DET-TRONICS®

SPECIFICATION DATA

Eagle Quantum™

Digital Communication Unit

EQ2200DCU

APPLICATION

The Eagle 2000 Digital Communication Unit (DCU) offers a convenient and economical means of obtaining addressable gas detection. The DCU digitizes a 4 to 20 ma analog signal from a sensor/transmitter and transmits the value as a process variable to the Eagle communication gateway. All circuitry is housed in a single explosion-proof/watertight enclosure for location at the area of detection.

The DCU is provided in various configurations, depending on the type of gas to be detected. All DCUs contain a communication module and a terminal wiring board. DCUs for detecting combustible gas also contain a transmitter board.

The Eagle DCU is available for use with Det-Tronics' combustible gas, oxygen and toxic gas sensor/transmitters. The DCU can also be used with a wide variety of "third party" 4 to 20 ma analog instruments.

FEATURES

- Field addressable
- Unique patented fault isolation
- Utilizes state-of-the-art communication technology
- Pass through communication circuitry on power loss
- Ten bit signal resolution capability
- Two alarm setpoints
- Non-volatile memory for logging of alarm and calibration events
- Non-intrusive one person calibration
- LED for calibration, fault and alarm status annunciation
- EMI hardened
- Screw terminal connectors.

SPECIFICATIONS

INPUT VOLTAGE—
24 vdc. Operating range is 18 to 32 vdc.

INPUTS—
4 to 20 ma analog signal, with an input impedance of 200 ohms, 10 bit resolution.

OUTPUTS—
Digital communication, transformer isolated (78.5 kbaud). Calibrated 0 to 4095 digital corresponds to 0 to full scale.

POWER CONSUMPTION—
DCU with toxic gas sensor/transmitter:
95 ma maximum.

DCU with transmitter and combustible gas sensor:
180 ma maximum during normal operation, 500 ma during startup.

TEMPERATURE RANGE—
Operating: –40°F to +167°F (–40°C to +75°C).
Storage: –67°F to +185°F (–55°C to +85°C).

CERTIFICATION—

FM: Class I, Div. 1, Groups B, C and D.
Class II, Div. 1, Groups E, F, and G.
Class I, Div. 2, Groups A, B, C, and D (T4A).
Class II, Div. 2, Groups F and G (T4A).
Class III, Div. 1 and 2.
NEMA Type 4X

CSA: Class I, Div. 1, Groups B, C and D.
Class II, Div. 1, Groups E, F, and G.
Class I, Div. 2, Groups A, B, C, and D (T4A).
Class II, Div. 2, Groups F and G (T4A).
Class III, Div. 1 and 2.
Enclosure Type 4X.

CENELEC: EEx d IIC T4 (Tamb = –60°C to +75°C)
EEx d IIC T5 (Tamb = –60°C to +65°C)
EEx d IIC T6 (Tamb = –60°C to +50°C)
IP66.

CE: Conforms to all relevant European norms.

SHIPPING WEIGHT—
Aluminum: 6 lb (2.7 kg)
Stainless Steel: 10 lb (4.5 kg).

DIMENSIONS—
See Figure 1.

