



Silver Series EM

The Silver Series EM is a rugged, touch-screen operator interface terminal (OIT). Available in three sizes (4.3, 7 and 10 inch diagonal display sizes), the OIT's feature serial and Ethernet communications with multiple controllers, email messaging, universal serial bus (USB host), data logging, flexible password security and multiple languages. The small bezel size and two-inch depth make mounting in tight spots easy.

The Silver Series EM programming software, EZwarePlus, is easy to use and features a large variety of built-in screen objects that makes it powerful. When creating screens, the user can call upon extensive graphics libraries, import custom graphics and add numeric displays, entry fields, analog meters, bar graphs and trend graphs with just a few mouse clicks. Screen objects are highly customizable, and the user can create libraries of their own objects for repeat use. The online simulator, Ethernet and USB support make testing and downloading fast. The EZwarePlus screen editor is part of the EZwarePlus software suite and is available as a FREE download on www.watlow.com.

The Silver Series EM OIT paired with Watlow® controllers is the perfect solution for your industrial process or machine control application.

Features and Benefits

Bright, color, high resolution, graphic, touch screen, thin film transistor (TFT) display

- Maximizes display space in the OIT footprint
- Allows application specific interface design
- Allows viewing from a distance and at an angle
- Highlights important process information with color and animation

User selectable portrait or landscape operation

- Fits in tight spots

Ethernet, serial and USB host ports

- Allows options for connecting to controllers
- Provides options for downloading projects
- Expands memory for additional recipe and data log storage
- Supports barcode readers, keyboard, mouse and printers
- Supports monitoring from a personal computer (PC) with free virtual network computing (VNC) client software



Support for over 100 protocols, up to three simultaneously plus multiple protocols over Ethernet

- Connects to a wide range of industrial controllers and devices
- Integrates a variety of devices to simplify complex operation tasks

Data logging, display and trending

- Helps operators monitor processes
- Reduces labor and increases accuracy by automating time-stamped data collection
- Stores captured data for future retrieval in multiple files
- Saves time by exporting data to Excel®-compatible comma separated value (.csv) files
- Improves process understanding by allowing live and historical data to be viewed on the OIT

Alarm and event email notification, monitoring and recording

- Reduces downtime by helping troubleshoot equipment and processes
- Simplifies troubleshooting by recording time and date-stamped alarm and event history
- Organizes and prioritizes alarms and events in up to 255 categories and four priority levels

Recipe management

- Reduces errors by automating process setting changes

Offline and online simulation

- Speeds up development by making it faster and easier to test projects
- Allows faster creation of fine-tuned interfaces by speeding up iterations

Time or trigger-based data exchange

- Simplifies integration by allowing the OIT to copy data from one controller or OIT to another

Internal, piezoelectric buzzer

- Provides audible alarms and key chirp



Operator Interfaces and Indicators

Silver Series EM

Features and Benefits (Continued)

Two-year warranty

- Provides product support and reliability

Screen object password security with programmable hierarchy and multiple users

- Prevents errors and tampering by allowing only authorized users to access restricted items on the screen
- Allows flexible hierarchies by letting the developer assign each screen object to any of 12 groups and grant each user access to any combination of groups
- Provides password protection for upload, download and access to local setup
- Supports up to 127 users

Screen object invisibility and/or interlock control

- Prevents errors by guiding operators

Powerful, easy-to-use EZwarePlus programming software

- Requires only a small investment in time to create a useful interface
- Provides the ability to learn additional features as needed
- Provides advanced interface features such as animation and pop-up windows

- Reduces development time by providing extensive graphical libraries and facilitating reuse with user-created libraries
- Simplifies development allowing import of common graphic formats: Bitmaps, JPEGs and animated GIFs

User-programmable macros with math functions and support for floating point

- Extends functionality
- Automates processes

TrueType fonts with Unicode (international) characters and language switching feature

- Makes screens easy to read by allowing bold, italic, underlined, scrolling and blinking text to direct operator's eyes
- Prevents errors by communicating with users in their native languages
- Reduces development and support by allowing inclusion of up to 24 user-selectable languages in a project

UL®, NEMA 4, CE, RoHS,

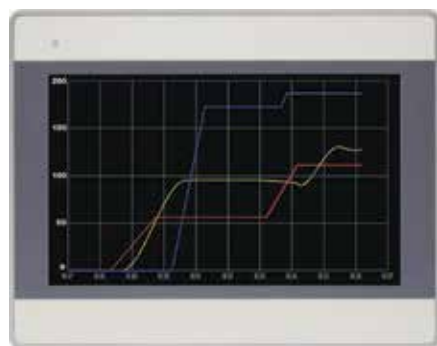
- Allows use in harsh industrial environments
- Assures prompt product acceptance



Integrate multiple devices to simplify operation of complex systems.



Include the types of displays users understand such as gauges, sliders and bar graphs to make screens intuitive.



Log and graph process data for quality records and better process control.



