

CO₂ Carbon Dioxide Transmitter

90DM₃A

User Manual



Protecting your health and your environment.

WARRANTY AND LIMITS OF LIABILITY

Vulcain Inc. warrants to the original purchaser that its product and the component parts thereof will be free from defects in workmanship and materials for a period of five years from the date of purchase. Without any charge and at its option, Vulcain will repair or replace defective products or components upon their delivery to its Repair and Service Department. This warranty does not apply in the event of misuse or abuse of the product, or as a result of unauthorized alterations or repairs. Vulcain shall not be liable for any consequential damages, including and without limitation, damages resulting from loss of use.

Every precaution for accuracy has been taken in the preparation of this manual. However, Vulcain neither assumes responsibility for any omissions or errors that may appear, nor liability for any damages that may result from the use of the products in accordance with the information contained in this manual.

To obtain warranty service, return the product, along with a complete description of the defect, transportation prepaid. Vulcain assumes no risk for damage in transit. Following warranty repair, the product will be returned to the buyer, transportation prepaid.



**Technical Support Line:
1-800-563-2967**

Before returning a product for warranty service, please contact Vulcain's Technical Support Department.



Warranty Registration



To validate the warranty, this registration form must be completed in full and sent to Vulcain within 90 days of the date of purchase. Fax it to Vulcain at 1 888 967-9938.

Customer name: _____

Address: _____

City: _____ State/Province: _____

Location of the installation: _____

Serial No.: _____

BEFORE RETURNING ANY INSTRUMENT, PLEASE CONTACT US TO OBTAIN A RETURN OF MATERIAL AUTHORIZATION NUMBER.

TABLE OF CONTENTS

WARRANTY	1
UNPACKING	3
DESCRIPTION	3
INSTALLATION GUIDELINES	3
SURFACE-MOUNT INSTALLATION	4
DUCT-TYPE INSTALLATION	5
DUCT-MOUNT INSTALLATION DETAILS	6
USER INTERFACE	6
SPECIFICATIONS	7
PERIODIC INSPECTIONS AND CALIBRATION	7
CALIBRATION MENU	8
ELECTRICAL WIRING	9
4-20 mA LOOP CONFIGURATION	10
4-20 MA CURRENT SOURCING OUTPUT CONFIGURATION	10
4-20 MA OUTPUT LOOP-POWERED OPERATION (FACTORY SETTING)	10
VDC OUTPUT	12
0-5 VOLT OUTPUT	12
0-10 VOLTS OUTPUT	12
CALIBRATION PROCEDURE	13

UNPACKING

Open the package and remove the equipment and components. Make sure that you have all the items described on the order form or packing slip.

DESCRIPTION

The 90DM₃A is an infrared CO₂ Carbon Dioxide Gas Monitor. A 4-20 mA, 0-10 Vdc or 0-5 Vdc output may be configured on-site. The monitor permits a reading on a 0-2000 PPM range. Optional ranges at 0-1% or 5% Vol. are also available.

INSTALLATION GUIDELINES



Make sure to locate the monitor and sensing assembly(ies) in an area easily accessible to a technician.



Avoid any location where the monitor could be subject to vibrations.



Avoid any location close to noisy equipment.



Avoid any location where temperature changes occur rapidly.