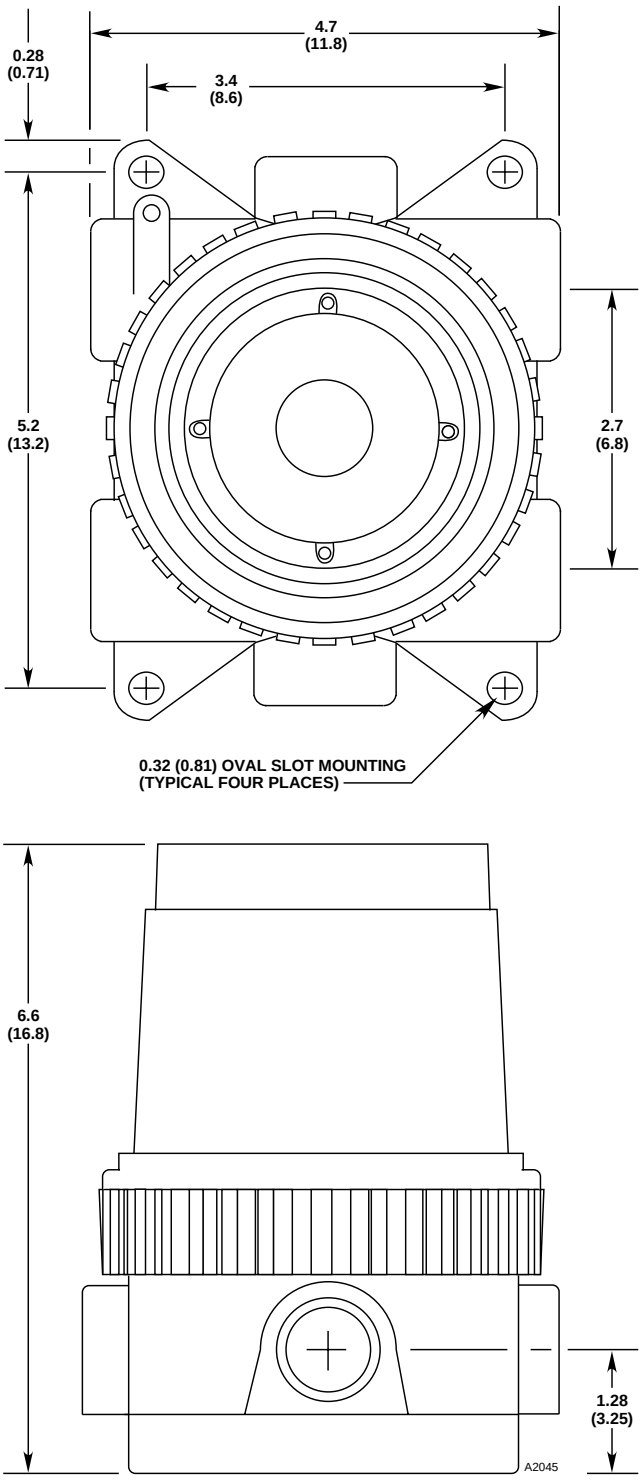


Figure 1—Dimensions of DCU Enclosure in Inches (Centimeters)

DESCRIPTION

The DCU consists of an explosion-proof, NEMA 4X aluminum enclosure containing a communication module, a terminal wiring board, and a transmitter board (catalytic combustible gas models only). The DCU serves as a single point analog input to the Eagle Quantum system and is compatible with most 4 to 20 ma instruments. It provides three status indicating LEDs that are visible through a viewing window on the enclosure cover, and supports single person non-intrusive calibration with a Det-Tronics gas sensor.

DETECTOR ENCLOSURE

The NEMA 4X explosion-proof aluminum enclosure is designed for use in hazardous locations. The removable cover is furnished with a window for viewing the status indicator LEDs.

STATUS LEDS

Three LEDs are provided for indicating detector status conditions. The LEDs are located on the communication module and are visible through the viewing window on the enclosure. The green LED serves as a power-on indicator. The flashing rate of the red LED indicates detector status (calibrate = slow, fault = fast, alarm = steady). The amber LED is provided for factory diagnostic purposes.

EVENT LOGGING

The DCU stores its last eight alarms and calibrations with date and time stamp in on-board non-volatile memory using a “First In First Out” (FIFO) format. This information can then be accessed over the network.

CALIBRATION LOG

Each time the sensor attached to the DCU is calibrated, the zero and span levels as well as the time and date of the calibration are recorded. The initial calibration is kept for the life of the sensor, and all subsequent calibrations are stored in a seven record FIFO format. When the sensor is replaced, the calibration log is cleared by pressing the "sensor replacement switch" on the communication module in the DCU and performing a successful calibration of the sensor. Det-Tronics EagleVision™ software compares the initial calibration to later ones to produce a "sensor sensitivity trend," which can be a valuable maintenance or troubleshooting tool. Refer to the Eagle Quantum system manual, form number 95-8470, for complete instructions regarding calibration.