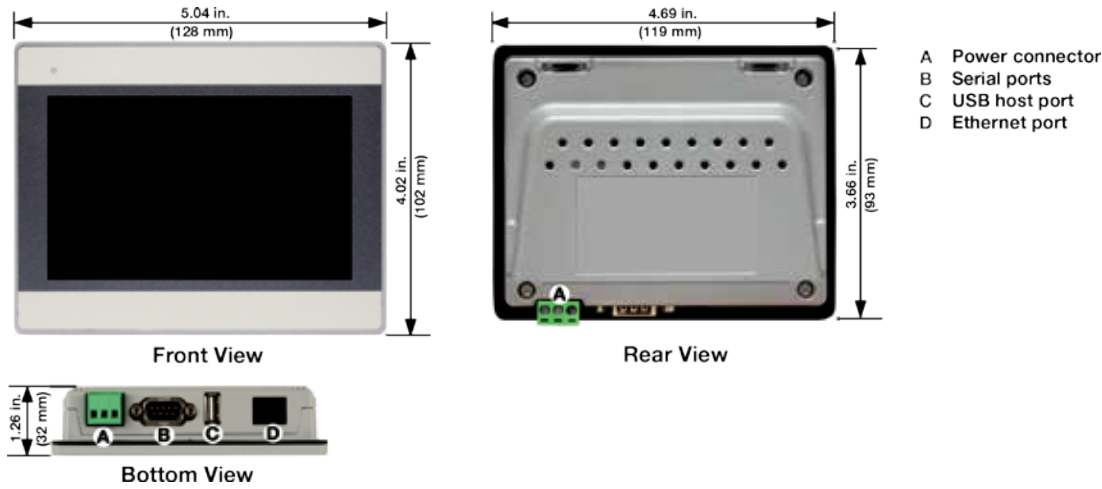
Create screens that guide work flow.