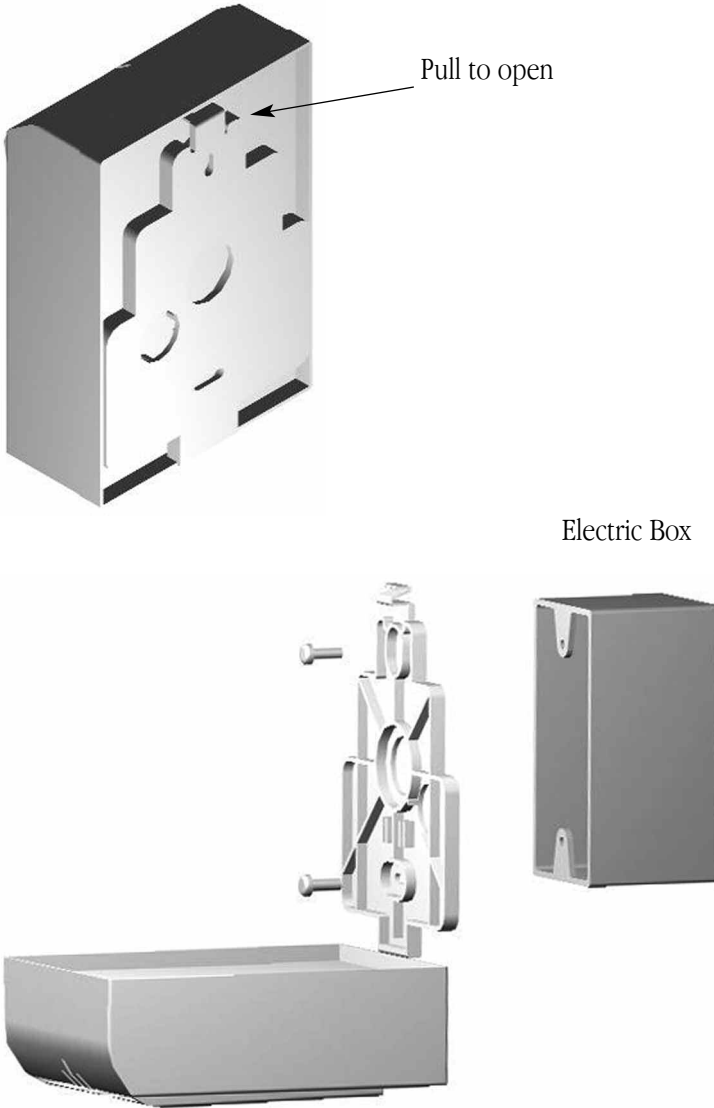
Verify all the requirements and existing regulations which may affect the choice of location.



For the DT Duct-Type housing, installation is recommended on a straight duct at least 3 feet (1 m) away from any curve.

SURFACE-MOUNT INSTALLATION

The recommended height for installation is 5 feet (1.5 m) from the floor for CO₂ monitoring in offices or similar applications related to indoor air quality. For applications such as CO₂ cylinder warehouses where health hazards are an issue, the recommended height for installation is 1 foot (30 cm) from the floor.



DUCT-TYPE INSTALLATION

The 90DM3A may be duct-mounted. It will operate most effectively when the air-speed is between 500 and 4,000 ft/minute (2.5 to 20.3 m/sec), and it may be installed to monitor incoming fresh air or outgoing exhausted air. Make sure to verify all the requirements and existing regulations that may affect the choice of its location. In order to optimize its operation we recommend installation on a straight section of duct 3 feet (1 m) away from any curved ductwork.

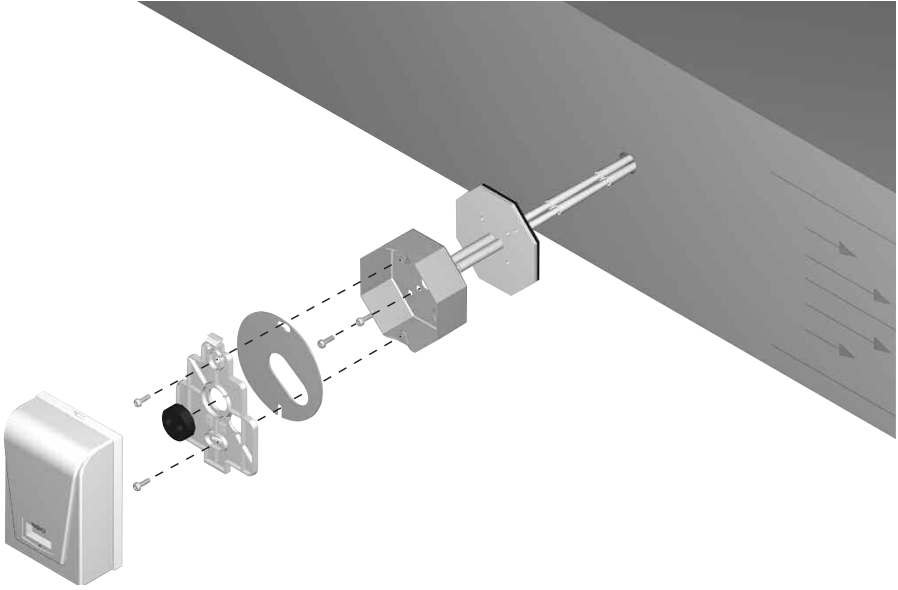
1. Drill 3 cm openings for the sampling tubes.
2. Insert the sampling tube with its lateral air holes in the appropriate opening, orienting the air holes (FLOW indication) to face the airflow.
3. Knock out the rear hole of the octagonal box and place the box on the plastic plate. The box mounting holes must be vertically oriented. Mount the box with two #8 metal screws.
4. Install the electric wire in the octagonal box.
5. Assemble the metallic mounting plate and the plastic base on the octagonal box with two 1/2" 8/32 sheet-metal screws.
6. Install the rubber gasket to seal the middle opening.
7. Connect the power and the outputs as shown in the ELECTRICAL WIRING diagram.
8. Before mounting the cover of the sampling unit box, start the ventilation feeding fan and check if there is any air leakage. If necessary, seal with air plugs.
9. Press fit the 90DM3 onto the plastic base.