FAULT TOLERANT NETWORK

The DCU utilizes a unique patented fault isolation technique for detecting and isolating a wide variety of network wiring problems. Using a combination of onboard software and hardware, the module can determine when network integrity has been compromised. Corrective action is taken by electrically disconnecting the faulty segment of network wiring and properly terminating the "good" side of the network. This automatic "reconfiguration" changes the topology of the network from a ring that starts and ends at the gateway to a linear bus network that is properly terminated on either side of the isolated faulty network segment.

The DCU communicates with the LCU over the digital highway as shown in Figure 2. In the event of a single open or short circuit on the digital highway, all units will be fully functional (condition A). In the event of multiple open or short circuits on the digital highway, all units except those between the two faults will be able to communicate with the gateway (condition B).

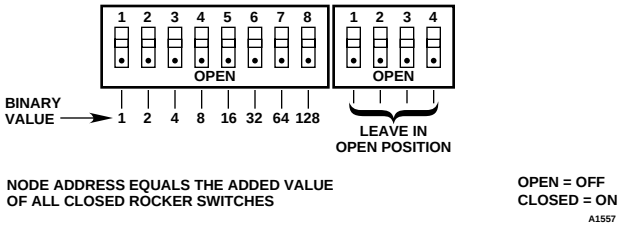


Figure 3—Field Device Address Switches

ADDRESSABILITY

Each device on the LON/SLC must be assigned a unique address. This is accomplished by setting DIP switches on the module's circuit board. See Figure 3. Each rocker switch has a specific binary value. The node address is equal to the added value of all closed rocker switches. All open switches are ignored. The valid address range is from 5 to 250. Refer to the Eagle Quantum system manual (form 95-8470) for additional information.

REED SWITCH

A magnetic reed switch, located on the terminal board, enables calibration of the sensor without opening the enclosure. The switch is activated by placing a magnet on a specified location on the side of the enclosure.

INSTALLATION

The detectors are wired on a digital communication loop starting and ending at the gateway, using communication grade shielded twisted pair wire. Wiring for power, inputs and outputs must be 18 AWG minimum.

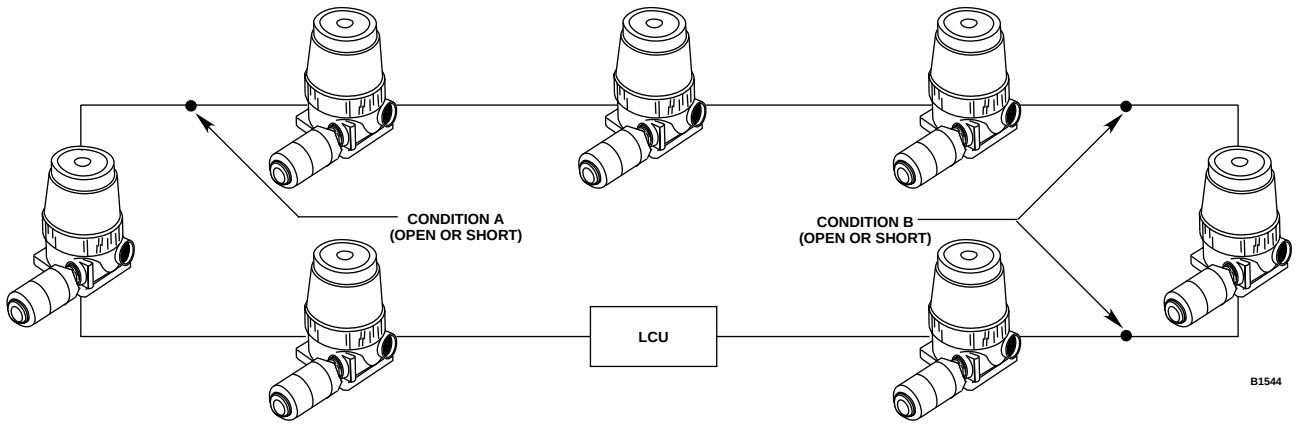


Figure 2—Communication by means of the Digital Highway

NOTE

Refer to the Eagle Quantum system manual, form number 95-8470, for complete instructions regarding wiring and installation.

EQ2200DCU DIGITAL COMMUNICATION UNIT USED WITH DET-TRONICS H_2S/O_2 SENSORS OR OTHER TWO-WIRE 4 TO 20 MA DEVICES

Determine the best mounting locations for the detectors. Whenever practical, detectors should be placed where they are easily accessible for calibration.