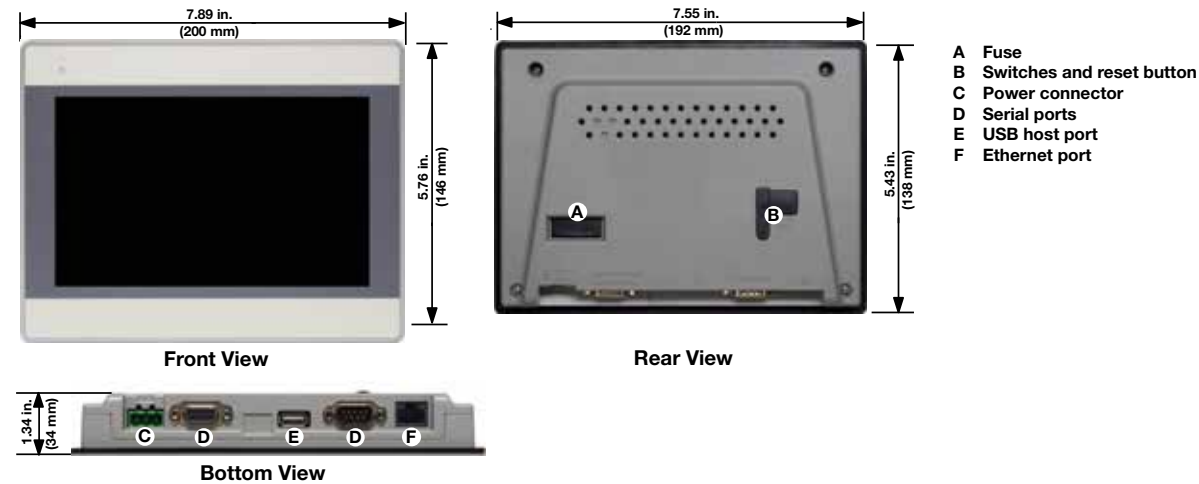
Silver Series EM

Dimension and Connection Diagrams

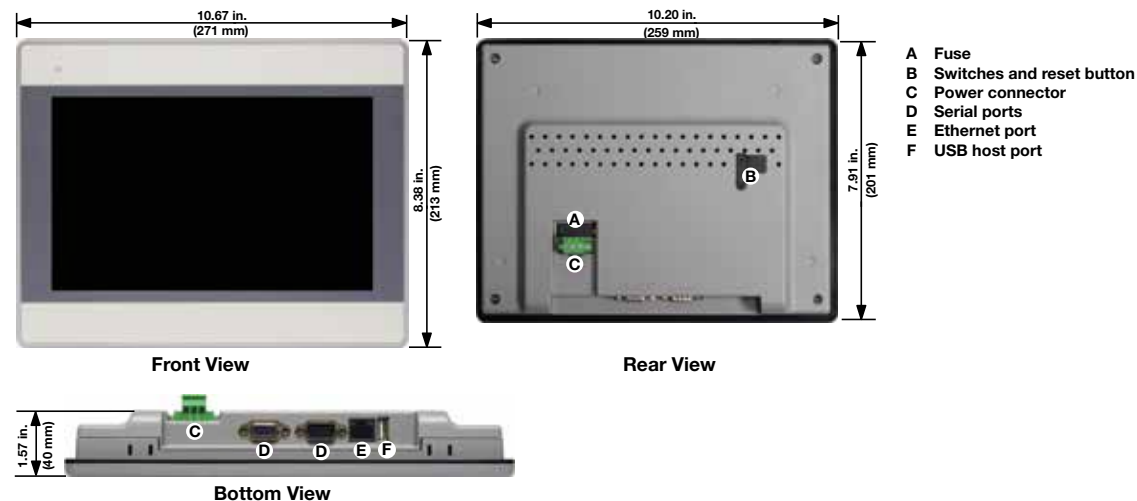
Models TS00-0043-EM00/TS00-0043-EM0B



Model TS00-0070-EM00/TS00-0070-EM0B



Model TS00-0100-EM00





Operator Interfaces and Indicators

Silver Series EM

Feature	Model Number		
	TS00-0043-EM00/TS00-0043-EM0B	TS00-0070-EM00/TS00-0070-EM0B	TS00-0100-EM00
Processor Type	600MHz, 32-bit, RISC, fanless		
Memory	128MB Flash, 128MB DRAM		
Ethernet Port	10/100 Base-T (RJ45)		
Serial Ports	COM1: RS-232 or RS-485 (2-wire or 4-wire) COM3: RS-485 (2-wire)		
USB Host (Type A) Version 2.0	1 each		
Real Time Clock	Built-in		
Audible Alarm and Key Chirp	Piezoelectric buzzer		
Display Type	TFT LCD		
Resolution (Pixels)	480 x 272	800 x 480	
Colors	16 million		262 thousand
LED Backlight Brightness	500 cd/m ²	350 cd/m ²	300 cd/m ²
Contrast Ratio	500:1		
Viewing Angle	Top: 50°, bottom, right, left: 70°	Top: 60°, bottom, right, left: 70°	Top: 45°, bottom, right, left: 65°
Backlight Longevity	30,000 hours		
Touch-Screen Type	4-wire analog resistive		
Touch-Screen Resolution	Continuous		
Touch-Screen Light Transmission	Greater than 80%		
Touch-Screen Lifespan	1,000,000 activations min.		
Operating Temperature	32 to 122°F (0 to 50°C)		
Storage Temperature	-4 to 140°F (-20 to 60°C)		
Relative Humidity	10 to 90% @ 40°C (non-condensing)		
Operating Shock Resistance	10 to 25Hz (X, Y, Z direction 2G, 30 min.)		
Environmental Ratings	NEMA 4 (IP65) indoor only		
Agency	CE, cULus, RoHS	Class 1, Division 2, CE, cULus, RoHS	CE, cULus, RoHS
Enclosure	Plastic molded		
Mounting	Panel		
Dimensions Cutout (W x H)	4.69 x 3.66 in. (119 x 93 mm)	7.55 x 5.43 in. (192 x 138 mm)	10.20 x 7.91 in. (259 x 201 mm)
Dimensions Overall (W x H x D)	5.04 x 4.02 x 1.26 in. (128 x 102 x 32 mm)	7.88 x 5.76 x 1.34 in. (200 x 146 x 34 mm)	10.67 x 8.38 x 1.57 in. (271 x 213 x 40 mm)
Weight	0.55 lbs (0.25 kg)	1.31 lbs (0.6 kg)	2.9 lbs (1.3 kg)
Input Power: Voltage	24VDC		
Input Power: Current	300mA max.	350mA max.	400mA max.

EZwarePlus Software System Requirements

Compatible Operating Systems:

- Windows® 10, 8.1 and 7



Silver Series EM

EZwarePlus Software Suite

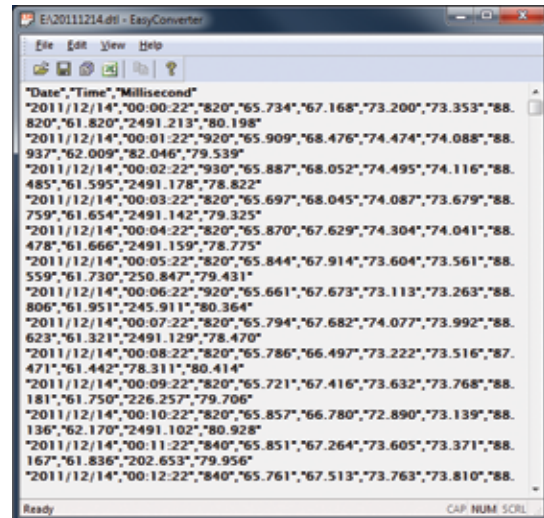
The EZwarePlus software suite includes EasyConverter, EZwarePlus screen editor, Utility Manager and Recipe Editor programs.



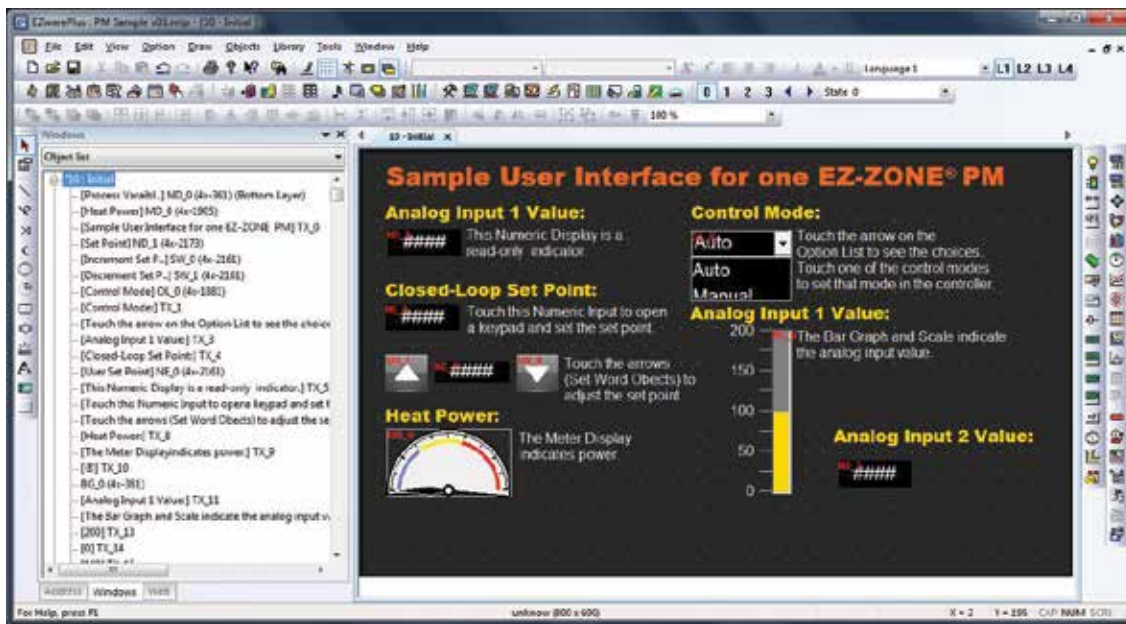
Utility Manager uploads and downloads projects to and from the Silver Series EM OIT, opens compiled projects in simulation and launches the other EZwarePlus programs.

