

BRASCH ENVIRONMENTAL TECHNOLOGIES, LLC

GAS TRANSMITTER

Installation / Operation Manual

Brasch Gas Transmitter with Digital Signal Output

If you have questions concerning the installation or operation of this transmitter not answered by the manual, please call our Customer Service Department at 1-314-291-0440. FAX: 1-314-291-0646

Please have the following information available:

- Model number (located on the front label)
- Serial number (located on the front label)
- Date of manufacture (on front label)
- Name of distributor where purchased

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Operation Safety Notice

Certain procedures and operations detailed in this manual require that specific precautions be taken prior to beginning the procedure or operation. When precautions are required, a notice will be printed in an appropriate location in the manual. The user is urged to read and understand all such notices.

Types of Notices

Three types of notices may be used in this manual to describe the severity of the situation encountered.

WARNING This notice indicates that conditions exist that could cause personal injury or loss of life.

Caution Conditions exist that could cause damage to the equipment or other property.

Note Special consideration should be given to the procedure or operation or an unexpected operational result could occur.

QUICK INSTALLATION GUIDE

Please read this entire manual before attempting to install and operate this gas transmitter. But, if you do not read the manual, this Quick Installation Guide will provide the basic steps necessary to install and operate the transmitter. In each step, reference is made to the portion of the manual where more complete information can be obtained.

Follow the basic steps listed below to install and operate your Brasch Gas Transmitter. However, we recommend that you read the complete manual to obtain a more detailed description of the transmitter's capabilities.

Installing and operating your Brasch transmitter:

Step 1

Determine the location for mounting your transmitter(s). The location(s) may be indicated on the architectural drawing. Also, the owner or designer of the facility may be consulted. Mounting guidelines can be found on **page 1** of this manual.

Step 2

WARNING

This transmitter may require the use of voltage levels high enough to cause fatal injuries. Proper procedures must be followed anytime work is performed on this unit.

Only Qualified Personnel Should Attempt To Install, Maintain Or Service This Equipment.

The transmitter can operate from 24 VAC or +/- 25 VDC. **If the transmitter provides a signal to a customer supplied building management system, or a Brasch GDCP-0, GDCP-1, GDCP-2, or GDCP-3 control panel, the transmitter is connected to 24VAC.** This voltage is provided by a step-down transformer connected to the building's AC line.

Provide a dedicated circuit, at the required 24 VAC and 5 VA, at each transmitter mounting location. Follow all national and local wiring codes. The wiring should be at least 14 AWG. A conductor, connected to the earth ground, should also be provided. The circuit must include a disconnect switch located within easy reach of the transmitter.

To access the power connections, it is not necessary to remove the transmitter's housing cover. All connections to the transmitter are made using the wiring that exits through the conduit fitting on the top of the transmitter. See the wiring diagram on **page 5** and the suggested mounting method on **page 13**.

CAUTION

Operating this transmitter with the incorrect voltage and power requirement can cause internal electrical components to overheat and fail. Operation under these conditions will void the manufacturer's warranty, and the installer will be responsible for any damage that occurs.

Contact Brasch Environmental Technologies before connecting power to the transmitter if you are unsure of the correct power requirement.

Connect both the **black** and **red** wires coming out of the top of the transmitter to one lead from the transformer's 24 VAC secondary. Connect the remaining transformer lead to the **green** wire from the transmitter housing.

If the transmitter is part of a **Brasch GSE Detector**, the controller supplies the operating power to each transmitter in the system. Use a six conductor shielded cable, with color-coded conductors, to connect the power. Three of these conductors provide the +25 volts, -25 volts and Ref. Com. power to the transmitter. The remaining three conductors carry the signal from the transmitter to the controller. See **page 6** for typical wiring diagrams and suggestions for appropriate color-coded cables. If possible, choose a cable with color coded conductors that follow the suggested color code scheme listed on the drawings.

CAUTION

It is very important that the power and signal connections between each transmitter and between the transmitters and the Brasch controller be correct. If the connections are wired incorrectly, damage to both the transmitters and the controller will occur.

Use a cable with color-coded conductors and make sure that the same conductor connects to the same terminal on TS1 of each transmitter and the controller.

DO NOT APPLY POWER TO THE TRANSMITTER OR CONTROLLER UNLESS YOU ARE SURE THAT THE CONNECTIONS ARE CORRECT.

The transmitter will be shipped with six color coded wires exiting the top of the housing through a conduit fitting. If you have chosen color coded conductors that match the wire colors, connect the cable conductors to the wires of the same color. **If your cable conductors do not match the wire colors, assign a cable conductor color to each wire and make a list of this assignment. Follow this color assignment when connecting any other transmitters in the system.** All transmitters share the same conductors back to the controller. Therefore, a six conductor cable can be connected from transmitter to transmitter, or from transmitter to the controller, as the situation dictates. Follow the wiring diagrams on **page 6** to determine the proper connections at the control panel, detector or building management system.

Refer to **page 2** for product specifications.