To convert from CFM to velocity (ft/minute), divide the flow by the area.

Example: In a 2 ft x 4 ft duct, where the area is 8 ft² with a CFM of 30,000, the air velocity will be $30,000 \text{ ft}^3/\text{minute} / (8 \text{ ft}^2) = 3,750 \text{ ft/minute}$

DUCT-MOUNT INSTALLATION DETAILS



USER INTERFACE

```
900M3  
R-X.44C
```

When the unit is powered ON, the display indicates the type of unit and the revision.

```
V.5.5.53  
00036
```

For a very short time, the sensor sends information to the display.

```
* CO2  
Warm-Up
```

The type of gas and the word Warm-Up are displayed.

```
*01 CO2  
700 ppm
```

During normal operation, the display shows a “+” and an “X” alternating to indicate the CPU is running, followed by the transmitter’s address and type of gas. The gas concentration read is indicated on the second line.

SPECIFICATIONS

Power Requirement:	17-27 Vac or 24-38 Vdc, 200 mA
Gas Detected:	CO ₂
Detection Range:	0-2000 PPM, 0-1% OR 0-5%
Accuracy:	± 40 ppm + 3% reading
Response Time:	<60 sec. (for 90% step change)
Sensor Life Expectancy:	> 10 years
Operating Temperature Range:	32°F to 100°F (0°C to 40°C)
Operating Humidity Range:	0% - 95% RH, Non-Condensing
Dimensions:	5.25 in (H) x 3.5 in (W) x 2.0 in (D) (11.5 cm x 7.5 cm x 4.4 cm)
Weight:	SM: 0.55 lbs (0.20 kg) DT: 0.66 lbs (0.30 kg)
Warranty:	5 year limited warranty

Optional Outputs:

1: 4-20 mA, 0-5 Vdc or 0-10 Vdc

2: 1 SPDT Relay

Relay Output Rating: 5A, 30 Vdc or 250 Vac (resistive load)

3: Display LCD

PERIODIC INSPECTIONS AND CALIBRATION

This unit requires calibration. The calibration frequency will be a function of the operating conditions, including operating under extreme temperatures, exposure to contaminants or gas concentrations. A calibration inspection must be included as part of a routine maintenance to ensure proper operation of the gas detection unit.



If unit span or zero cannot be adjusted, the sensor may be approaching its end-of-life and must be replaced.

CALIBRATION MENU

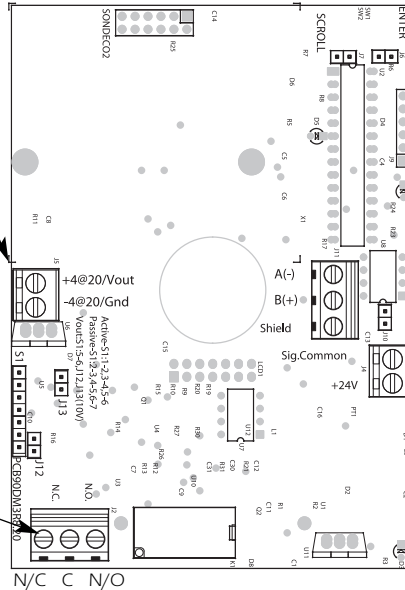
Password * AA *	User Password to enter the Menu.			
MainProg Max Conc	Scale configuration field.			
MainProg Max Conc	Max Conc 2000 ppm	Adjust the maximum scale concentration for the transmitter.		
MainProg Max Conc	Alarm setting field.			
MainProg Alarm A	Alarm A 850 ppm	Adjusting Alarm level.		
MainProg Set 4ma	4mA setting field.			
MainProg Set 4ma	Set 4ma Adj 4@20	4mA adjusting field.		
MainProg Set 20ma	20mA setting field.			
MainProg Set 20ma	Set 20ma Adj 4@20	20mA adjusting field.		
MainProg Set Zero	Zero setting field.			
MainProg Set Zero	Set Zero GO CALIB	Activate the zero calibration using nitrogen.		
MainProg Set Zero	Set Zero GO CALIB	Set Zero * Wait *	* Zero * calibration is underway.	
MainProg Set Span	Calibration with the Span gas.			
MainProg Set Span	Set Span 225 ppm	Adjust the Span gas value that will be used.		
MainProg Set Span	Set Span 225 ppm	Set Span GO CALIB	Accept the Span value and validate.	
MainProg Set Span	Set Span 225 ppm	Set Span GO CALIB	Set Span * Wait *	Span is underway.
MainProg *Reset**	Resets the unit.			
MainProg *Reset**	Reset * Yes *	Acknowledge if you want to reset.		
MainProg * Quit *	To quit from the menu program.			
MainProg * Quit *	Wait Re-init	The unit reinitializes itself once quitting the Programming Menu.		