ID	ADDRESS	Recipe Name	Set Point 1	High Process Alarm 1	Set Point 2	High Process Alarm 2	Cor
0	0	Standard Process	450.5	500	487	525	
1	19	Spec for Alpha Lab	235	250	215	250	
2	38	Mil Specificatio	425.1	450	375	425	
3	57	FDA Test	140.3	175	150.7	180	
4	76	CE Test	50	65	75	100	

The Recipe Editor configures memory files for use with Silver Series EM OITs and allows offline creation of recipes.



EasyConverter converts log files saved by the Silver Series EM OIT to file formats used by popular Windows® software such as Microsoft® Excel®.



EZwarePlus provides a graphical screen designing environment with point-and-click access to features and drag-and-drop ease.

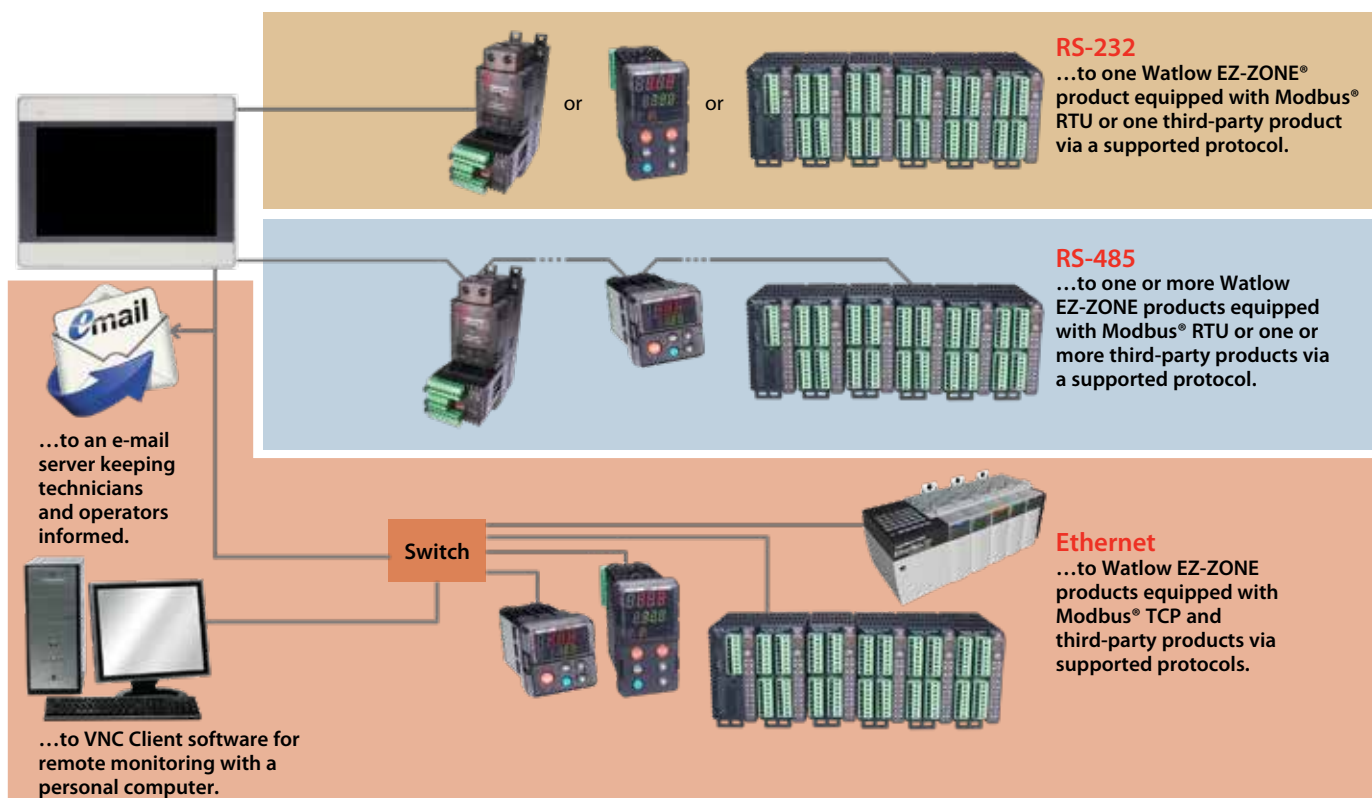


Operator Interfaces and Indicators

Silver Series EM

Connectivity

Silver Series EM connects via...