WARNING

Do not apply power to the system with the cover removed unless the area has been verified to be free of combustible gases or vapors.

The DCU utilizes the following:

1. A terminal wiring board mounted at the bottom of the junction box.

2. A communication module mounted above the terminal wiring board using the standoffs provided. See Figure 4.

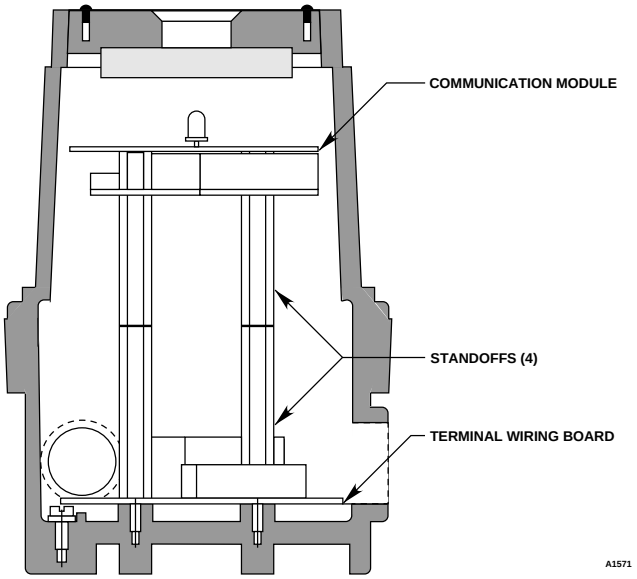


Figure 4—Printed Circuit Boards in Universal DCU

Assembly and Wiring Procedure

Attach the sensor to the DCU enclosure. Do not overtighten. If a sensor separation kit is used, attach the sensor to the separation kit junction box and wire the device as described in the "Sensor Separation" section.

CAUTION

The sensor threads can be coated with an appropriate grease to ease installation. Also lubricate the cover threads.

Connect the external wiring to the appropriate terminals on the DCU terminal wiring board. Refer to Figure 5 for terminal identification. See Figure 6 for an example of a Det-Tronics electrochemical sensor wired to a DCU.

