*Installation Instructions*

# DataSite Natural Gas Flow Meter and Remote Terminal Unit

## Catalog Numbers 1758-FLO301, 1758-FLO302, 1758-RTU201, 1758-RTU202




Allen-Bradley • Rockwell Software Rockwell Automation

# Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://literature.rockwellautomation.com) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

| | |
|---|---|
| **WARNING**  | Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss. |
| **IMPORTANT** | Identifies information that is critical for successful application and understanding of the product. |
| **ATTENTION**  | Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard and recognize the consequences. |
| **SHOCK HAZARD**  | Labels may be on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present. |
| **BURN HAZARD**  | Labels may be on or inside the equipment (for example, drive or motor) to alert people that surfaces may reach dangerous temperatures. |

## Environment and Enclosure

**ATTENTION**

Do not remove the protective debris strip until after the module and all other equipment in the panel near the module are mounted and wiring is complete. Once wiring is complete, remove protective debris strip. Failure to remove strip before operating can cause overheating.

**ATTENTION**

Electrostatic discharge can damage semiconductor devices inside the module. Do not touch the connector pins or other sensitive areas.

**ATTENTION**

To comply with UL restrictions, the product and any connected devices must be powered from a source compliant with the following:

Class 2 or Limited Voltage/Current.

## Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D locations only. The following WARNING statement applies to use in hazardous locations.

**WARNING**

**EXPLOSION HAZARD**

- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components or disconnect equipment unless power has been switched off.
- Do not connect or disconnect components unless power has been switched off.
- This product must be installed in an enclosure. All cables connected to the product must remain in the enclosure or be protected by conduit or other means.
- All wiring must comply with N.E.C. article 501-10(b).

Use only the following communication cables in Class I, Division 2 hazardous locations.

| Environment Classification | Communication Cables |
|---|---|
| Class I, Division 2 Hazardous Environment | 1747-CP3 RS-232 Serial Communications Cable |

## Environnements dangereux

Cet équipement est conçu pour une utilisation en environnements dangereux de Classe I, Division 2, Groupes A, B, C, D. La mise en garde suivante s'applique à utilisation en environnements dangereux.

**WARNING**

**DANGER D'EXPLOSION**

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe I, Division 2.
- Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée.
- Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée.
- Ce produit doit être installé dans une armoire. Tous les câbles connectés à l'appareil doivent rester dans l'armoire ou être protégés par une goulotte ou tout autre moyen.
- L'ensemble du câblage doit être conforme à la réglementation en vigueur dans les pays où l'appareil est installé.

Utilisez uniquement les câbles de communication suivants dans les environnements dangereux de Classe I, Division 2.

| Classification des environnements | Câbles de communication |
|---|---|
| Environnement dangereux de Classe I, Division 2 | 1747-CP3 RS-232 Serial Communications Cable |

## Overview

DataSite controllers are suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2[1]) and with circuits not exceeding Over Voltage Category II[2] (IEC 60664-1).[3]

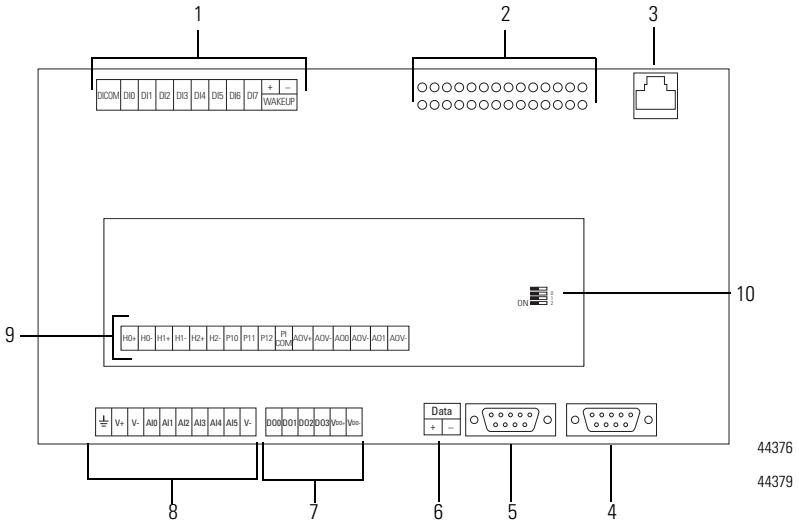
Install your DataSite unit using these installation instructions.

(1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.