Ordering Information

Part Number	Description
TS00-0043-EM00	4.3 in. (480 x 272) color TFT LCD touch screen; two-tone, light gray bezel; USB host; two serial ports and Ethernet
TS00-0043-EM0B	4.3 in. (480 x 272) color TFT LCD touch screen; two-tone, dark gray bezel; USB host; two serial ports and Ethernet
TS00-0070-EM00	7 in. (800 x 480) color TFT LCD touch screen; two-tone, light gray bezel; USB host; two serial ports and Ethernet
TS00-0070-EM0B	7 in. (800 x 480) color TFT LCD touch screen; two-tone, dark gray bezel; USB host; two serial ports and Ethernet
TS00-0100-EM00	10 in. (800 x 480) color TFT LCD touch screen; two-tone, light gray bezel; USB host; two serial ports and Ethernet

Accessories

Part Number	Description
0601-0001-0000	Controller support tools DVD-ROM with programming software and product manuals
0830-0750-0000	Power supply, input: 85-264VAC, output: 24VDC, 1.7A, 40W (not Class 2)
0847-0299-0000	Class 2 power supply, input: 90-264VAC, output: 24VDC, 1.3A, 31W
0219-0388-0000	TS00-0043-EM00 and TS00-0043-EM0B communication cable, 5-foot, COM1 (RS-485, 2-wire) to bare wires for Watlow EZ-ZONE® controller screw terminals
0219-0374-0000	TS00-0070-EM00, TS00-0070-EM0B or TS00-0100-EM00 communication cable, 5-foot, COM1 (RS-485, 2-wire) to bare wires for Watlow EZ-ZONE controller screw terminals
0830-0782-0000	Package of 5 ea. protective screen covers for the TS00-0043-EM00 and TS00-0043-EM0B
0830-0753-0000	Package of 5 ea. protective screen covers for the TS00-0070-EM00 and TS00-0070-EM0B
0830-0754-0000	Package of 3 ea. protective screen covers for the TS00-0100-EM00



EZ-ZONE® RUI and Gateway

The EZ-ZONE® Remote User Interface (RUI and communications gateway) can be utilized as a communication gateway device to save cost, space and wiring when digital communications is being used with two or more EZ-ZONE controllers. The EZ-ZONE RUI can also serve as a display for showing all parameter values for up to 16 EZ-ZONE controllers, again saving cost, space and wiring expenses.



Indicator Features and Benefits—Remote User Interface (RUI)

Single user interface device or location to access multiple controllers

- Easy accessibility to all controllers and all parameters from a central location by using one RUI display
- Reduces component material costs by using a single RUI to display multiple control zones
- Eliminates cost and complexity from bringing all controller related input and output wiring to the front panel

Flexible use of a display interface

- Can be used when needed during normal machine production, for OEM prototype design purposes or for remote troubleshooting scenarios
- Ability to use more than one RUI indicator to display additional data including temperature and current (ammeter) to improve user system interface

Communications Gateway Features and Benefits

A single RUI and gateway provides field bus access for up to 16 EZ-ZONE controllers

- Lowers solution cost when field bus communications is required for multiple loops

Expand communication protocols to all EZ-ZONE controllers

- Ability to utilize multiple communication protocols for different user preferences. Flex between different communication protocols while still maintaining a reduced level of inventory

Delivers multiple communication protocol options

- Ability to connect EZ-ZONE controllers to communication networks utilizing
 - Modbus® RTU
 - DeviceNet™
 - Ethernet/IP™
 - Modbus® TCP
 - PROFIBUS DP

Additional Features

EZ-ZONE P3T armor sealing system

- Complies with NEMA 4X, IP65 RUI
- Offers water and dust resistance, can be cleaned and washed down

EZ-KEY (RUI)

- Programmable EZ-Key is a functional key programmable by the user to perform simple one-touch operation of repetitive user activities

Compact package

- Reduces required panel size for 1/6 DIN
- Utilizes less depth behind panel allowing for mounting in tight spaces

Touch-safe package

- Complies with IP2X which increases safety for user

Agency approvals: UL® Listed, CSA, CE, RoHS, W.E.E.E., SEMI F47-0200, Class 1, Div. 2 rating on selected models

- Meets applications requiring agency approvals

Three-year warranty

- Provides product support and protection



Operator Interfaces and Indicators

EZ-ZONE RUI and Gateway

Specifications

Line Voltage/Power

- Universal high voltage 100 to 240VAC, +10%/-15%; (85-264VAC), 50/60Hz, ±5%
- Low voltage 20 to 28VAC or 25 to 40VDC, 50/60Hz, ±5% for RUI only in short case version
- Low voltage 20 to 28VAC or 12 to 40VDC, 50/60Hz, ±5% for RUI and Gateway in long case version
- Data retention upon failure via nonvolatile memory

Environment

- 0 to 149°F (-18 to 70°C) operating temperature
- -40 to 185°F (-40 to 85°C) storage temperature
- 0 to 90% RH, non-condensing

