature, humidity, CO_2, and motion sensor.
- Allure EC-Smart-Comfort sensors feature colored LED indicators to provide user feedback, rotary knobs to adjust the setpoint offset and fan speed, and an occupancy override push button. This sensor can also be expanded with a combination of up to 4 add-on push button modules for lighting and shade/ sunblind control.
- Allure EC-Smart-Air sensors combine precise environmental sensing in a discreet and alluring enclosure for temperature, humidity, and CO_2.

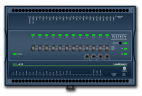
Operator Interface

The ECL-450 and ECL-453 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. The status is color coded to show if the value is overridden.
- Visually tune PID loops with system response graphing.
- View active alarm list.
- 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.



Model Selection

						
Model	**ECL-400**	**ECL-403**	**ECL-410**	**ECL-413**	**ECL-450**	**ECL-453**
Points	24-Point Controller	24-Point Controller	24-Point Controller with HOA	24-Point Controller with HOA	24-Point Controller with Color Display	24-Point Controller with Color Display
Universal hardware inputs	12	12	12	12	12	12
Wireless inputs[1]	28	28	28	28	28	28
15 Vdc Power Supply	■	■	■	■	■	■
Digital (Triac) outputs		8		8		8
Universal outputs	12	4	12	4	12	4
HOA switch & potentiometer			■	■		
Operator interface: interactive color display to monitor and override controller parameters					■	■

1. 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

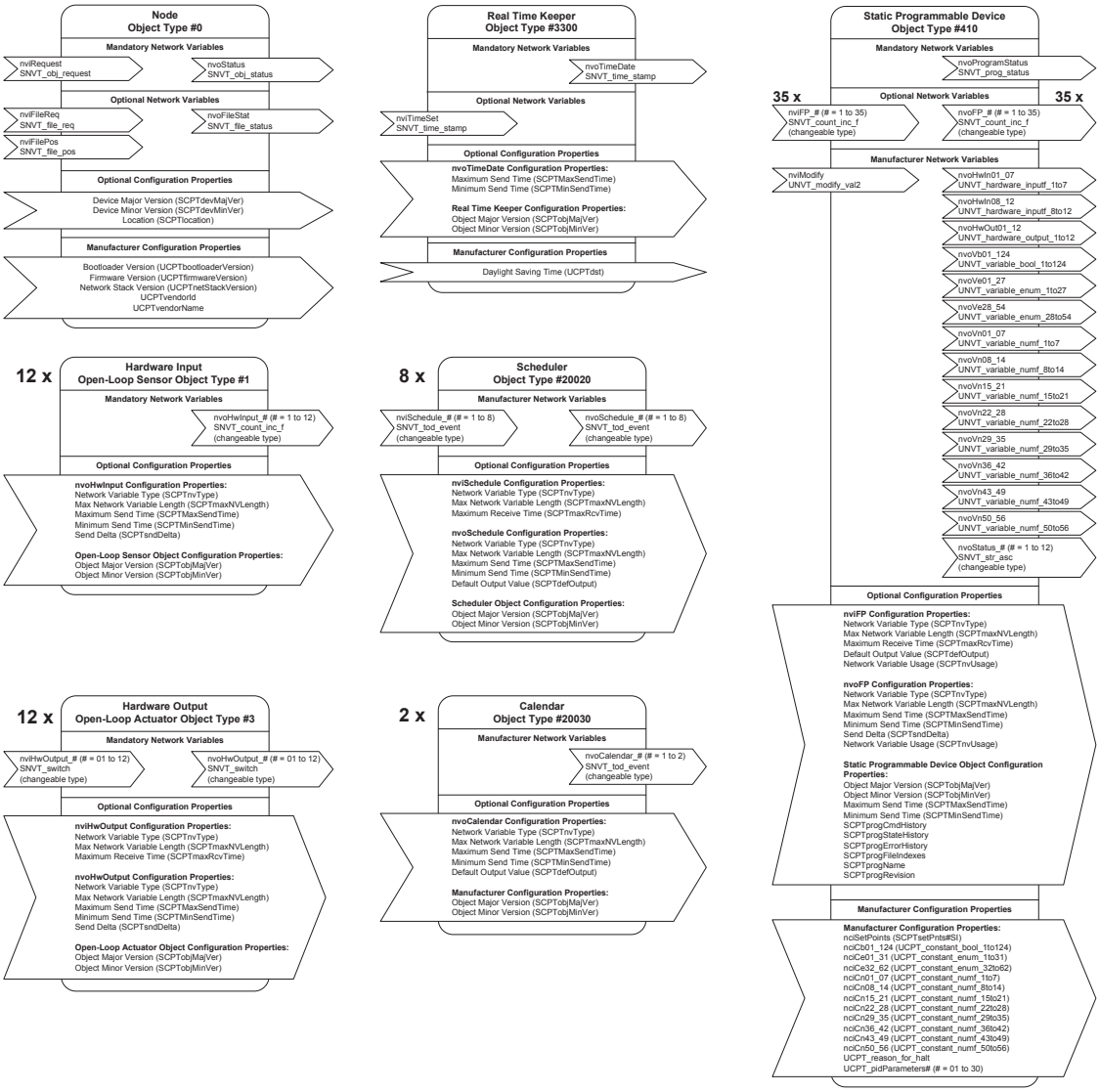
Model	**ECL-400**	**ECL-403**	**ECL-410**	**ECL-413**	**ECL-450**	**ECL-453**
Roof Top		■		■		■
Air Handling Unit	■	■	■	■	■	■
Multi-Zone Application	■		■		■	
Chiller	■	■	■	■	■	■
Boiler	■	■	■	■	■	■
Cooling Tower	■	■	■	■	■	■