Step 3

The transmitter conveys its sensor signal to the central controller in one of two ways. If the transmitter provides a sensor signal to a customer supplied building management controller, or GDCP-0, -1, -2 or -3 panel, the signal travels over a 4–20 ma. current loop. **A two conductor, shielded cable must be provided for each transmitter in the system.** Each cable terminates at individual inputs at the customer's controller. At each transmitter, the **positive** conductor connects to the **yellow** wire from the transmitter. The **reference common** conductor connects to the **gray** wire from the transmitter. See the wiring diagrams on **pages 5 and 7.**

If the transmitter is part of a **GSE Detector**, the sensor signal is transferred as a digital voltage over three conductors connected to the **brown, blue** and **white** wires from the transmitter housing. All transmitters share the same three conductors. Therefore, a cable is connected from transmitter to transmitter, or transmitter to the controller, as the situation dictates. See the wiring diagram on **page 6** for more information. Also, please read the **caution** notes in **Step 3** again before applying power.

Step 4

Once you are sure that the wiring connections are correct, apply power to the transmitter circuit. When power is first applied, the green power indicator will glow indicating that the transmitter is active. The first five minutes after applying power is a "warm up" period. At the end of this period, the transmitter will begin sending signals to the Brasch controller or building management controller.

PART ONE – INSTALLATION

Mounting the Transmitter

The ability of the transmitter to efficiently sense the target gas depends greatly upon proper selection of the mounting location. This transmitter monitors the area around it by sampling the air that passes by the sensor. Therefore, the transmitter should be positioned where it can sample air that contains a target gas concentration representative of the average value in that area.

When determining the mounting location, give special consideration to the following guidelines.

- Use one transmitter for each 7000 to 9000 square feet of area to be monitored.
- The types of gases the transmitter is designed to monitor have densities approximately equal to that of air. For maximum safety, mount the transmitter at the average breathing height.
- Avoid mounting locations that would not be representative of the average gas value in that area. Locations near doorways, fans, ventilation inlets and outlets and areas with high volume of air flow should be avoided.
- Avoid locations that would allow direct contact with water. Mounting the transmitter near outside garage doors may allow rain to hit the transmitter when the door is open.
- Avoid locations that are directly in the outlet air vents of heaters or air conditioners.
- Do not allow exhaust from engines to flow directly on the transmitter. This transmitter is designed to sense gas concentrations that are 300 to 1000 times less concentrated than the gas levels found in engine exhaust. Also, engine exhaust contains high levels of other components. These components can shorten the useful life of the sensor if they contact the sensor before being diluted by the room air volume.
- Avoid mounting locations where the transmitter may be hit by passing vehicles. If the transmitter must be mounted in these locations, provide a shielding cage around the transmitter for protection.
- Do not restrict the air flow to the transmitter housing.
- Do not mount the transmitter near containers of chemicals such as gasoline, kerosene, alcohol or other cleaning fluids. High level concentrations of these chemicals may be mistaken as the target gas by the sensor and cause false readings. Also, some welding gases may cause false readings.

The transmitter is attached in the mounting position in one of three ways.

- Attach the housing to conduit using appropriate conduit fittings. If you use this method, make sure that the conduit is securely attached to a solid support. Firmly tighten the threaded nuts on the conduit fittings inside the transmitter housing so they will not loosen over time.
- Attach the housing to a four inch square conduit box using the ½ inch fitting provided with the transmitter. Make sure that the conduit box is firmly fastened to the mounting surface with screws. Securely tighten the fitting nut on the inside of the conduit box so it will not loosen over time. **Fig. 6, in the appendix**, illustrates how the box is connected to the transmitter.
- Attach the housing to a solid support base using screws through the internal housing mounting holes. This method requires removal of the housing cover to gain access to the mounting holes. A mounting hole is located at the top and bottom of each of the housing end walls.

Find a flat area at least 6" high by 6" wide and place the back of the open housing flat against it. Using a pencil, or other slender marking tool, mark the location of the four mounting holes using the housing as a template. Start the screws without the housing in place to avoid any possibility of damage to the housing or circuit board. Remove the screws, place the housing in position and install the mounting screws. Do not over-tighten the screws and crack the plastic housing. Being careful not to damage the printed circuit board, replace the housing cover and securely tighten the four cover retaining screws.

PART TWO – TECHNICAL SPECIFICATIONS

Description

The Brasch Gas Transmitter is designed to function as a gas sensor and signal transmitter. The transmitter consists of a sensor and digital control circuitry. A 4-20 ma. analog output circuit is available to provide signals to a customer supplied building management controller. A microprocessor monitors the signal from the sensor circuitry, converts that signal to a digital value and, on demand, transfers the digital signal to a **Brasch GSE Detector**. In the case of the 4-20 ma. circuit, the digital signal is converted to a current and sent over a two wire current loop to the building management controller.

The sensor used in the transmitter operates on the **electrochemical** principle. A current is produced when the target gas reacts chemically with water inside the sensor. This small current is changed to a voltage by the transmitter's circuitry, amplified and changed to a digital signal by the microprocessor. This digital signal is proportional to the gas concentration present at the sensor. When requested by the **Brasch GSE Detector**, the digital signal is sent to the controller. The transmitter then updates the sensor reading and stores it for the next request.

The transmitter's circuitry consists of a printed circuit board mounted inside a polycarbonate housing. The housing has a NEMA 1 rating. A port is provided at the top of the housing cover that allows the sensor access to the ambient air.