Wiring Termination—Touch-Safe Terminals

- Terminals touch safe, removable, 12 to 22 AWG

DIN Sizes

- 1/6 DIN

Display Update Rate

- 1HZ

Operator Interface

- Dual 4 digit, 7 segment LED displays
- Forward, backward, up and down keys plus a customer-programmable function key - EZ key

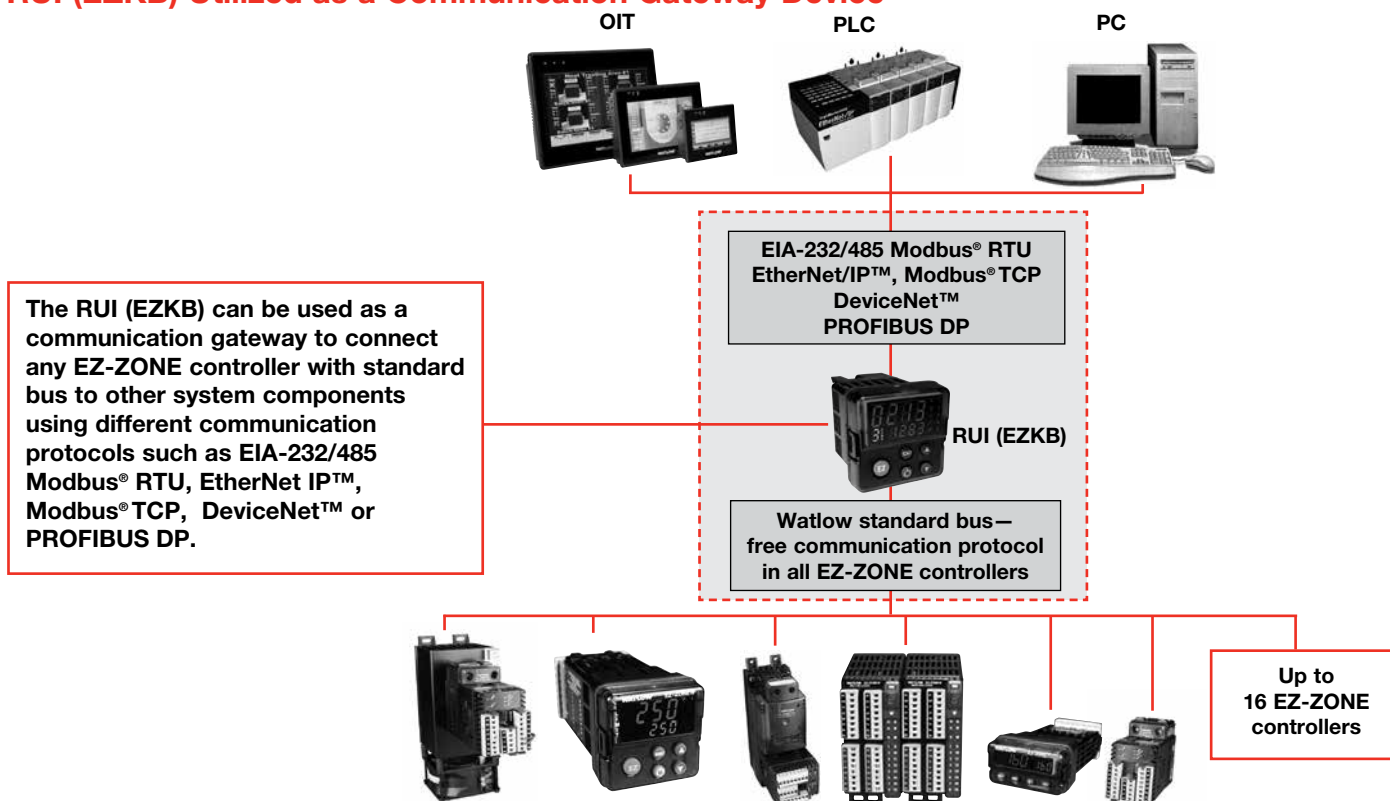
Communication Options

- Standard bus - ships with all EZ-ZONE products
- EIA-235/485, Modbus® RTU
- EtherNet/IP™, Modbus® TCP, 10 BASE-T/100 BASE-TX
- DeviceNet™
- PROFIBUS DP

Agency Approvals

- cULus® UL®/EN/CSA C22.2 No. 61010-1 listed, File E185611 for long case models
- cULus® UL®508/EN/CSA C22.2 No. 61010-1 listed, File E102269 for short case models
- CSA C22.2 No. 14 (short case) No. 24 (long case), File 158031
- UL® 50 4X indoor locations, NEMA 4X, IP65 front seal
- cULus® ANSI/ISA 12.12.01-2007, CSA-C22.2 No. 213-1987, Class 1, Div. 2, Groups A, B, C and D, temperature code T4A, File E184390 (optional)
- CE, RoHS by design, W.E.E.E.
- SEMI F47-0200 when powered at 24V or greater