(2) Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

# Controller Description




| Item | Description |
|---|---|
| 1 | Discrete Inputs and wake up connectors |
| 2 | Status indicators |
| 3 | Ethernet connector |
| 4 | RS 232 COM 2 connector |
| 5 | RS 232 COM 1 connector |
| 6 | RS 485 COM 1 connector |
| 7 | Discrete Output connectors |
| 8 | Power Input and Analog Input connectors |
| 9 | HART, Pulse Input, and Analog Output connectors |
| 10 | Pulse Input Filter switches |

## Mounting the Controller

Most applications require installation in an industrial enclosure to reduce the effects of electrical interference and environmental exposure. Locate your controller as far as possible from power lines, load lines, and other sources of electrical noise such as hard-contact switches, relays, and AC motor drives. For more information on proper grounding guidelines, see the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

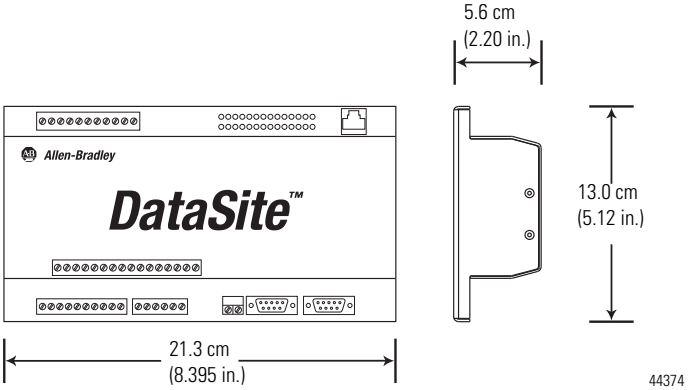
You can mount the controller either horizontally or vertically on DIN rails, but horizontal mounting is recommended for thermal considerations.

**ATTENTION**

Be careful of metal chips when drilling mounting holes for your controller or other equipment within the enclosure or panel. Drilled fragments that fall into the controller could cause damage.

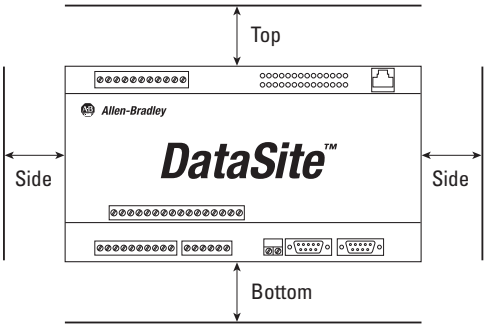
## Dimensions

1758-FLO301, 1758-FLO302, 1758-RTU201, 1758-RTU202



## Controller Spacing

When mounting the controller, allow 25 mm (1 in.) of space on all sides for adequate ventilation, as shown below.




## DIN Rail Mounting

A small Phillips screwdriver is required for the installation or removal of the controller. The controller can be mounted to EN50022-35 x 7.5 DIN rails.

Follow these steps to install your controller on the DIN rail.

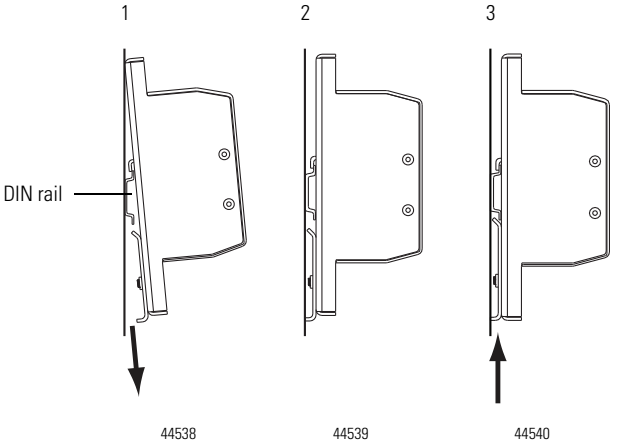
1. Mount your DIN rail.
   Make sure that the placement of the controller on the DIN rail meets the recommended spacing requirements.

2. Loosen the two clamp screws until the clamp can slide out.

**IMPORTANT** Do not remove the screws from the clamp, otherwise they will fall into the chassis.

3. Place the controller onto the DIN rail, using the rail hooks on the back of the controller.

4. Slide the clamp out while pushing the controller fully onto the DIN rail (1). When the controller is properly aligned on the DIN rail (2), slide the clamp in, so that it makes direct contact with the lower edge of the DIN rail (3).




5. Tighten the clamp screws.

Follow these steps to remove your controller from the DIN rail.

1. Loosen the two clamp screws until the clamp can slide out, taking care not to dislodge the clamp screws from the clamp.