Product Specifications

Power:	+/- 25 VDC Input Voltage 0.2 Amps
	24 VAC Input Voltage 50/60 Hz. 0.200 Amps
Installation Category:	II (local level, over-voltage transients less than 500 volts)
Operating Temperature:	Storage -50° C to 120° C (-58° F to 248° F)
	Operating -15° C to 40° C (5° F to 104° F)
Humidity:	10% to 90% (non-condensing)
Front Panel Indicators:	Power (green LED)
Dimensions:	4.8" W x 4.72" H x 2.16" D (12.2 cm W x 12 cm H x 5.5 cm D)
Weight:	1 lb. (0.5 Kg.)
Housing:	Gray, NEMA 1, polycarbonate plastic
Agency Acceptance:	ETL listed to UL 3111-1

Target Gas Specifications

The Brasch Gas Transmitter is available for monitoring several different target gases. Various regulatory agencies have determined the threshold concentrations at which these gases become dangerous. Brasch Environmental Technologies has designed their transmitters so that the measurement ranges for each target gas meet the agencies' requirements.

Each target gas, for which Brasch currently produces a transmitter, is listed below along with the relevant concentration specifications.

Carbon Monoxide

Full Scale Span:	200 PPM
Resolution:	1 PPM

Nitrogen Dioxide

Full Scale Span:	10.0 PPM, (BMS); 2.0 PPM, (GDGP-0, 1, 2, 3)
Resolution:	0.05 PPM

Oxygen

Full Scale Span:	25.0 %
Resolution:	0.1 %

Description of Front Panel Indicators

The only indicator on the transmitter's front panel is the green power lamp. This lamp glows continuous whenever power is present.

How the Transmitter Senses the Target Gas

Ambient air surrounding the transmitter contacts the sensor through the sensing port at the top of the housing cover. Any target gas present in this air causes a response from the sensor. If the transmitter is located properly, the sensor will respond to the average amount of the target gas present in the area. For help in properly locating the transmitter, please read the mounting guidelines on **page 1**.

The transmitter monitors the actual concentration of the target gas exposed to the sensor. This actual value may be different than the time-weighted-average values displayed by most of the personal gas monitors. Please take this difference into account when comparing the response of the two units.

Obtaining the Best Operation

Carbon Monoxide and/or Nitrogen Dioxide Transmitters

These transmitters are placed in areas to monitor for a rising concentration of the target gas.

No two installations will be exactly the same. The number of gas producing sources, air flow patterns inside the room, the total room volume and the exact location of the transmitter(s) influence how effective each is in sensing the target gas concentration.

In some cases, you may find that a target gas source is too close to the transmitter. Consider other mounting locations for the transmitter, or move the gas source farther away.

Oxygen Detector

This transmitter is placed in areas to monitor for a decreasing concentration of oxygen. Usually a controller will respond by activating a ventilation system to bring fresh air, at a normal oxygen concentration, into the area being monitored. In other instances, the controller may only be used to sound an alarm allowing workers to evacuate the area.

The number of oxygen depleting sources, air flow patterns in the area, the total room volume and the transmitter location influence the effectiveness of the transmitter.

Under most conditions, the only variable that the installer can change will be the location of the transmitter. Please see **page 1** for mounting guidelines.

Assembly View and Wiring Diagrams

The following assembly view and wiring diagrams should be referenced during installation.