RUI (EZKB) Utilized as a Communication Gateway Device

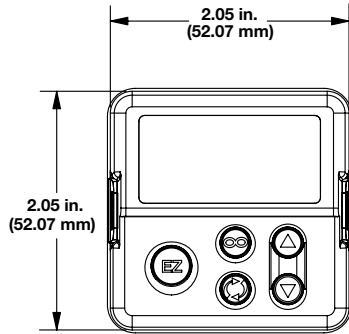




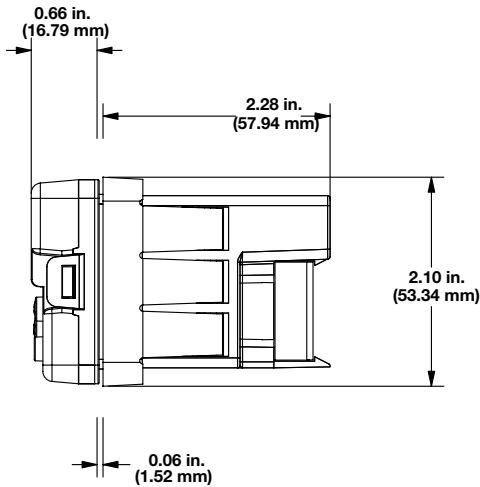
EZ-ZONE RUI and Gateway

Remote User Interface (RUI) – Dimensional Drawings

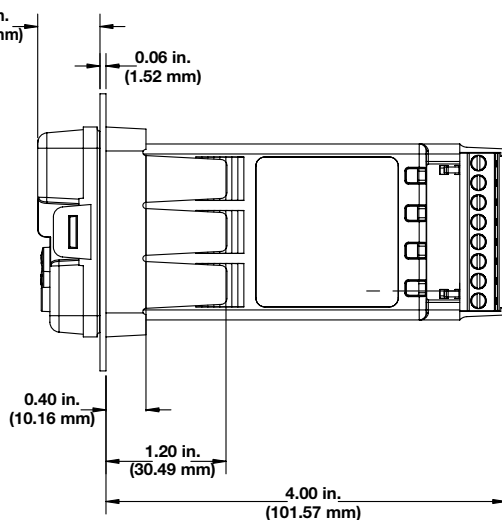
Front View



Short Case Version



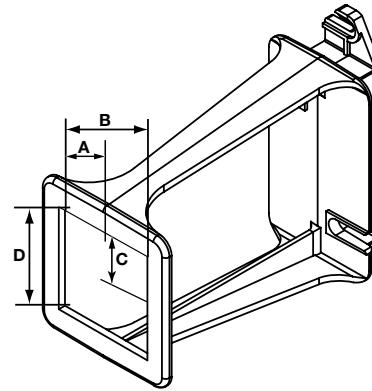
Long Case Version



Accessory – DIN-Rail Mounting Bracket

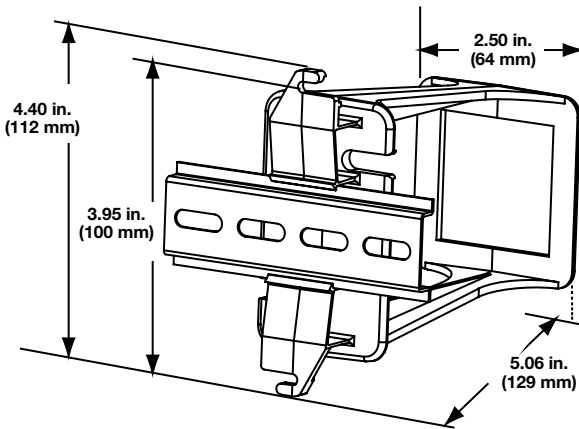
Part Number: 0822-0586-P002

Front View



Dim. A	Dim. B	Dim. C	Dim. D
0.886 in. (23 mm)	1.772 in. (45 mm)	0.886 in. (23 mm)	1.772 in. (45 mm)

Rear View





Operator Interfaces and Indicators

EZ-ZONE RUI and Gateway

Ordering Information

Part Number

① ② ③	④ Remote User Interface	-	⑤ Power Supply Voltage for RUI	⑥ Comm. Gateway Options	⑦ ⑧ Custom RUI	-	⑨ ⑩ Future Options	⑪ ⑫ Custom Options
EZK							AA	

④ Remote User Interface (RUI)	
B =	Basic 1/16 DIN

⑤ Power Supply Voltage for RUI	
L =	Low voltage 24-28VAC/VDC
H =	Universal high voltage 100-240VAC/VDC

⑥ Communication Gateway Options* (Standard Bus Always Included)	
A =	None
2 =	EIA-232/485 Modbus® RTU
3 =	EtherNet/IP™/Modbus® TCP
5 =	DeviceNet™
6 =	PROFIBUS DP
* Options 2 through 6 require the long case dimensions	

⑦ ⑧ Custom RUI	
AA =	None
XX =	Custom options, contact factory

⑪ ⑫ Custom Options	
AA =	None
12 =	Class 1, Div. 2 (only available with communication options 2, 3, 5 and 6)



SERIES TM

The SERIES TM temperature indicator from Watlow provides an economical solution for applications requiring temperature monitoring and display. Square 1/8 DIN panel mount and DIN-rail mount packaging options are available. A red, four-character, seven-segment LED display indicates the process value. The microprocessor-based design provides significant improvements in performance, repeatability and accuracy over analog indicators.

The indicators are UL® approved and include CE approvals. Panel mount indicators include NEMA 4X/IP65 seal protection. Watlow's SERIES TM temperature indicators include industry leading service and support and are backed by a three-year warranty.