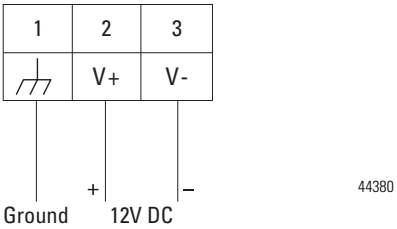
2. Remove the controller.

## Power Source Requirements

**ATTENTION**

The DataSite modules (1758-FLO301, 1758-FLO302, 1758-RTU201, 1758-RTU202) must be powered by a National Electrical Code (NEC) or Canadian Electrical Code (CEC) Class 2 power source when used in locations covered by Underwriters Laboratories.
In locations governed by International Electrotechnical Commission (IEC) or EN standards, a Safety Extra Low Voltage (SELV) power source must be used.

## Wiring for Power Supply Input

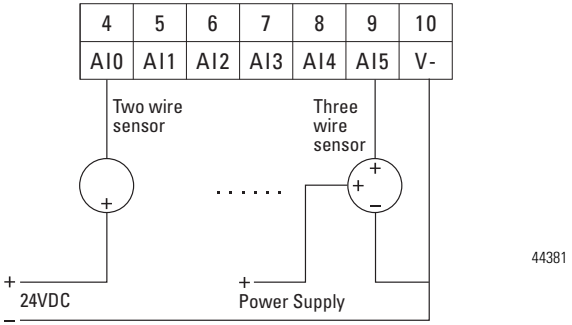



**WARNING**

Refer to Power Source Requirements for details on wiring.

## Wire the Controller for Analog Input

The analog input circuits are equipped with overvoltage and overcurrent protection.

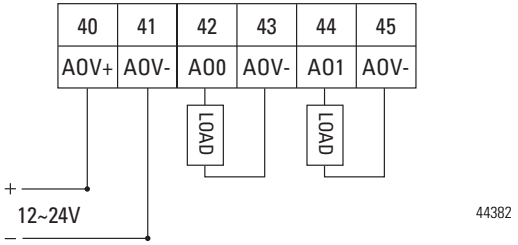



**WARNING**

Refer to Power Source Requirements for details on wiring.

## Wire the Controller for Analog Output

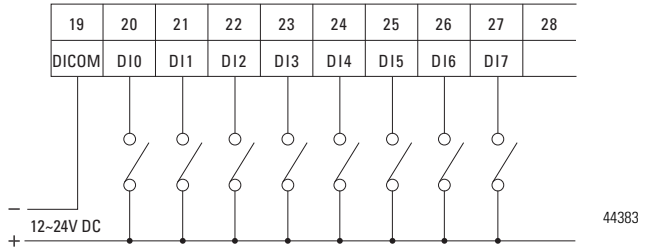
### Analog Output wiring




**WARNING**

Refer to Power Source Requirements for details on wiring.

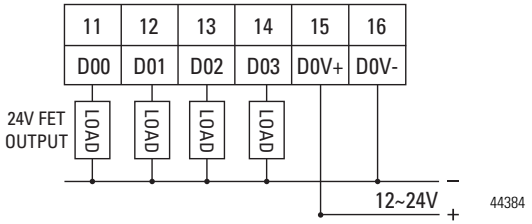
## Wire the Controller for Digital Input




**WARNING**

Refer to Power Source Requirements for details on wiring.

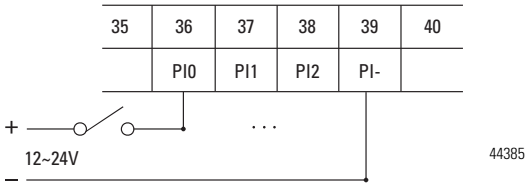
## Wire the Controller for Digital Output




**WARNING**

Refer to Power Source Requirements for details on wiring.

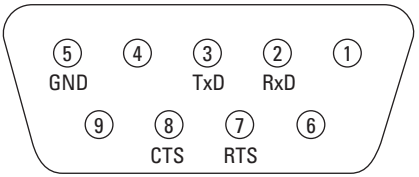
## Wire the Controller for Pulse Input



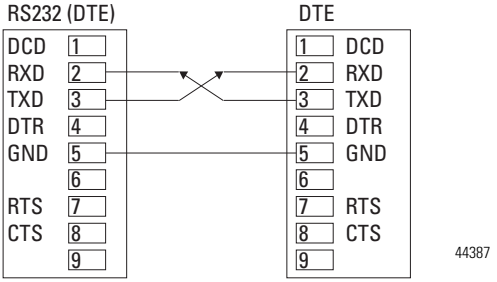

**WARNING**

Refer to Power Source Requirements for details on wiring.