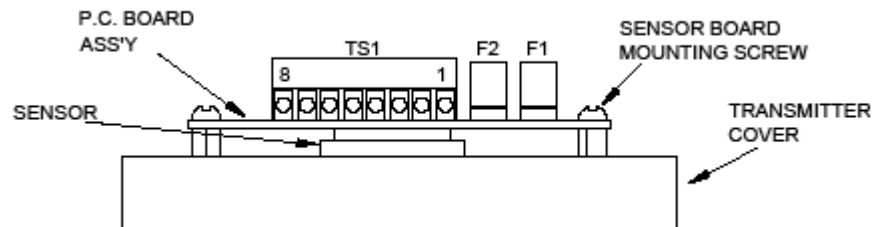


Fig. 1: Assembly View: Sensor P.C. Board to Transmitter Cover

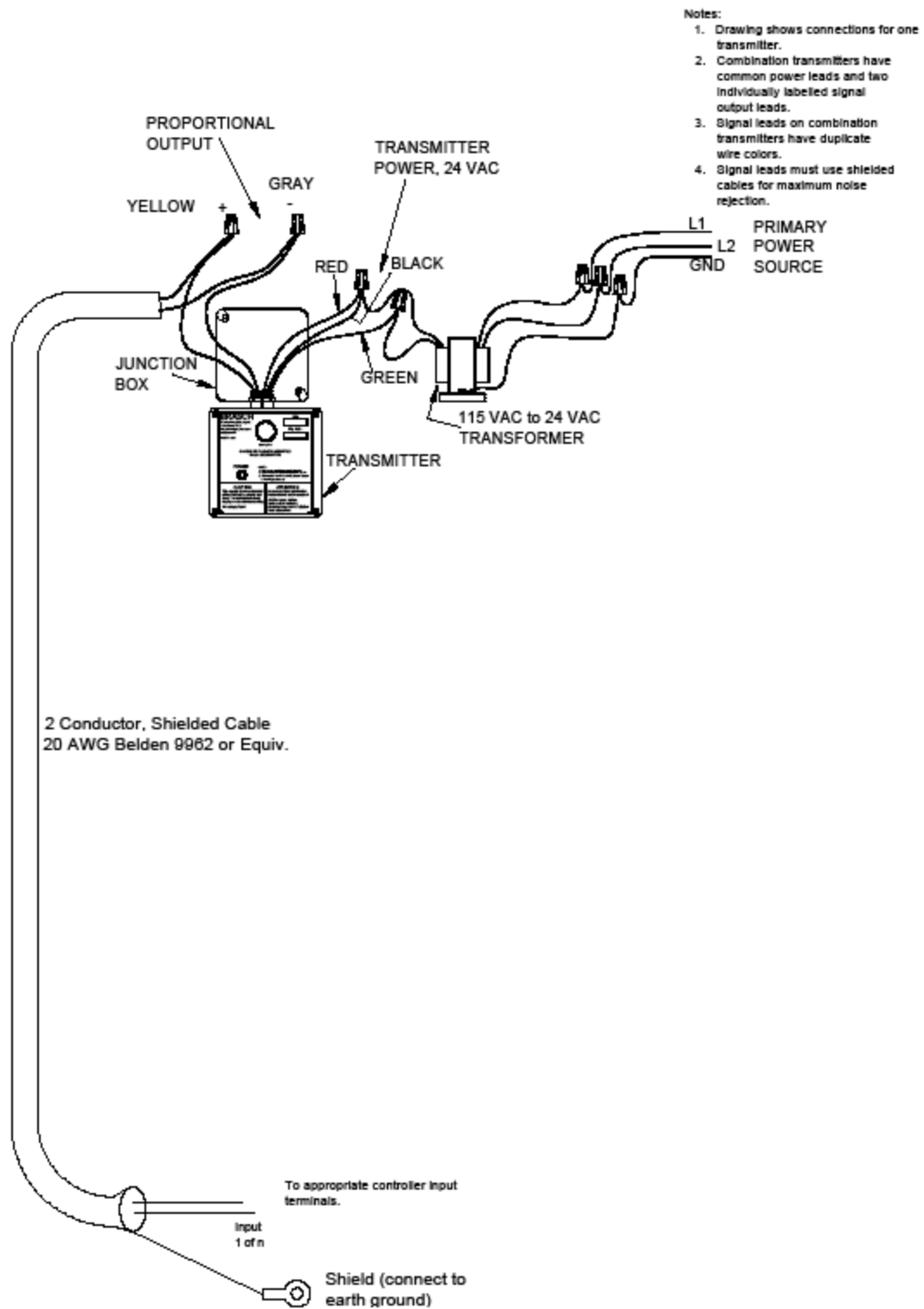


Fig. 2: Wiring Diagram, Others BMS to Remote Transmitter

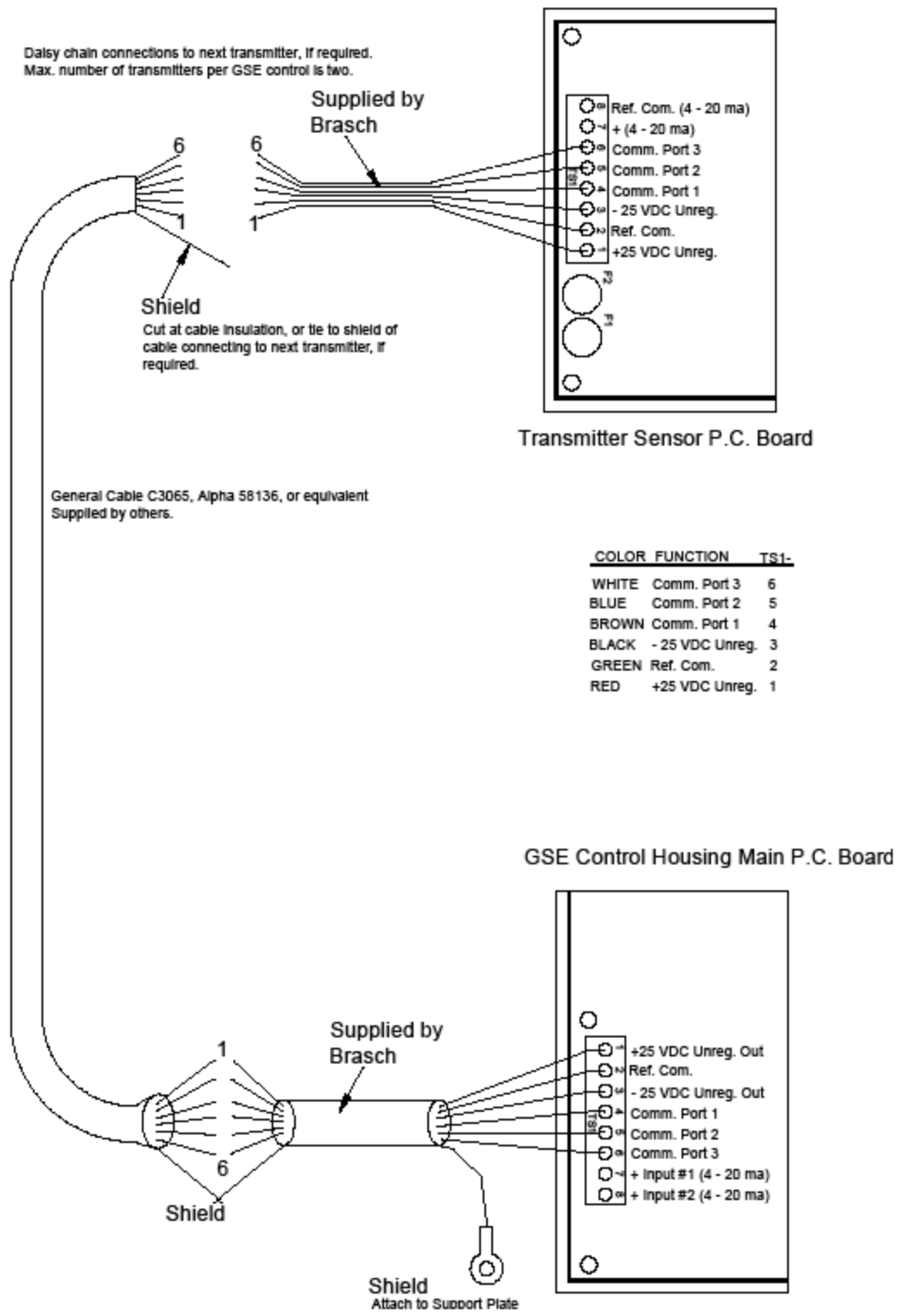


Fig. 3: Wiring Diagram, Brasch GSE Detector to Remote Transmitter

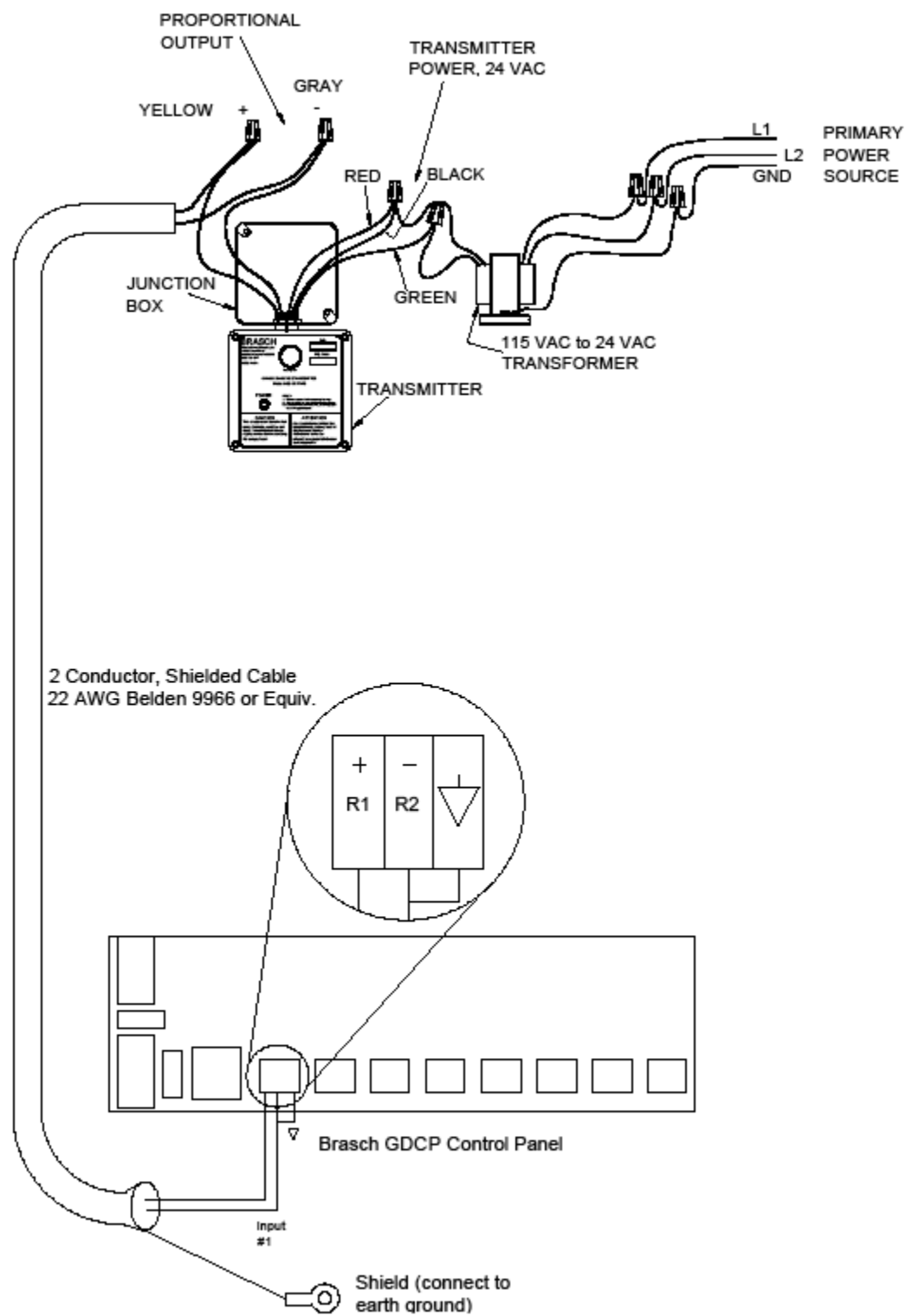


Fig. 4: Wiring Diagram, Brasch Control Panel to Remote Transmitter

PART THREE – TROUBLESHOOTING and MAINTENANCE

Testing the Response to the Target Gas

Carbon Monoxide or Nitrogen Dioxide Transmitters

Testing these transmitters require that the target gas be applied to the sensor using one of two methods. Gas can be applied from a tank of air containing a known concentration of the target gas, or a level of target gas sufficient to activate the control system can be produced from the exhaust of an operating engine. Use a gasoline engine to produce CO and a diesel engine to produce nitrogen dioxide.