Features and Benefits

Four character LED display

- Improves accuracy

Multiple mounting options

- Minimizes installation time

Fahrenheit or Celsius operation with indication

- Offers application flexibility

Agency approvals

- Meets certification requirements/compliance

Microprocessor-based technology

- Ensures accurate repeatable indication

Typical Applications

- Food preparation
- Industrial machinery
- Packaging
- Plastics processing

Specifications

Operator Interface

- 4-digit, 7-segment LED displays, 7 mm (0.28 in.) high
- °F or °C indicator

Standard Conditions For Specifications

- Rated line voltage, 50 to 60Hz, 0 to 90% RH non-condensing, 15-minute warm-up
- Calibration ambient range: 77°F (25°C) ±3°C

Thermocouple Input

- Grounded or ungrounded
- Type E, J, K, T thermocouple types
- >10 MΩ input impedance
- 250 nV input referenced error per 1Ω source resistance

RTD Input

- 2-wire platinum, 100Ω
- DIN curve (0.00385 curve)
- 125 μA nominal RTD excitation current

Input Accuracy Span Range

Type E:	-328	to	1470°F	or	-200	to	800°C
Type J:	32	to	1382°F	or	0	to	750°C
Type K:	-328	to	2282°F	or	-200	to	1250°C
Type T:	-328	to	662°F	or	-200	to	350°C
RTD (DIN)	-328	to	1472°F	or	-200	to	800°C

Thermocouple Input Accuracy

- Calibration accuracy: ±1% of input accuracy span, ±1° at standard conditions and actual calibration ambient. Exception: Type T, ±2.4% of input accuracy span for -328 to 32°F (-200 to 0°C)
- Temperature stability: ±0.3° per degree change in ambient



Operator Interfaces and Indicators

SERIES TM

Specifications (Continued)

RTD Input Accuracy

- Calibration accuracy $\pm 1\%$ of input accuracy span $\pm 1^\circ$ at standard conditions and actual calibration ambient
- Temperature stability: $\pm 0.2^\circ$ per degree change in ambient

Indication Ranges

Type E:	-328 to 1470°F	or	-200 to 800°C
Type J:	-346 to 1900°F	or	-210 to 1038°C
Type K:	-454 to 2500°F	or	-270 to 1370°C
Type T:	-454 to 750°F	or	-270 to 400°C
RTD (DIN)	-328 to 1472°F	or	-200 to 800°C

Agency Approvals

- CE^①, W.E.E.E., RoHS EU Directive (2002-95-EC)
- UL[®] 873 recognized temperature indicator, File # E43684
- UL[®] 197 reviewed for use in foodservice appliances
- Temperature indicator CSA 22.2 No. 24, File # 30586
- Front panel mount models with gasket
 - UL[®] 50 Type 4X indoor use only
 - NEMA 4X/IP65 approved

Terminals

- 0.25 in. (6.3 mm) quick connect, push on terminal or removable screw style terminal block

Power

- 24VAC +10%; -15%; 50/60Hz, $\pm 5\%$
- 120VAC +10%; -15%; 50/60Hz, $\pm 5\%$
- 230 to 240VAC +10%; -15%; 50/60Hz, $\pm 5\%$
- 10VA max. power consumption

Operating Environment

- 32 to 158°F (0 to 70°C)
- 0 to 90% RH, non-condensing
- Storage temperature: -40 to 185°F (-40 to 85°C)

Dimensions

- DIN-rail model can be DIN-rail or chassis mount
DIN-rail spec DIN 50022, 1.38 x 0.30 in. (35 x 7.5 mm)

Style	Width	Height	Depth
DIN-rail	3.08 in. (78.1 mm)	4.42 in. (112.3 mm)	3.57 in. (90.7 mm)
Square 1/8 DIN Panel	2.85 in. (72.4 mm)	2.85 in. (72.4 mm)	Behind panel 2.04 in. (51.7 mm)

① See declaration of conformity.

Ordering Information

Indicator only, 4-character, 7-segment display

Part Number

① ②	③	④	⑤	⑥	⑦ ⑧ ⑨ ⑩	⑪ ⑫ ⑬ ⑭	⑮
TM	Power Supply	Package	Sensor Type & Scale	A	AAAA	AAAA	Overlay/Custom Options

③	Power Supply
B =	120VAC
D =	230 to 240VAC
F =	24VAC

④	Package
1 =	Panel mount, 1/8 in. DIN square - spade terminals
2 =	DIN-rail mount - spade terminals
5 =	Panel mount, 1/8 in. DIN square - screw terminals
6 =	DIN-rail mount - screw terminals
A =	NEMA 4X panel mount - spade terminals
C =	NEMA 4X panel mount - screw terminals

⑤	Sensor Type & Scale
H =	T/C Type J °F (-346 to 1900°F)
J =	T/C Type J °C (-210 to 1038°C)
K =	T/C Type K °F (-454 to 2500°F)
L =	T/C Type K °C (-270 to 1370°C)
M =	T/C Type T °F (-454 to 750°F)
N =	T/C Type T °C (-270 to 400°C)
P =	RTD °F (-328 to 1472°F)
R =	RTD °C (-200 to 800°C)
S =	T/C Type E °F (-328 to 1470°F)
T =	T/C Type E °C (-200 to 800°C)

⑮	Overlay/Custom Options
A =	Standard with Watlow logo
1 =	Standard without Watlow logo