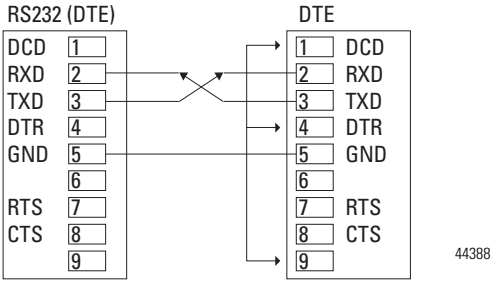
## Wiring for RS232 Serial Communications



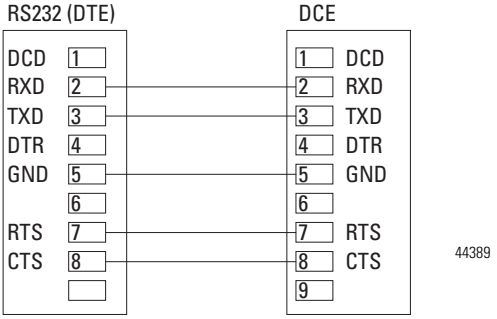

### RS232 DTE to RS232 DTE without Handshaking



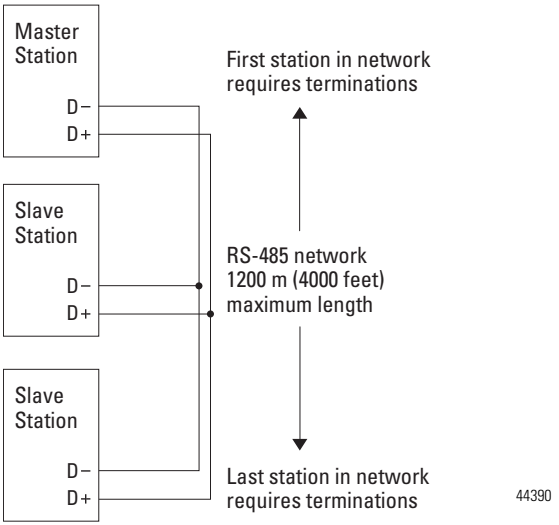
### RS232 DTE to RS232 DTE with Handshaking




### RS232 DTE to RS232 DCE with Handshaking



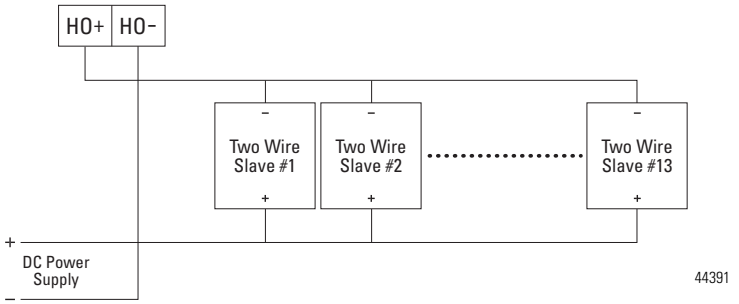
## Wiring for RS485 Serial Communications



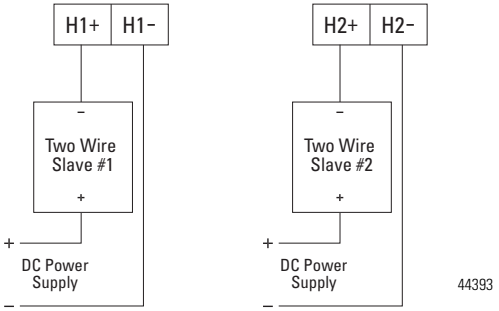

## Wire the Controller for HART Communication

The controller comes with three HART protocol communications ports, including one that is multi-point, and can connect to thirteen HART protocol meters. The other two are point-to-point ports, and can also collect 4…20 mA signals.

### HART0 multi-point port wiring to passive meters

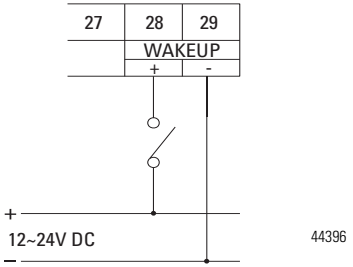


### HART1 or HART2 point-to-point wiring to passive meters




## Wire the Controller for Sleep/Wake Up mode

To reduce power consumption in unattended or solar-powered applications, the controller can be configured to enable Sleep mode, and disable Sleep mode when inputs are detected.




## Ground the Module

In solid-state control systems, grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground terminal of the controller to the ground bus prior to connecting any devices. Use AWG #14 wire.

**ATTENTION**

All devices connected to the RS-232/485 communication port must be referenced to controller ground, or be floating (not referenced to a potential other than ground). Failure to follow this procedure may result in property damage or personal injury.