Of the two methods of obtaining test gas, the simplest is operating an engine in the vicinity of the transmitter under test. The engine should be placed about 10 feet away from the transmitter so that exhaust gases will not contact the transmitter directly.

Caution

Allowing the transmitter to come in direct contact with undiluted exhaust gases will decrease the expected useful lifetime of the sensor. The high concentration of acids and other components in the exhaust gas will overload the activated carbon filter inside the sensor and will increase the effects of interfering gases upon the accuracy of the sensor.

If the sensor becomes damaged, it must be replaced with a new sensor calibrated at the factory.

The engine should be allowed to operate until the level of the target gas is sufficient to activate the ventilation system. Depending upon the volume of the area where the transmitter is located, this may take from 10 to 30 minutes.

Using test gas applied from a tank has the advantage of speed as well as assurance that the transmitter is responding to the target gas. However, the gas must be applied directly to the sensor if the response is to be close to the value present in the tank. The test gas can not be allowed to become diluted by the air in the room before it comes in contact with the sensor. This reduces the concentration to a level too low to give the desired result.

While a test gas mixture is readily available for CO, gas mixtures containing low PPM levels of nitrogen dioxide is not available.

When testing the CO sensor response using test gas from a tank, the gas is allowed to flow through a flexible hose into a plastic fitting that is placed directly over the sensing port. Allow 2 to 3 minutes for the sensor to respond to the test gas. If the test gas has the required concentration of CO, the controller should respond by displaying a concentration and activating the appropriate ventilation component.

Because of the uncontrolled conditions in the test area, the controller will probably not indicate a concentration equal to the CO value of the test gas. However, sufficient response can be obtained to determine that the system is working.

Oxygen Detectors

The response of the oxygen sensor is checked by exposing the transmitter to room air having a normal concentration of oxygen. Ambient air should contain 20.9 % oxygen. Therefore, if the controller displays a reading close to 20.9 %, the transmitter is responding correctly to the oxygen level in the area.

If the ventilation system operation is to be tested, a tank containing the appropriate concentration of oxygen must be used. Flow from this tank is channeled through a flexible hose into a plastic fitting. This fitting is then placed over the sensing port of the transmitter housing. Allow 2 to 3 minutes, depending upon conditions in the test area, for the sensor to respond and send a signal to the controller. Because of the uncontrolled room conditions, do not expect the controller to display an oxygen concentration equal to that specified on the tank data sheet.

Checking and Replacing Fuses

The fuses used to protect the transmitter circuitry are time-lag TR5 elements. They are UL rated at 250 VAC, and manufactured by Wickmann, series 374.

There are two fuses labeled F1 and F2 on the P.C. board. These fuses have a rating of 0.200 Amps. Access the fuses by removing the cover securing screws and lifting off the housing cover. Test these fuses by removing them from their holders after disconnecting all power sources. Measure for a low value of resistance across the pins. Replace any fuse that does not have a resistance reading near 0 ohms. Always replace fuses with one having the same ratings and characteristics.

Replacing the Sensor

The sensor's useful lifetime depends greatly upon its operating conditions. Continuous operation around large or numerous gas sources may shorten the sensor's useful life. **The recommended replacement date is two years after the manufacturing date listed on the front panel label.**

Because each sensor requires individual calibration, the sensor is replaced by installing a new, calibrated sensor board assembly **purchased through your Brasch distributor**. This procedure can be accomplished in the field. The old sensor board assembly can be discarded.

Please refer to the assembly drawing on page 4 of this manual while removing and installing the sensor board assembly.

To replace the sensor board assembly, remove all transmitter power sources and remove the front cover from the transmitter. Carefully lay the cover assembly on its front to expose the sensor P.C. board. Disconnect the wires from terminal strip TS1, and remove the four securing screws from the sensor board. After making sure that the sensor is firmly seated on the replacement sensor board, place the board in position with the sensor toward the inside of the front cover. Secure the board with the four mounting screws. Connect the wiring to terminal TS1 being very careful to place the wires back on the correct terminals. Secure the wires by firmly tightening the terminal screws.

Place the cover on the transmitter housing and secure with the four cover screws. Restore the transmitter power source and check for proper operation. See "Testing the Response to the Target Gas" on **page 8**.

Suggested Repair Parts

The Brasch Gas Transmitter contains few field serviceable parts. However, the fuses are replaceable in the field. While an open fuse may indicate problems with the P.C. board circuitry, fuses may also open because of power surges on the AC line. Therefore, Brasch Environmental Technologies recommends that the following fuses be available for replacement.