Objects List

Objects List	
Calendar Objects	2
□ Special events per calendar	50
Schedule Objects	8
□ Special events per schedule	10
PID Loop Objects	30
Constants:	
□ Boolean	124
□ Enumeration	62
□ Numeric	56
Variables:	
□ Boolean	124
□ Enumeration	54
□ Numeric	56
nciSetpoint	■
Total Network Variables	171
Network Variable Input (General Usage):	
□ NVI Changeable Type, Up to 31 Bytes[1]	35
Network Variable Output (General Usage):	
□ NVO Changeable Type, Up to 31 Bytes	35
Hardware Input Network Variable:	
□ nvoHwInput per Hardware Input	■
Hardware Output Network Variable:	
□ nviHwInput per Hardware Output	■
□ nvoHwInput per Hardware Output	■

1. Any type of Fan-In function is supported in combination with the “FOR” loop function.

Functional Profile



Product Specifications

Power Supply Input

Voltage Range	24VAC/DC; ±15%; Class 2
Frequency Range	50/60Hz
Overcurrent Protection	Field replaceable fuse
Fuse Type	3.0A

Power Consumption:

☐ ECL-400/ECL-410	22 VA typical plus all external loads[1], 60 VA max.
☐ ECL-403/ECL-413	22 VA typical plus all external loads[1], 50 VA max.
☐ ECL-450	25 VA typical plus all external loads[1], 63 VA max.
☐ ECL-453	25 VA typical plus all external loads[1], 53 VA max.

1. External loads must include the power consumption of any connected modules such as an Allure Series Communicating Sensor. Refer to the respective module's datasheet for related power consumption information.

Communications

Communication	LonTalk Protocol
Transceiver	FT 5000 Free Topology Smart Transceiver
Channel	TP/FT-10; 78Kbps
LonMark Interoperability Guidelines	Version 3.4
Device Class	Static Programmable Device

LonMark Functional Profile :

☐ Input Objects	Open-Loop Sensor #1
☐ Output Objects	Open-Loop Actuator #3
☐ Node Object	Node Object #0
☐ Real Time Clock	Real Time Keeper #3300
☐ Scheduler	Scheduler #20020
☐ Calendar	Calendar #20030
☐ Programmable Device	Static Programmable Device #410

Hardware

Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit
CPU Speed	72 MHz
Memory	1 MB Non-volatile Flash (applications)
	2 MB Non-volatile Flash (storage)
	96 kB RAM
Real Time Clock (RTC)	Built-in Real Time Clock with rechargeable battery
	Network time synchronization is initially required
RTC Battery	20 hours charge time, 20 days recharge time
	Up to 500 charge/discharge cycles
Status Indicator	Green LEDs: power status & LAN Tx
	Orange LEDs: controller status & LAN Rx
Communication Jack	LON® audio jack

Subnetwork

Communication — RS-485

Cable — Cat 5e, 8 conductor twisted pair

Connector — RJ-45

Connection Topology — Daisy-chain

Maximum number of supported devices per controller combined — 12

- ☐ Allure EC-Smart-Vue Series — Up to 12[1]
- ☐ Allure EC-Smart-Comfort Series — Up to 6
- ☐ Allure EC-Smart-Air Series — Up to 6[1]

1. A controller can support a maximum of two Allure Series Communicating Sensor models equipped with a CO_2 sensor. The remaining connected Allure Series Communicating Sensor models must be without a CO_2 sensor.
1. A controller can support a maximum of two communicating sensors equipped with a CO_2 sensor. The remaining connected communicating sensor models must be without a CO_2 sensor.

