



# Macurco™ CD-6H/CD-6MC/CD-12MC Carbon Dioxide Detector, Controller and Transducer User Instructions



IMPORTANT: Keep these user instructions for reference.

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# 1 General Safety Information

The following instructions are intended to serve as a general guideline for the use of the Macurco CD-6H, CD-6MC, CD-12H, and CD-12MC Carbon Dioxide Detector. This manual will refer to these devices a CD-xx-H/MC unless content is specific to a model. This manual is not to be considered all-inclusive, nor is it intended to replace the policy and procedures for your facility. If you have any doubts about the applicability of the equipment to your situation, consult an industrial hygienist or call Technical Support at 1-844-325-3050.

## 1.1 List of warnings

 <b>WARNING</b>
Each person using this equipment must read and understand the information in this user manual before use. Use of this equipment by untrained or unqualified persons or use that is not in accordance with this user manual, may adversely affect product performance.
Use only for monitoring the gas which the sensor and monitor is designed to detect. Failure to do so may result in exposures to gases not detectable and cause serious injury or death. For proper use, see supervisor or user manual, or contact Technical Support at 1-844-325-3050.
This equipment may not function effectively below 32°F or above 122°F (0°C or above 50°C). Using the detector outside of this temperature range may adversely affect product performance.
This detector helps monitor for the presence and concentration level of a certain specified airborne gas. Misuse may produce an inaccurate reading, which means that higher levels of the gas being monitored may be present and could result in overexposure and cause serious injury or death. For proper use, see supervisor or User manual, or contact Technical Support at 1-844-325-3050.
High voltage terminals (120/240 VAC) are located within this detector, presenting a hazard to service technicians. Only qualified technicians should open the detector case and service the internal circuits. Ensure power is de-energized from the detector relays prior to servicing the unit. Failure to do so may result in electrical shock.
Do not disassemble unit or attempt to repair or modify any component of this instrument. This instrument contains no user serviceable parts, and substitution of components may impair product performance.
Using a certified gas with a concentration other than the one listed for this detector when conducting a calibration or calibration verification test (bump test) will produce inaccurate readings. This means that higher levels of the gas being monitored may be present and could result in overexposure. For proper use, see supervisor or User manual, or contact Technical Support at 1-844-325-3050.
The following steps must be performed when conducting a calibration or calibration verification test (bump test) to ensure proper performance of the monitor. Failure to do so may adversely affect product performance. <ul style="list-style-type: none"> <li>• When performing a calibration or calibration verification test (bump test), only use certified calibration gas at the required concentration level.</li> <li>• Do not test with expired calibration gas.</li> <li>• Do not cover or obstruct display or visual alarm cover.</li> <li>• Ensure sensor inlets are unobstructed and are free of debris</li> </ul> Failure to follow instructions outlined in this user manual can result in sickness or death.



## 2 Use Instructions and Limitations

The Macurco CD-xxH/MC a dual relay Carbon Dioxide (CO<sub>2</sub>) detector, controller, and transducer available in low voltage and line voltage options. The CD-xxH/MC has selectable 4-20 mA output, buzzer and digital display options. It is an electronic detection system used to measure the concentration of Carbon Dioxide and provide feedback and automatic ventilation control to help reduce CO<sub>2</sub> concentrations in conference rooms, classrooms, meeting halls or similar applications. The CD-xxH/MC is a low-level meter capable of displaying from 0-5000 ppm (parts per million) of Carbon Dioxide. The CD-xxH/MC is factory calibrated and 100% tested for proper operation.

The CD-xxH uses an automated background calibration program to set the clean air level on a regular basis.

The CD-xxMC has the same setting and features of the CD-xxH with the addition of being able to perform a manual calibration. The CD-xxMC requires a manual calibration process at a minimum of once per year using the Macurco CD6-FCK calibration kit.

### WARNING

Each person using this equipment must read and understand the information in this user manual before use. Use of this equipment by untrained or unqualified persons or use that is not in accordance with this user manual, may adversely affect product performance.