ELECTRICAL WIRING

A wiring info sticker is pasted on the unit to simplify installation, however the electrical connections must be made according to the following information.

**Outputs 4-20 mA,
0-5 Vdc or 0-10 Vdc:**

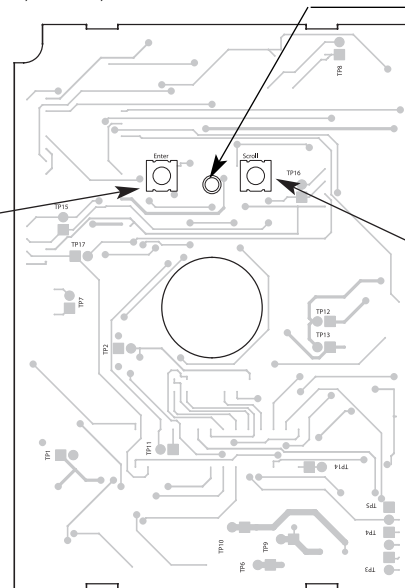
Output J5. See details in Table 1



Power: Input J4
17 to 27 Vac, 24 to 38
Vdc, 200 mA

If the 4-20mA output is present and configured in active mode, a local power supply is required:
17 to 27 Vac,
24 to 38 Vdc,
200 mA

Relay Output (optional): J2
5 A, 30 Vdc or 250 Vac
(resistive load)



Red LED:
Indication for calibration
when there is no display

Enter Key:
Validation Key

Scroll Key:
Browsing key
in menu mode

4-20 mA LOOP CONFIGURATION

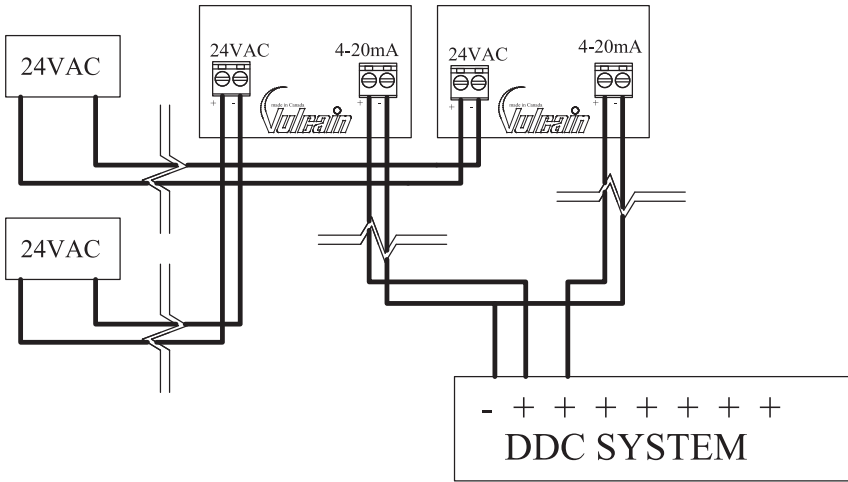
4-20 mA CURRENT SOURCING OUTPUT CONFIGURATION

The transmitter supplies the loop current. The maximum impedance supported by the loop is 400 ohms. Set jumpers on S1 at 1-2, 3-4 and 5-6.



WARNING

A dedicated power supply must be used with each unit. Considerable damage may occur if this condition is not strictly followed.