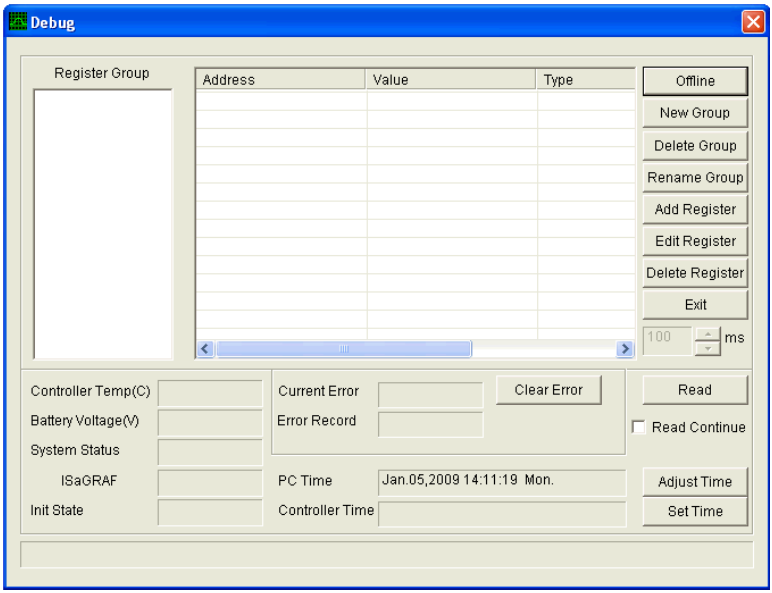
You must also provide an acceptable grounding path for each device in your application. For more information on proper grounding guidelines, refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

## Battery Status Check

The DataSite controller uses a lithium battery that allows the real-time-clock (RTC) to maintain the correct time setting through periods when line power has been removed from the unit.

Current drain on the battery during these periods is approximately 1 microamp, and the battery should provide approximately 10 years of operation for the RTC without power applied.

The DS Settings Utility provides a display of the battery voltage. If the battery voltage should drop below 2.0 V, contact Rockwell Automation Technical Support (see the back page for contact information) to arrange for repair/exchange of the DataSite unit.




**WARNING**

The lithium battery is not user replaceable.

## Decommission and Recycle the Battery

**WARNING**

The lithium battery is not user replaceable. Follow the instructions in this section to remove the battery from the DataSite unit for recycling when decommissioning the DataSite unit.
Dispose of used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire.

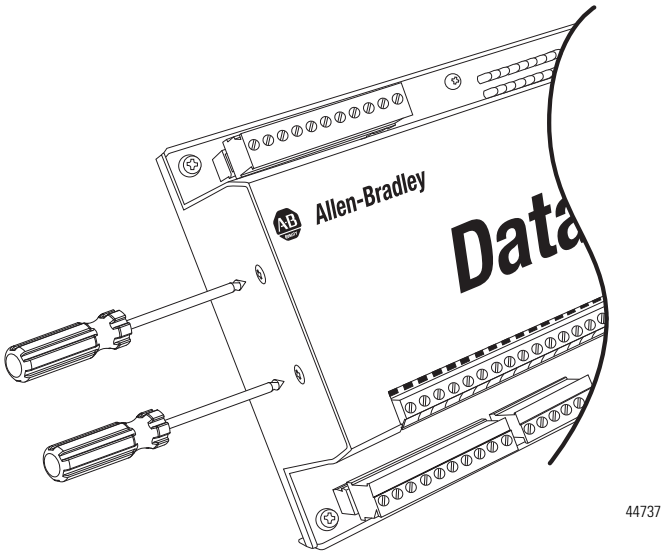
**IMPORTANT**

Refer to the SLC 500 Lithium Battery Installation Instructions, publication 1747-IN515, for more information on handling, usage, storage, and disposal of lithium batteries.