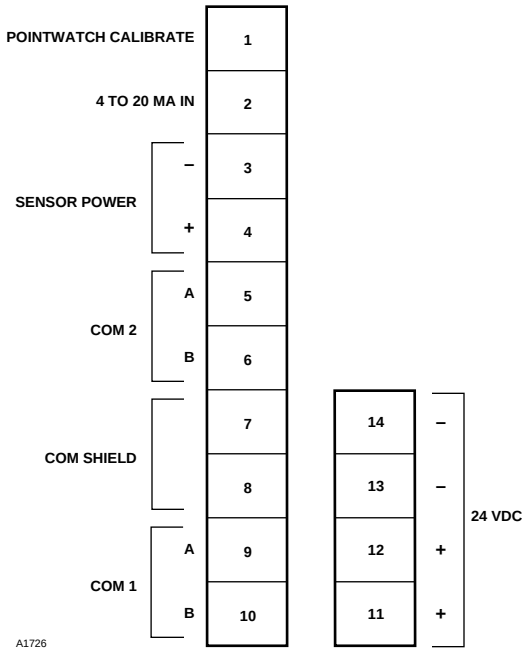


Figure 5—Terminal Identification for DCU

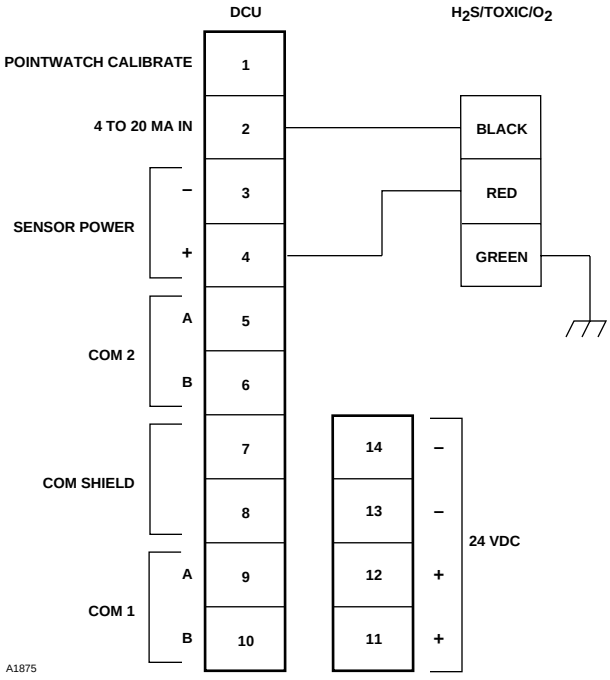


Figure 6—Electrochemical Sensor Connected to DCU

IMPORTANT

Insulate the shields to prevent shorting to the device housing or to any other conductor.

Attach the communication module to the standoffs as shown in Figure 4. Connect the ribbon cable from the terminal wiring board to the communication module.

Set the address for the device (see "Addressability" on page 3).

Check the wiring to ensure proper connections, then pour the conduit seals and allow them to dry (if conduit is being used).

NOTE

Before placing the cover back on the enclosure following completion of assembly and wiring, inspect the enclosure O-ring to be sure that it is in good condition and properly installed. Lubricate the O-ring and the threads of the cover with a thin coat of an appropriate grease to ease installation. If the installation uses catalytic type combustible gas sensors, it is imperative that lubricants containing silicone NOT be used, since they will cause irreversible damage to the sensor. Place the cover on the enclosure. Tighten only until snug. Do not over tighten.

SENSOR SEPARATION FOR DCU WITH H2S AND O2 SENSORS

Since the transmitter for the electrochemical sensor is already mounted within the sensor housing, simply mount the entire sensor assembly to the sensor separation kit junction box and wire it to terminals 2 and 4 inside the DCU, the same as a regular (without sensor separation) installation. Connect the shield to the ground terminal in the DCU junction box.

Refer to Table 1 for separation distance limitations for H_2S/toxic/O_2 sensors.

Table 1—Maximum Separation Distances — Electrochemical Sensor to DCU

Wire Size	Maximum Wiring Distance	
	Feet	Meters
18 AWG (1.0 mm^2)*	5700	1750
16 AWG (1.5 mm^2)*	9000	2800

* Approximate Metric Equivalent.

EQ2200DCU DIGITAL COMMUNICATION UNIT USED WITH POINTWATCH

Determine the best mounting locations for the detectors. Whenever practical, detectors should be placed where they are easily accessible for calibration.

WARNING

Do not apply power to the system with the cover removed unless the area has been verified to be free of combustible gases and vapors.

The DCU utilizes the following:

1. A terminal wiring board mounted at the bottom of the junction box.

2. A communication module mounted above the terminal wiring board using the standoffs provided. See Figure 4.

Assembly and Wiring Procedure

Attach the PointWatch to the DCU enclosure. Do not over-tighten. If a sensor separation kit is used, attach the sensor to the separation kit junction box and wire the device as described in the "Sensor Separation" section.

Refer to the PointWatch manual (form 95-8440) for complete installation and application information.

Refer to Figure 7 when wiring a PointWatch IR gas detector and a DCU. The wiring code for PointWatch is:

Red = + (24 vdc)
Black = – (common)
White = 4 to 20 ma signal
Yellow = Calibration input
Green = Chassis ground

IMPORTANT

Insulate the shields to prevent shorting to the device housing or to any other conductor.

Set the address for the device (see "Addressability" on page 3).

Sensor Separation for DCU with PointWatch

Shielded four wire cable is recommended for connecting the detector junction box to the DCU. Cable with a foil shield is recommended. The shield of the cable should be open at the detector junction box and connected to earth ground on the DCU junction box.

NOTE

To ensure proper operation, a minimum of 18 vdc (including ripple) must be maintained at the PointWatch.

EQ2200DCUEX DIGITAL COMMUNICATION UNIT USED WITH DET-TRONICS COMBUSTIBLE GAS SENSORS

Determine the best mounting locations for the detectors. Whenever practical, detectors should be placed where they are easily accessible for calibration. Always orient the junction box with the sensor pointing down.