### 2.1 Use For

The CD-xxH/MC provides CO<sub>2</sub> detection and automatic ventilation control for conference rooms, classrooms, meeting halls or similar applications. Carbon dioxide is a colorless, odorless gas that is produced both by people exhaling CO<sub>2</sub> as well the burning of gasoline, coal, oil, and wood. The outdoor concentration of carbon dioxide can vary from 350-450 parts per million (ppm) or higher in areas with high vehicle traffic or industrial activity. The indoor CO<sub>2</sub> level depends upon the number of people present, how long an area has been occupied, the amount of outdoor fresh air entering the area and other factors. CO<sub>2</sub> concentrations indoors can vary several hundred parts per million in areas with many people present for an extended period and where fresh air ventilation is limited. Outdoor "fresh" air ventilation is important as it can dilute CO<sub>2</sub> levels of the indoor environment. The amount of fresh air that should be supplied to a room depends on the type of facility and room. Ventilation should keep carbon dioxide concentrations below 1000 ppm and create indoor air quality conditions that are acceptable to most individuals.

For applications storing or using CO<sub>2</sub> tanks, the detector will provide notification in the event of a gas leak. Such applications include but are not limited to food storage, beverage dispensing, agriculture, fire suppression, medical, etc.

The CD-xxH uses an automated background calibration program to set the clean air level on a regular basis. The CD-xxH will maintain accuracy if it is exposed to the "clean air reference value" (this reference value is the lowest concentration to which the sensor is exposed) at least once per week.

The CD-xxMC does not perform automated background calibrations and it is suggested to perform a Manual Calibration on the unit no less than once per year using the Macurco CD6-FCK calibration kit.

**Note:** This applies when used in typical indoor ambient air. The CD-xxH/MC can be used stand alone, with the Macurco Detection and Ventilation Control Panel, other 12 VAC or 24 VDC fire/security panels or building automation systems.

### WARNING

Use only for monitoring the gas which the sensor and monitor is designed to detect. Failure to do so may result in exposures to gases not detectable and cause serious injury or death. For proper use, see supervisor or user manual, or contact Technical Support at 1-844-325-3050.



## 2.2 Do NOT use for

The CD-xxH/MC is not intended for use in hazardous locations or industrial applications such as refineries, chemical plants, etc. Do not mount the CD-xxH/MC where the normal ambient temperature is below 32°F or exceeds 122°F (0°C or above 50°C). The CD-xxH/MC mounts on a type 4S electrical box supplied by the contractor. Do not install the CD-xxH/MC inside another box unless it has good air flow through it.

### WARNING

This equipment may not function effectively below 32°F or above 122°F (0°C or above 50°C). Using the detector outside of this temperature range may adversely affect product performance.

## 2.3 Features

- ETL LISTED to UL 61010-1, Certified to CSA C22.2#61010-1
- Low level meter capable of displaying from 0-5000 ppm of CO<sub>2</sub>
- Sensor Resolution of 50 ppm
- The CD-xxH uses an automated background calibration program to set the clean air level on a regular basis \*
- The CD-xxMC uses a manual Calibration to set clean and polluted air levels using a Calibration Kit \*\*
- Selectable fan and alarm relay activation
- 5 A SPDT fan relay for control of ventilation systems / communication with Alarm system
- 0.5 A N.O. or N.C. alarm relay connects to warning devices or control panels
- 4-20 mA Current Loop
- Mounts on a standard 4x4 electrical box and becomes cover for the box
- Supervised system: any internal detector problem will cause the fan & alarm relay to activate
- Carbon Dioxide sensor has an expected 15-year life. EOL indicator after 180 months of sensor power-up
- Calibration verification test kit is available. One screw allows access for gas test

\*CD-xxH Only

\*\*CD-xxMC Only

## 2.4 Specifications

- Shipping Weight: 1 pound (0.45 kg)
- Size: 4 1/2 x 4 x 2 1/8 in. (11.4 X 11.4 X 5.3 cm)
- Color: White or Dark Gray
- Connections: plugs/terminals
- Mounting box: (not included) 4x4 electric
- Fan relay: 5 A, 240 VAC, pilot duty, SPDT, latching or non-latching
- Fan relay actuation: selectable at dIS (disabled), 600, 700, 800, 900, 1000 (default)..., 4800, 4900, 5000 ppm
- Fan Delay Settings of 0, 1, 3 (default), 5 and 10 minutes
- Fan Relay Minimum Runtime settings are 0 (default), 3, 5, 10 or 15 minutes
- Fan relay latching or non-latching (default) selectable
- Alarm relay: 0.5A 120 V, 60 VA
- Alarm relay actuation: selectable N.O. (default) or N.C.
- Alarm relay settings: "dIS" (disabled), 900, 1000, 1100, 1200, ...4000(default), ...4900, 5000
- Current Loop, 4-20 mA for 0-5000 ppm CO<sub>2</sub>, selectable to off or on (default)
- Buzzer: 85 dBA at 10cm settable to off or on (default)
- Digital display: 4-digit LED selectable to off or on (default).
- Operating Environment: 32°F to 122° F (0°C to 50°C), 10 to 90% RH non-condensing
- Operating altitude: Up to 16,404ft (5,000m)