4-20 mA OUTPUT LOOP-POWERED OPERATION

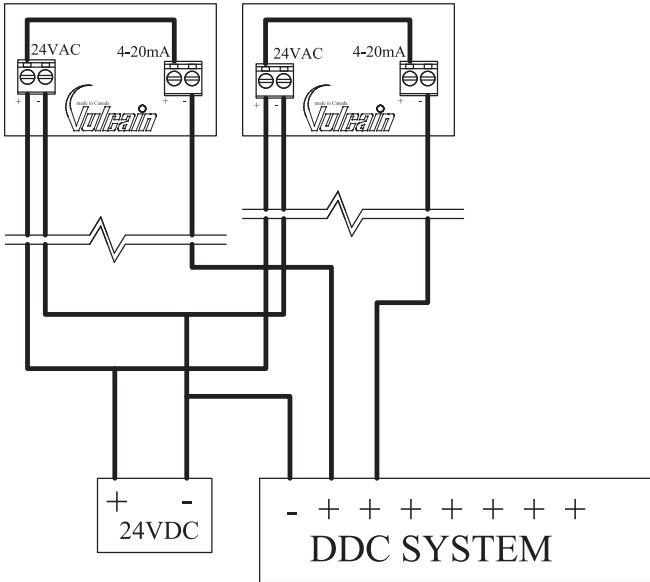
(Factory Setting)

The 4-20 mA output is **factory set for loop-powered operation** and requires a power source of 12 Vdc to 30 Vdc. The overall impedance depends on the voltage supplied at the 4-20 mA loop. Set jumpers on S1 at 2-3, 4-5 and 6-7 for this type of configuration.

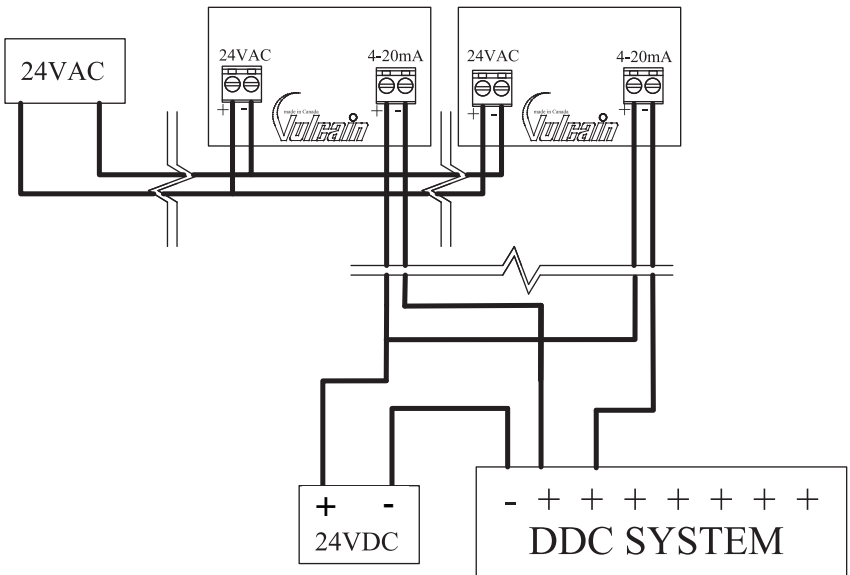
Table 1
Permitted Impedance in the 4-20 mA Loop

Voltage Source Applied	Total Impedance
12 Vdc	400 Ohms
16 Vdc	600 Ohms
20 Vdc	800 Ohms
24 Vdc	1000 Ohms
30 Vdc	1300 Ohms

3-Wire Configuration



4-Wire Configuration



VDC OUTPUT

0-5 VOLT OUTPUT

The transmitter sends a voltage signal proportional to the gas concentration read on the total detection scale. To configure this mode, take away the jumpers on S1. Insert a jumper on position 5-6 of S1 and one jumper on J12. Insert the last jumper on pin 7 of S1 for further use.

0-10 VOLTS OUTPUT

The transmitter sends a voltage signal proportional to the gas concentration read on the total detection scale. To configure this mode, take away the jumpers on S1. Insert a jumper on position 5-6 of S1, a second jumper on J12, and a third jumper on J13.



WARNING

If several units are powered with the same transformer, the Vdc outputs cannot share a common ground. Most DDC systems share common ground, therefore, separate transformers must be used for each unit, including the DDC. Do not attempt to connect any power sources to the Vdc outputs. The Vdc output must not be grounded to earth.

Significant damage may occur if these recommendations are not followed.