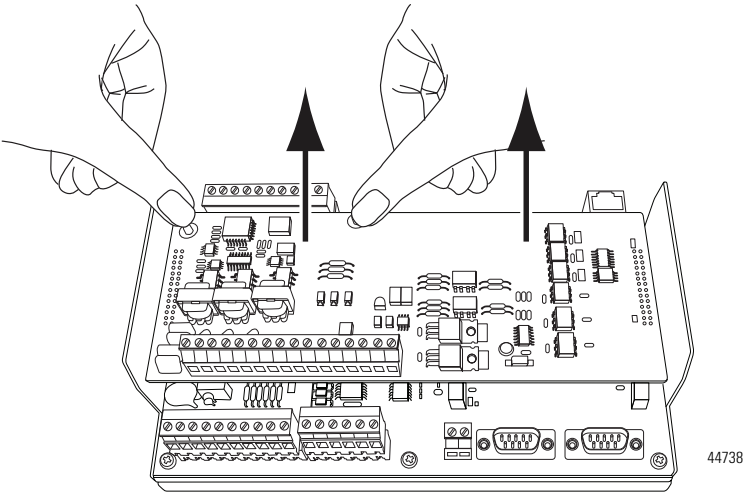
**WARNING**

When you connect or disconnect the battery an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that the area is nonhazardous before proceeding.
For Safety information on the handling of lithium batteries, including handling and disposal of leaking batteries, see Guidelines for Handling Lithium Batteries, publication AG 5-4.

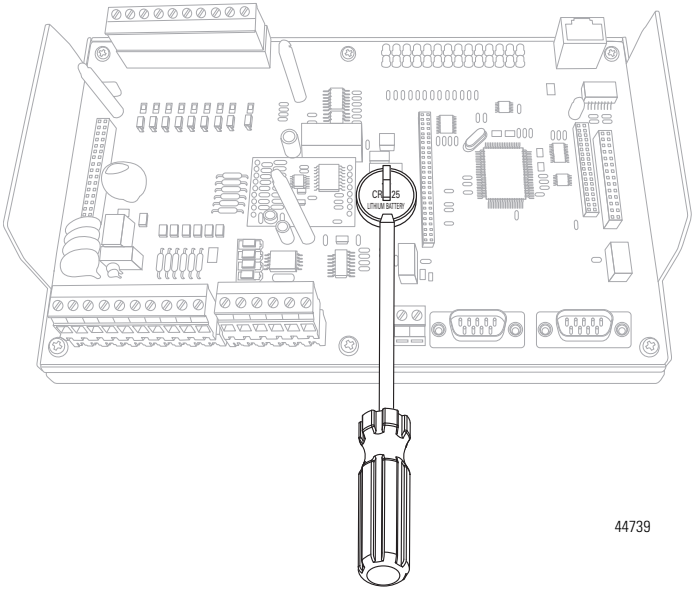
1. Remove the cover by first removing the screws on either side of the controller.



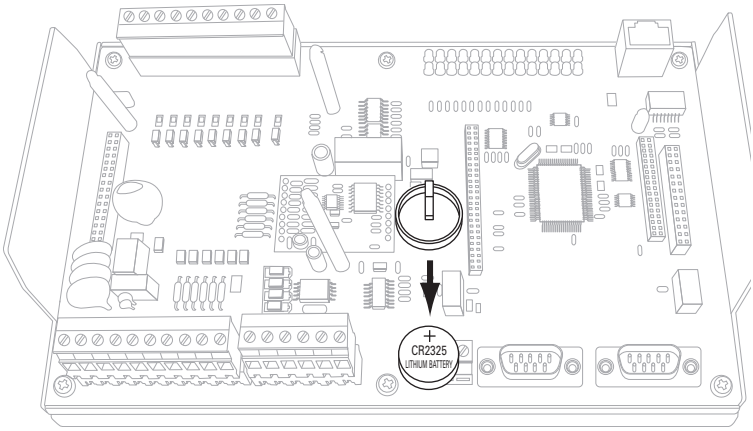
2. Pry the board off from the standoffs.




3. Use a flat-blade screwdriver to pry the battery out from under the clamp.



4. Remove the battery.

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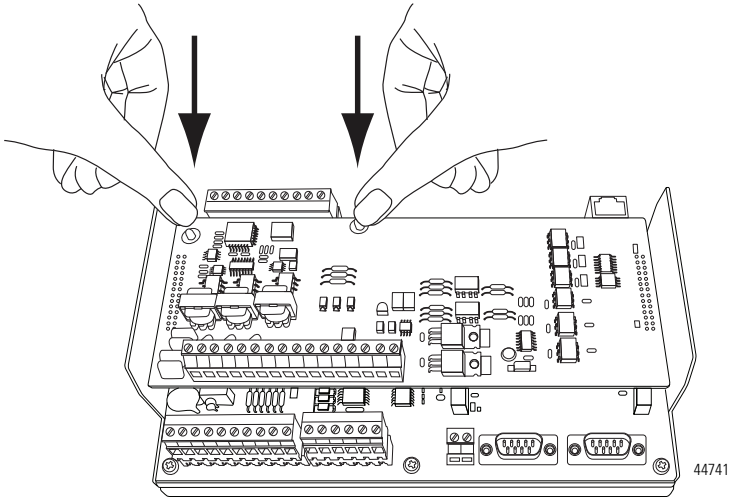
5. Replace the board onto the standoffs.