Wireless Receiver[1]

Communication Protocol — EnOcean wireless standard

Number of Wireless Inputs[2] — 28

Supported Wireless Receivers — Refer to the Open-to-Wireless Solution Guide

Cable — Telephone cord

- ☐ Connector — 4P4C modular jack
- ☐ Length (maximum) — 6.5ft (2m)

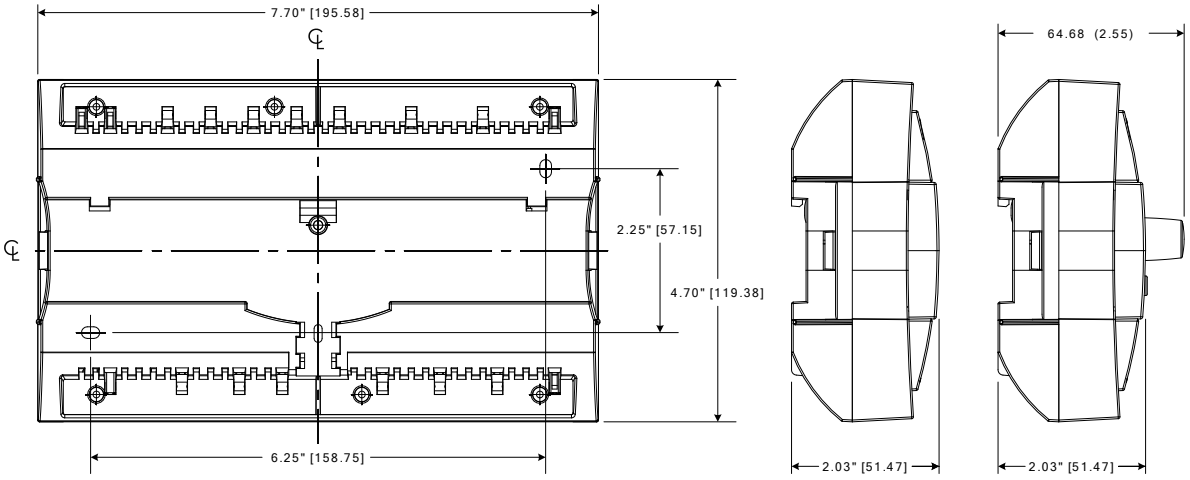
enocean

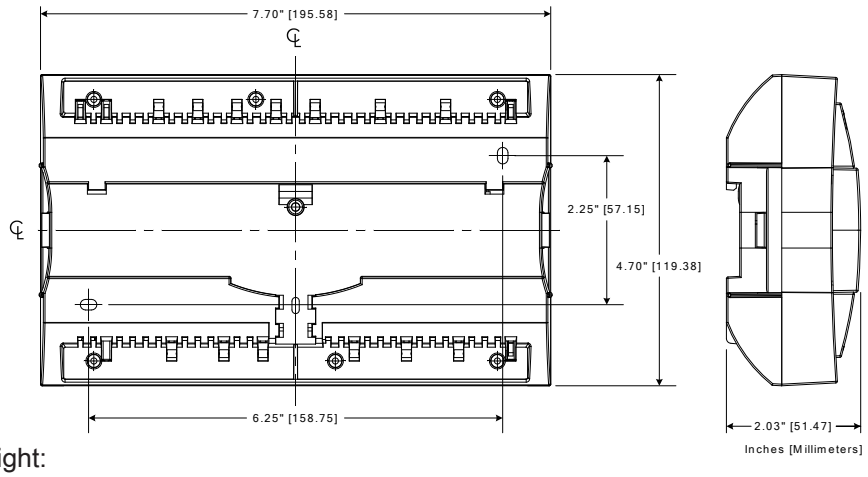
1. Available when an optional external Wireless Receiver module is connected to the controller. Refer to the Open-to-Wireless Solution Guide for a list of supported EnOcean wireless modules.
2. Some wireless modules may use more than one wireless input from the controller.