### 2.4.1 6-Series Low Voltage

- Power: 3 W (max) from 12 to 24 VAC or 12 to 32 VDC
- Current (max) @ 24 VDC: 126 mA in alarm (two relays), 108 mA (fan relay only) and 85 mA (standby)

### 2.4.2 12-Series Line Voltage

- Power: 100-240VAC (50-60 HZ)
- Current (Max) 1.0 A MAX

## 3 Installation Instructions

### WARNING

This detector helps monitor for the presence and concentration level of a certain specified airborne gas. Misuse may produce an inaccurate reading, which means that higher levels of the gas being monitored may be present and could result in overexposure and cause serious injury or death. For proper use, see supervisor or User manual, or contact Technical Support at 1-844-325-3050.

### 3.1 Location

Mounting height will be dependent on the application. For applications with CO<sub>2</sub> tanks, mount height should be about one foot above the floor. For indoor air quality mount detector at breathing level, about 5 feet (1.5 meters) above the floor on a wall or column in a central area where air movement is generally good. The unit, on average, can cover between 900 sq. ft. (83.62 sq. meters) and 5000 sq. ft. (464.51 sq. meters) depending on the application. Applications with CO<sub>2</sub> tanks, spacing near the tanks should be closer to the 900 sq. ft. For indoor air quality and purposefully enriched areas, such as greenhouses, spacing can be up to 5000 sq. ft. When determining the coverage area for each application, keep in mind that each application is going to be different and needs to be evaluated to determine the number of detectors required to ensure proper coverage. Some of the factors that affect the coverage area are application type, personnel work areas and movement, room size, air movement, potential threat, mounting location, along with other site-specific factors that must be considered. Please check local regulations or requirements prior to installation.

The CD-xxH/MC mounts on a 4x4 electrical box supplied by the contractor. Do not install the CD-xxH/MC inside another box unless it has good air flow through it. DO NOT mount the CD-xxH/MC where the normal ambient temperature is below 32°F or exceeds 122°F (below 0°C or above 50°C).

### WARNING

High voltage terminals (120/240 VAC) are located within this detector, presenting a hazard to service technicians. Only qualified technicians should open the detector case and service the internal circuits. Ensure power is de-energized from the detector relays prior to servicing the unit. Failure to do so may result in electrical shock.

### 3.2 Installation

#### 3.2.1 6-Series Low Voltage

1. The CD-xxH/MC mounts on a 4" square (or 4x4) electrical box supplied by the contractor. DO NOT mount the CD-xxH/MC inside another box, unless it has good air flow through it.



2. Connect the CD-6H/MC to Class 2 power supply only. It is suggested to use a dedicated transformer for powering the unit or units because of possible interferences from other devices on the same power supply.
3. Connect the CD-6H/MC to the control cables with terminal plugs. When making connections, make sure the power is de-energized.
4. There are two terminals for Power: 12 to 24 VAC or 12 to 32 VDC, with no polarity preference.
5. There are two terminals for the dry alarm relay contacts, again with no polarity preference. The alarm relay can switch up to 0.5 A 120 V, or 60 VA. The alarm relay is activated if gas reaches or exceeds the alarm settings. See section [4.5 Default – Factory Settings](#) of this User manual for details on relay settings.
6. The alarm relay can be configured to normally open (default) (N.O.) or normally closed (N.C.) and will activate if the gas concentration exceeds alarm set point. It will deactivate once the gas concentration drops below the alarm set point. Note that the “disable” setting will cause the alarm relay not to engage at all.
7. The dry contact, SPDT fan relay has three terminals. The common (COM.), normally open (N.O.) and the normally closed (N.C.) contact. The fan relay can switch up to 5.0 A up to 240 VAC. See section [4.5 Default – Factory Settings](#) of these User Instructions for details on relay settings.
8. The Fan Relay can be configured for latching or non-latching (default) when activated (when the gas concentration exceeds fan relay setpoint). Once latched in, power will need to be interrupted or the “TEST” button pressed to unlatch the relay condition.
9. The Fan Relay will engage if the fan setting Carbon Dioxide concentration is exceeded for longer than the Fan Relay Delay time. Unless it is configured for latching, the fan relay will disengage once both conditions have been met:
  - Carbon Dioxide concentration has dropped below fan setting
  - Fan Relay Runtime has been exceeded