WARNING

Do not apply power to the system with the cover removed unless the area has been verified to be free of combustible gases or vapors.

The DCUEX uses the following:

1. The terminal wiring board is mounted at the bottom of the junction box.

2. The transmitter board is mounted above the terminal wiring board.

3. The communication module is mounted above the transmitter board.

The boards are connected to each other using the standoffs provided. See Figure 8.

NOTE

Be sure to note correct orientation of the transmitter board. If the transmitter board is rotated 180° from proper orientation, the device will not operate correctly — a LON communication fault will result. See Figure 8.

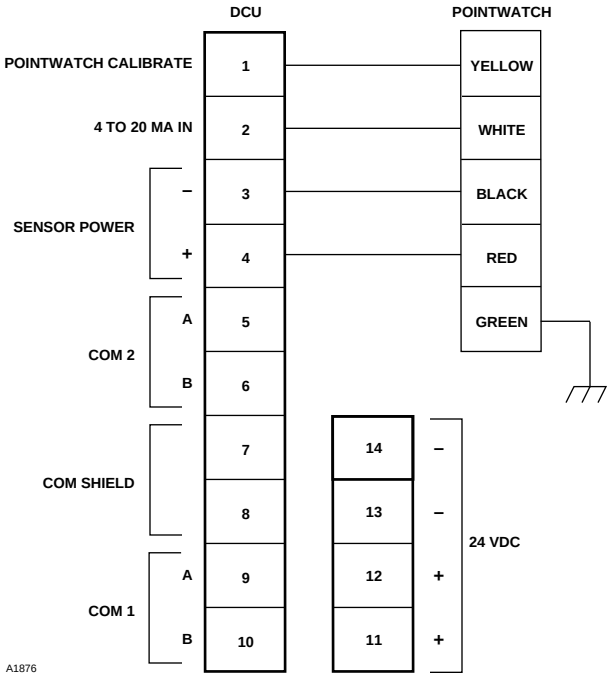
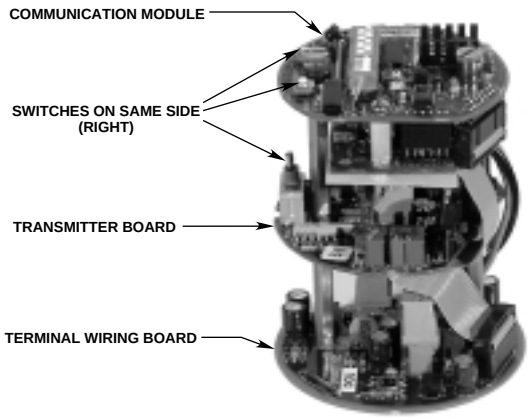
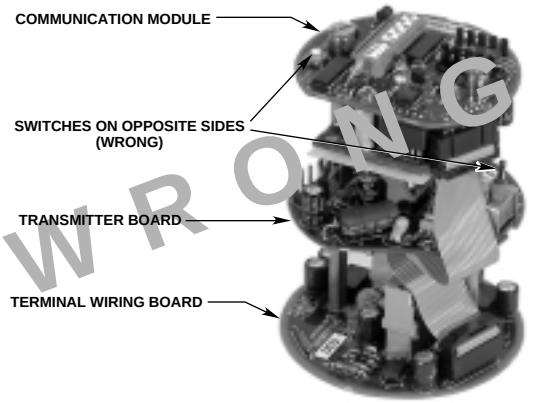