Qty.	Description	Part Number
5 ea.	Fuse, TR5, time-lag, 0.200 Amp, 250 VAC.	TR5-0.200

A package containing the proper quantity of fuses can be purchased through your Brasch distributor.

PART FOUR – COMMON INSTALLATION/OPERATION MISTAKES

Transmitter Gas Type Set Wrong

The sensor contained inside the transmitter housing is designed to respond to a specific type of gas. A two position header, TP2, on the sensor P.C. board is configured so that the controller will know the type of gas the transmitter is programmed to detect. Whenever the controller asks the transmitter for its latest sensor reading, the transmitter also sends information about the type of sensor it contains. The controller uses both the type information and the sensor reading to properly scale the sensor response before displaying the concentration.

Fig. 5, in the appendix, shows the location of TP2 and also indicates where jumpers should be placed so that the transmitter sends the controller the proper type of gas information. The header has two positions marked “A” and “B”. An “X” in a position indicates that the position should have a jumper placed across its two pins.

Transmitter I.D. Set Wrong

The transmitter is designed to operate in a system of up to 2 transmitters. In this case, each transmitter is assigned a unique number called its I.D. The controller uses this I.D. number to address the transmitter and distinguish the transmitter from the other transmitter in the system. The I.D. of the transmitter is determined by the jumper configuration of TP1 on the sensor board. The appropriate jumper configurations are shown in **Fig. 5** in the appendix. As an example, transmitter #1 would have an I.D. of “1” and jumpers would be placed on positions 2, 4, 8 and 16. Transmitter 2 would have an I.D. of “2” and jumpers would be placed on positions 1, 4, 8 and 16. The two transmitters can not share the same I.D. number in a system.

The communication protocol between the controller and the transmitters works as a “master/slave” configuration. The controller sends all transmitters the same I.D. number, but only one transmitter recognizes the command. The selected transmitter then becomes the “master” and sends the sensor type and reading to the controller which is now the “slave”. **If two transmitters are identified by the same I.D. number, a collision could occur on the serial data line that could destroy the transmitters’ microprocessors.**

When the transmitter is operated as part of a Brasch GDCP-0, 1, 2, or 3 panel system, each transmitter is not uniquely identified. In this case, all transmitters will have jumpers positioned on all of the header pins shown in **Fig. 5**.

If you are unsure of the proper I.D. configurations, do not operate the system. Instead, call your Brasch representative and discuss your questions with a Brasch technician before placing the system into operation.

Transmitter Mounted In an Unsatisfactory Location

For reliable operation, the transmitter(s) must be mounted in the proper location(s). Please read “Mounting the Transmitter” on **page 1** for guidelines on choosing locations. By following the mounting guidelines, much of the problems caused by improper mounting locations can be eliminated.

Common mistakes include mounting a transmitter too close to a garage door. When the door is open, rain may blow through the doorway and onto the transmitter housing. Another common mistake is to mount the transmitter in a location where it comes in direct contact with engine exhaust. The large amount of contaminates in engine exhaust can shorten the useful life of the sensor.

One more common mistake is to choose a mounting location that places the transmitter too near the outlet of air conditioners or heaters. Quick, drastic changes in ambient temperature can cause erratic shifts in the transmitter response.

PART FIVE – LIMITED WARRANTY

Warranty Statement

Limited Warranty

Brasch Environmental Technologies, LLC warrants gas transmitters, gas detectors, control panels and accessories for a period of one year from the date of shipment against defects in material or workmanship. Should any evidence of defects in material or workmanship occur during the warranty period, Brasch Environmental Technologies, LLC, will repair or replace the affected product, **at its own discretion**, without charge. The company shall not be held responsible for any charges incurred with removal or replacement of allegedly defective equipment, nor for incidental or consequential damages.

Service and Repair Procedures

Our goal at Brasch Environmental Technologies is to produce products that constantly exceeds the requirements and expectations of our customers. One of the ways of meeting that goal is to produce products that never fail or require service. However, when we are advised of a problem with one of our products, it is our intention to address the problem as quickly and efficiently as possible.

Many problems that appear at first to be associated with the product can be solved without returning the product. If you experience a problem, and would like to discuss it with a factory service technician, you may call the number listed on the product label. You will be transferred to a technician specially trained to service that specific product. This technician will help you determine the most efficient way of solving the problem.

If service or repair of your Brasch product becomes necessary, an authorization request for returning the product to the Brasch factory must be obtained from our sales office. If you are an end user, please contact your Brasch distributor to initiate this request. The distributor, after obtaining a description of the problem, will contact the factory and request a **Return Goods Tag, (RGT)**, number. This number must be placed in a conspicuous location on the outside of the shipping package. **Without this RGT number, Brasch will not accept the shipment.** A brief description of the reason for returning the product should be included in the package. Without this description, repair may take longer than necessary.

You may at the time you request service, request an estimate on the time it will take for repair. The Brasch representative will give you an estimate based upon the information you provide. Although Brasch Environmental Technologies will repair and return your product in as short a time as possible, Brasch can not be held responsible for meeting repair estimates.