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6. Replace the cover, and fasten the screws securely.

## Status Indicators

PWR STAT DO0 DO2 DI0 DI2 DI4 DI6 PI0 PI2 TX0 TX1 TX2 10\100M

RUN ERR DO1 DO3 DI1 DI3 DI5 DI7 PI1 LINK RX0 RX1 RX2 F\H

| Indicator | State | Description |
|---|---|---|
| PWR | Green | Power is applied. This indicator is not affected by LED power control settings. |
| RUN | Green | Normal operation. This indicator is not affected by LED power control settings. |
| STAT | Flashing red | ISaGRAF application running |
| ERR | Yellow | Error detected |
| DI0…DI7 | Green | Corresponding digital input is on |
| DO0…DO3 | Green | Corresponding digital output is on |
| PI0…PI2 | Green | Corresponding pulse input voltage is more than 8V |
| TX0 | Flashing red | Transmitting data through HART port |
| RX0 | Flashing green | Receiving data through HART port |
| TX1 | Flashing red | Transmitting data through serial port 1 |
| RX1 | Flashing green | Receiving data through serial port 1 |
| TX2 | Flashing red | Transmitting data through serial port 2 |
| RX2 | Flashing green | Receiving data through serial port 2 |
| LINK | Flashing yellow | Transmitting or receiving data through Ethernet port |
| | Yellow | Controller is connected to Ethernet network |
| 10\100M | Red | Speed for ethernet connection, 10\100 Mbps |
| F\H | Green | Ethernet mode, half duplex or full duplex |

# Specifications

## General

| Attribute | Description |
|---|---|
| Dimensions | 213 x 133 x 56 mm<br>(8.375 x 5.25 x 2.20 in.) |
| Number of I/O | 8 digital inputs<br>4 digital outputs<br>8 analog inputs<br>2 analog outputs<br>3 pulse inputs |
| Power supply voltage | 12V DC, (-15%, +10%) |
| Heat dissipation, nominal | < 1.2 W |
| Power consumption | 80…120 mA |
| Input circuit type | Current Sinking |
| Output circuit type | Current Sourcing (FET) |
| Terminal screw torque | 0.8 Nm (7 in-lb) |
| North American temp code | T4 |
| Wire size | 0.34... 2.5 mm² (22...12 AWG) solid or stranded copper wire rated at 90 °C (194 °F ) or greater 1.2 mm (3/64 in.) insulation max |

## Pulse Input

| Attribute | Description |
|---|---|
| Voltage range | 12…24V DC |
| Off-state voltage | 8V DC |
| Operating frequency | 10 kHz with filters off<br>30 kHz with filters on |
| On-state current, min | 5 mA |
| On-state current, nom | 6 mA |
| On-state current, max | 13.2 mA |
| Off-state leakage current | 2.5 mA |
| Nominal impedance | 2 kΩ |

## Digital Input

| Attribute | Description |
|---|---|
| On-state voltage range | 8…24V DC |
| Off-state voltage range | 0…4V DC |
| Operating frequency | 100 Hz |
| On-state current, min | 3 mA |
| On-state current, nom | 5 mA |
| On-state current, max | 11 mA |
| Off-state leakage current | 2 mA |
| Nominal impedance | 2.4 kΩ |

## Digital Output

| Attribute | Description |
|---|---|
| Power supply | 12…24V DC |
| Continuous current per point | 200 mA |
| Operating frequency | 100 Hz |
| On-state current, min | 1 mA |
| On-state current, max | 200 mA |
| Off-state leakage current | 1 mA |

## Analog Inputs

| Attribute | Description |
|---|---|
| A/D resolution | 16-bit |
| Conversion type | Successive approximation |
| Type | Single ended (unipolar) |
| Isolation voltage | 500V AC from logic power supply |
| Transient variety protection | 600 W |
| Voltage Input Range | 0…10V DC or<br>4…20 mA versions |
| Upload time | 10 ms |
| Response time | 10 ms (10…90%) |
| Type of Data | Integer |
| Input Coding | Hexadecimal |

## Analog Inputs

| Attribute | Description |
|---|---|
| Voltage input impedance | 100 kΩ for 10V DC inputs<br>170 Ω for 20 mA inputs |
| Input Resolution | 16-bit |
| Non-linearity | ±0.1% of full scale |
| Overall accuracy | ±0.1% of full scale at 25 °C<br>±0.3% of full scale over temperature range |
| Voltage Input Overvoltage Protection | Continuous input must not exceed 160% of the rated range |