Figure 7—PointWatch Connected to DCU



CORRECT ORIENTATION OF TRANSMITTER BOARD



INCORRECT ORIENTATION OF TRANSMITTER BOARD

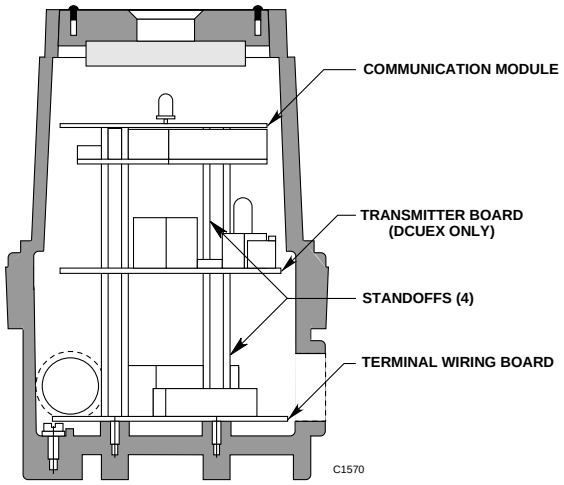


Figure 8—Printed Circuit Boards in Combustible Gas DCUEX

Assembly and Wiring Procedure

Connect the external wiring to the appropriate terminals on the DCU terminal wiring board. See Figure 9.

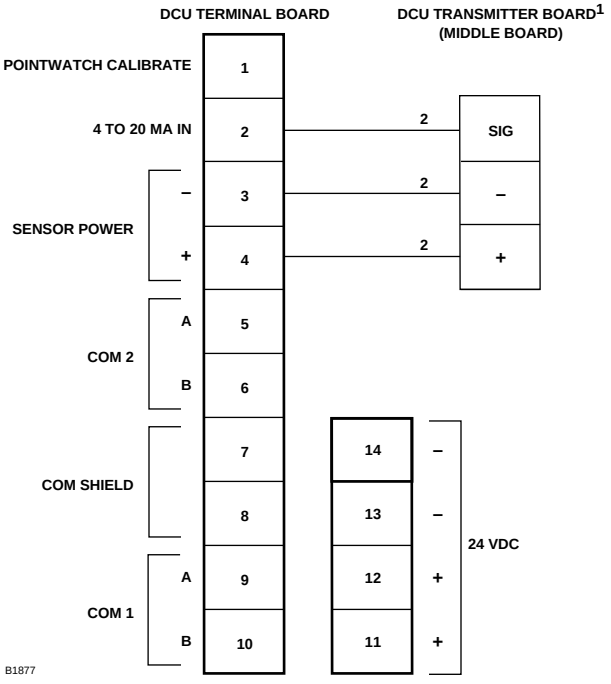
IMPORTANT

Insulate the shields to prevent shorting to the device housing or to any other conductor.

Attach the sensor to the DCU enclosure. Do not overtighten. If a sensor separation kit is being used, attach the sensor to the separation kit junction box and wire the device as described below.

CAUTION

The sensor threads can be coated with an appropriate grease to ease both the initial installation and future replacement of the sensor. Detector Electronics offers a silicone free grease that is especially suited for use with catalytic type combustible gas sensors (part number 102868-001). The use of other lubricants is not recommended, since some materials can cause irreversible damage to the sensing element. SILICONE based lubricants or compounds must NEVER be used.



NOTES: 1 Catalytic Combustible Gas Sensor Plugs into Connector Pins on the Middle Board inside the Junction Box.

2 Connections Wired at the Factory.

Figure 9—DCU Transmitter Board Connected to Terminal Wiring Board

Screw the transmitter board to the standoffs as shown in Figure 8. Connect the sensor plug to the transmitter board.

Attach the communication module to the standoffs mounted on the transmitter board. Connect the ribbon cable from the terminal wiring board to the communication module.

Set the address for the device (see "Addressability" on page 3).

Sensor Separation with DCUEX

If the installation requires mounting the sensor in a different location than the DCUEX, observe the following guidelines.

When separating a combustible gas sensor from the DCUEX, two options exist:

1. Preferred Method

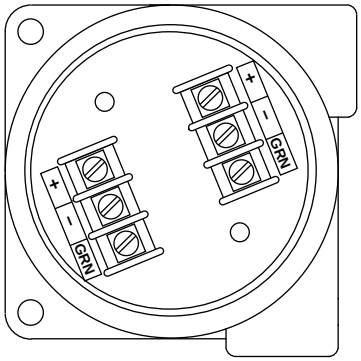
   Mount the transmitter PC board inside the sensor separation junction box. This assembly can be separated from the DCUEX by up to 1000 feet using three conductor 18 AWG shielded cable. (Regardless of separation distance, operating voltage at the transmitter MUST be at least 18 vdc to ensure proper operation.) See Figure 10.