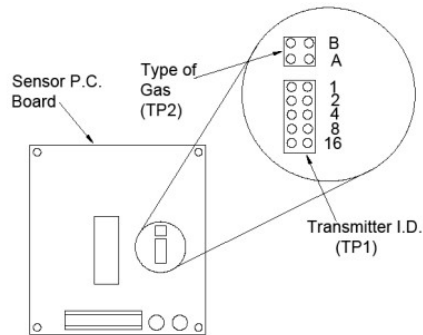
PART SIX – APPENDIX

Model Numbers and Descriptions

Each Brasch Gas Transmitter is given a model number that describes the type of target gas it is designed to monitor. This model number appears on the front panel label below the sensing port along with the name of the transmitter.

Use the following list to completely identify a transmitter once you know the model number.

Transmitter Model Number and Description	GSE = Gas Sensor, Electrochemical
Model Description	Model Number
Carbon Monoxide Transmitter:	GSE-CM-TRNS
Nitrogen Dioxide Transmitter:	GSE-ND-TRNS
Oxygen Transmitter:	GSE-OX-TRNS



“Type of Gas” (TP2) Jumper Positions:

TYPE	Jumpers on Position:	
	A	B
CO	X	X
NO ₂	X	
O ₂		X

“Transmitter I.D.” (TP1) Jumper Position

I.D.	Jumpers on Position:				
	1	2	4	8	16
1		X	X	X	X
2	X		X	X	X

Fig. 5: Transmitter Gas Type and I.D. Settings.

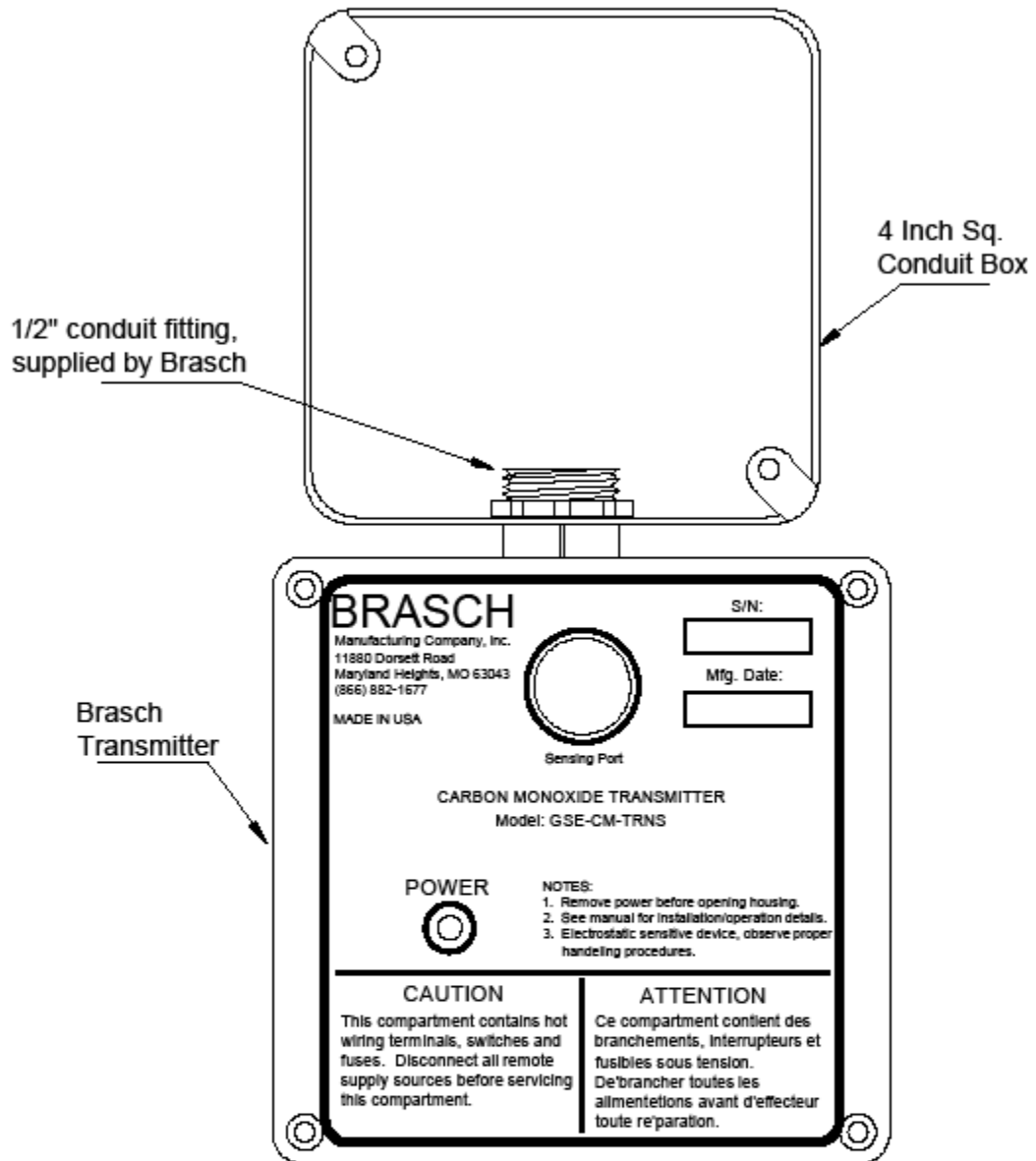


Fig. 6: Transmitter Mounting Method Using Four Inch Conduit Box