## Analog Outputs

| Attribute | Description |
|---|---|
| D/A resolution ratio | 16-bit |
| Power supply | Successive approximation |
| Output signal range | 4…20 mA |
| Maximum load Impedance | 1000 Ω with 24V DC loop power<br>400 Ω with 12V DC loop power |
| Output type | Single ended regulation on positive side with common negative return |
| Isolation voltage | 70V AC or 100V DC |
| Absolute accuracy | ±0.2% (25 °C with 250 Ω load)<br>±0.5% (full temperature range, 0…1000 Ω load) |
| Response time | 100 ms typical (10…90%) |
| Noise and ripple, max | 0.04% |
| Transient protection | 600 W |

## HART

| Attribute | Description |
|---|---|
| Modulation | Frequency Shift Keying (FSK)<br>Logic 1 - 1200 Hz<br>Logic 0 - 2200 Hz |
| Data rate | 1200 bps |
| Transmit level | 500 mVp-p / 250 Ω |
| Receive sensitivity | 120 mVp-p/ on<br>80 mVp-p/ off |

## HART

| Attribute | Description |
|---|---|
| Output impedance | 300 Ω<br>transformer isolated |
| Input impedance | 4000 Ω<br>transformer isolated |
| Load resistor | 250 Ω, 1 W max |

## Environmental Specifications

| Attribute | Value |
|---|---|
| Temperature, operating | -40... 70 °C (-40 ...158 °F) |
| Temperature, non-operating | -50...80 °C (-58... 176 °F) |
| Relative humidity | 5...95% non-condensing |
| Vibration | IEC 60068-2-6<br>Constant amplitude 0.15mm: 10…57 Hz<br>Constant acceleration 2g: 57…150 Hz |
| Shock | IEC 60068-2-27<br>18 shocks, semi-sinusoidal 15g / 11 ms |
| Electrical/EMC | EN 61000-6-4 2007;<br>EN 61000-6-2 2005 |
| ESD immunity | IEC 61000-4-2:<br>4 kV contact discharges<br>8 kV air discharges |
| Radiated RF immunity | IEC 61000-4-3:<br>10V/m with 1 kHz sine-wave 80% AM from 80…1000 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz<br>10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz<br>3V/m with 1 kHz sine-wave 80% AM from 1000…2700 MHz |

## Environmental Specifications

| Attribute | Value |
|---|---|
| EFT/B immunity | IEC 61000-4-4:<br>±2 kV at 5 kHz on power ports<br>±2 kV at 5 kHz on signal ports<br>±1 kV at 5 kHz on communications ports |
| Surge transient immunity | IEC 61000-4-5:<br>±1 kV line-line(DM) and ±2 kV line-earth(CM) on power ports<br>±1 kV line-line(DM) and ±2 kV line-earth(CM) on signal ports<br>±1 kV line-earth(CM) on shielded ports<br>±1 kV line-earth(CM) on communications ports |
| Conducted RF immunity | IEC 61000-4-6:<br>10V rms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz |

## Certifications

| Certification (when product is marked)[1] | Value |
|---|---|
| C-UL-US | UL Listed Industrial Control Equipment<br>UL Listed Industrial Control Equipment for use in Canada<br>UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E10314 |
| CE | Marked for all application directives |
| C-Tick | Australian Radiocommunications Act, compliant with:<br>AS/NZS CISPR 11; Industrial Emissions |

(1) See the Product Certification link at http://www.ab.com for Declaration of Conformity, Certificates, and other certification details.

## Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

| Resource | Description |
|---|---|
| DataSite Electronic Flow Meter and Remote Terminal Unit Hardware User Manual 1758-UM001 | Information on how to install and wire a DataSite controller. |
| Customized Function Blocks for DataSite Electronic Flow Meter and Remote Terminal Unit User Manual 1758-RM001 | Description of the customized function blocks used for programming DataSite controllers using ISaGRAF software. |
| DataSite Electronic Flow Meter and Remote Terminal Unit Software User Manual 1758-UM002 | Information on how to install and use the software tools, DS Settings, DS FloConfig, and DS DNP3 to configure and monitor DataSite controllers. |
| Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1 | Provides general guidelines for installing a Rockwell Automation industrial system. |

You can view or download publications at http://literature.rockwellautomation.com. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

## Notes:

# Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://support.rockwellautomation.com, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

## Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

| | |
|---|---|
| United States | 1.440.646.3434<br>Monday – Friday, 8 a.m. – 5 p.m. EST |
| Outside United States | Please contact your local Rockwell Automation representative for any technical support issues. |

## New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

| | |
|---|---|
| United States | Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor in order to complete the return process. |
| Outside United States | Please contact your local Rockwell Automation representative for the return procedure. |



**www.rockwellautomation.com**

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