   Assemble the DCUEX without the transmitter board similar to the DCU as shown in Figure 4. Plug the sensor into P2 on the transmitter board. Use a three conductor 18 AWG shielded cable to connect P1 on the transmitter board to terminals 2, 3 and 4 on the DCU terminal board (see Figure 10). Connect the shield to the ground terminal in the DCUEX junction box.

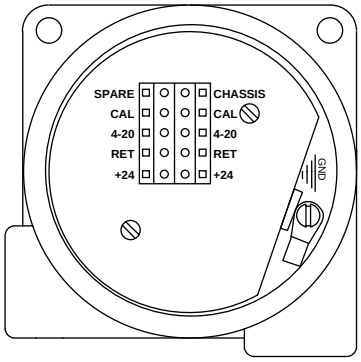
2. Alternate Method.

   If the transmitter board must be mounted separate from the sensor (high temperature applications, etc.), separate the sensor only, leaving the transmitter PC board inside the DCUEX enclosure. When using this installation option, see Table 2 for maximum wiring distances.

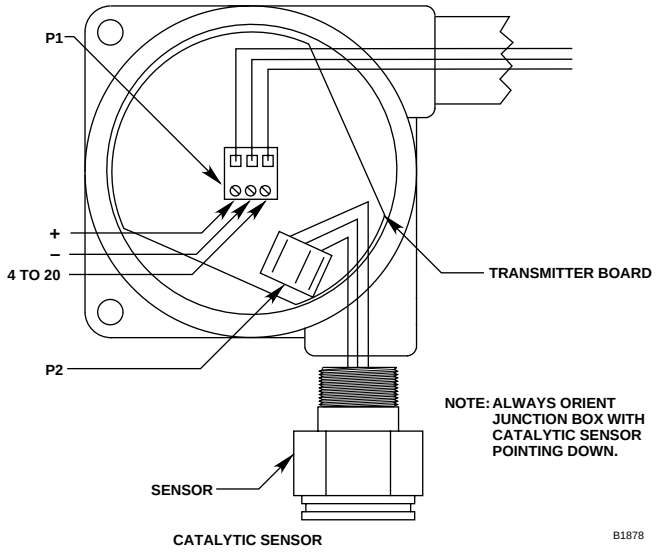
   Mount the sensor directly to the separation kit junction box. Use three conductor shielded cable for the connection between the terminal block in the separation kit junction box and P1 on the transmitter board. A plug with screw terminals is provided for connecting the cable to P1 on the transmitter board. Observe the wiring color code. Connect the shield to the ground terminal in the DCUEX junction box.



ELECTROCHEMICAL SENSOR



POINTWATCH



CATALYTIC SENSOR

Figure 10—Sensor Separation Kits

ORDERING INFORMATION

When ordering, please specify:

EQ2200DCU Ex - Eagle Quantum Digital Communication Unit for combustible gas sensors

EQ2200DCU Uni - Eagle Quantum Digital Communication Unit for 4-20 ma input from a variety of input devices (PointWatch, toxic sensors, pressure, flow, etc.).

Specify:

Enclosure Material:	Aluminum or stainless steel
Number of Ports:	5 or 6
Port Size:	3/4 inch NPT or 25 mm
Certification:	FM/CSA/CENELEC/CE.

For additional information or for assistance in ordering a system to meet the needs of a specific application, please contact:

Detector Electronics Corporation
6901 West 110th Street
Minneapolis, Minnesota 55438 USA
Operator: (952) 941-5665 or (800) 765-FIRE
Customer Service: (952) 946-6491
Fax: (952) 829-8750
Web site: www.detronics.com
E-mail: detronics@detronics.com

The specifications contained within this document are subject to change without notice.

Table 2—Maximum Separation Distances — Combustible Gas Sensor to DCU (Alternate Method)

Wire Size	Maximum Separation Distance	
	Feet	Meters
18 AWG (1.0 mm^2)*	40	12
16 AWG (1.5 mm^2)*	60	18
14 AWG (2.5 mm^2)*	100	30
12 AWG (4.0 mm^2)*	150	45

* Approximate Metric Equivalent.