Mechanical

Dimensions (H × W × D):

- ☐ ECL-400 — 4.7 × 7.7 × 2.03" (119.38 × 195.58 × 51.47 mm)
- ☐ ECL-450 — 4.7 × 7.7 × 2.55" (119.38 × 195.58 × 64.68 mm)





Shipping Weight:

- ECL-400 — 1.17lbs (0.53 kg)
- ECL-450 — 1.28lbs (0.58 kg)

Enclosure Material[1] — FR/ABS

Enclosure Rating — Plastic housing, UL94-5VB flammability rating
Plenum rating per UL1995

Color — Black & blue casing & grey connectors

Installation — Direct DIN-rail mounting or wall mounting through mounting holes (see figure above for hole positions)

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

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

Standards and Regulations

CE:

- Emission — EN61000-6-3: 2007; A1:2011; 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

CEC Appliance Database — Appliance Efficiency Program[1]

1. California Energy Commission's Appliance Efficiency Program: The manufacturer has certified this product to the California Energy Commission in accordance with California law.

ECL-450 and ECL-453 Display

Display Type — Backlit-color LCD

Display Resolution — 400 W x 240 H pixels (WQVGA)

Effective Viewing Area (W × H) — 2.4 × 1.4" (61.2 × 36.7mm)
2.8" (71mm) diagonal

Menu Navigation — Jog dial turn, select navigation with Exit button

Specifications - Universal Inputs (UI)

General

Input Type — Universal; software configurable
Input Resolution — 16-bit analog / digital converter
Power Supply Output — 15VDC; maximum 240mA

Contact

Type — Dry contact

Counter

UI1 to UI4:

Type — SO output compatible
Maximum Frequency — 50Hz maximum,
Minimum Duty Cycle — 10milliseconds On / 10milliseconds Off

UI5 to UI10:

Type — Dry contact
Maximum Frequency — 1Hz maximum,
Minimum Duty Cycle — 500milliseconds On / 500milliseconds Off

0 to 10VDC

Range — 0 to 10VDC (40kΩ input impedance)

0 to 5VDC

Range — 0 to 5VDC (high input impedance)

0 to 20mA

Range — 0 to 20mA
249Ω jumper configurable internal resistor

Resistance/Thermistor

Range — 0 to 350 KΩ
Supported Thermistor Types — Any that operate in this range

Pre-configured Temperature Sensor Types:

- Thermistor — 10KΩ Type 2, 3 (10KΩ @ 77ºF; 25ºC)
- Platinum — Pt1000 (1KΩ @ 32ºF; 0ºC)
- Nickel — RTD Ni1000 (1KΩ @ 32ºF; 0ºC)

RTD Ni1000 (1KΩ @ 69.8ºF; 21ºC)

Specifications - Universal Outputs (UO)

General

Output Type	Universal; software configurable
Output Resolution	10-bit digital to analog Converter
Output Protection	Built-in snubbing diode to protect against back-EMF, for example when used with a 12VDC relay Output is internally protected against short circuits
Load Resistance	Minimum 200 Ω for 0-10VDC and 0-12VDC outputs Maximum 500 Ω for 0-20mA output
Auto-reset fuse	Provides 24VAC over voltage protection

0 or 12VDC (On/Off)

Range	0 or 12VDC
Source Current	Maximum 60 mA at 12VDC (minimum load resistance 200Ω)

PWM

Range	Adjustable period from 2 to 65seconds
Thermal Actuator Management	Adjustable warm up and cool down time

Floating

Minimum Pulse On/Off Time	500milliseconds
Drive Time Period	Adjustable

0 to 10VDC

Voltage Range	0 to 10VDC linear
Source Current	Maximum 60 mA at 10VDC (minimum load resistance 200 Ω)

0 to 20mA

Range	0 to 20mA
Type	Current source (jumper configurable)

HOA

Hand-Off-Auto switch	When equipped Supervision allows control logic to read the current HOA switch and potentiometer settings
Threshold	Configurable
Potentiometer Voltage Range	0 to 12.5VDC

Specifications - Digital Output (DO)

General

Output Type	24VAC Triac; software configurable
Maximum Current per Output	0.5A continuous
	1A @ 15% duty cycle for a 10-minute period
Power Source	External

0 or 24VAC (On/Off)

Range	0 or 24VAC

PWM

Range	Adjustable period from 2 to 65seconds

Floating

Minimum Pulse On/Off Time	500milliseconds
Drive Time Period	Adjustable
Power Source	External