Note that the “disable” fan setting will cause the fan relay to not engage. The fan relay will engage in trouble fault condition (if the Trouble Fan Setting Option is set to “ON”) and will disengage once trouble fault condition is cleared.
10. The Current Loop is 4 mA in clean air and 4-20 mA for 0-5000 ppm CO<sub>2</sub>

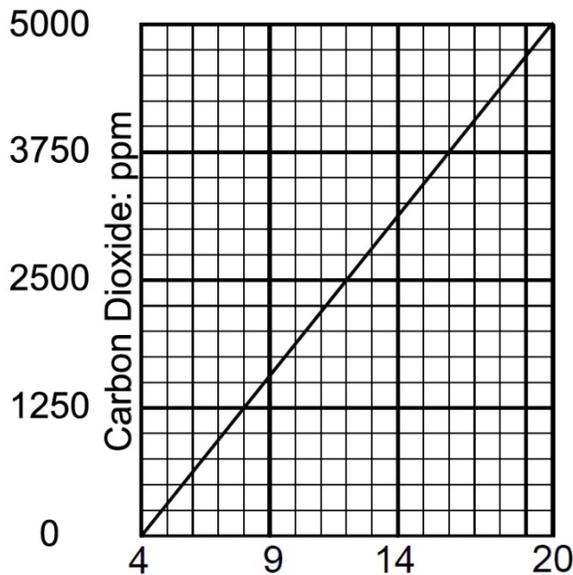


Figure 3-1 6-Series 4-20 mA Output diagram



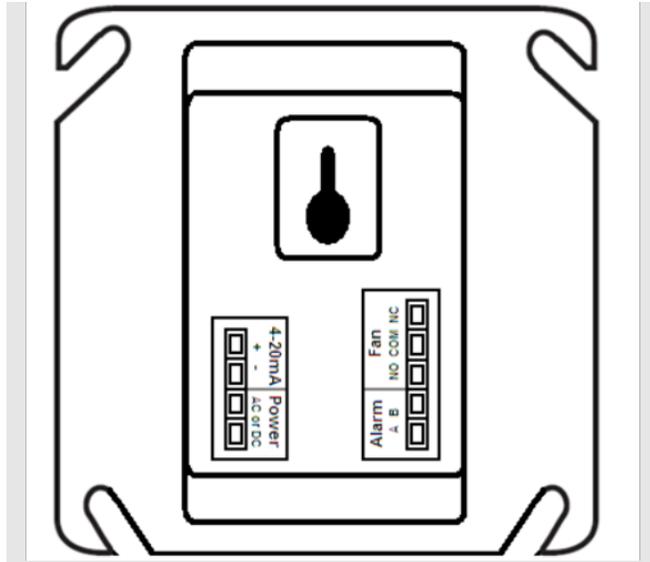


Figure 3-2 6-Series Rear View

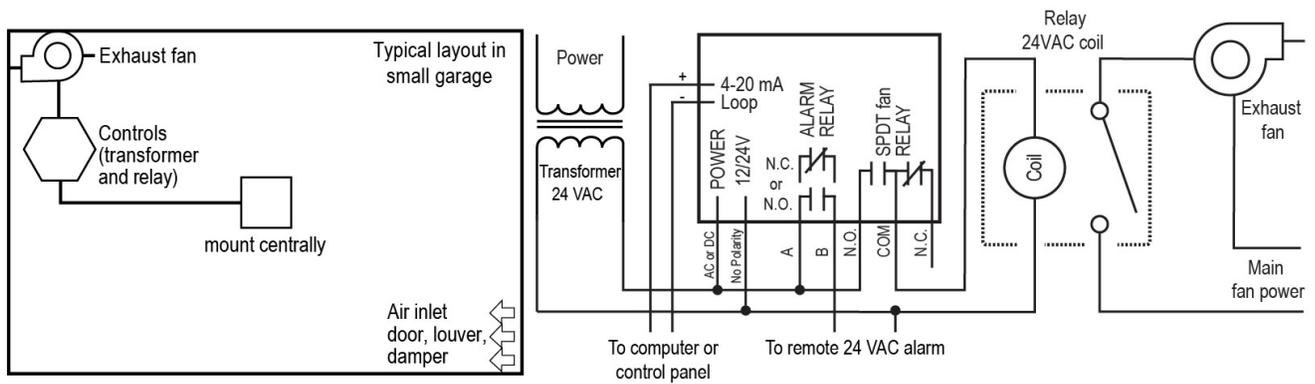


Figure 3-3 6-Series typical installation diagram

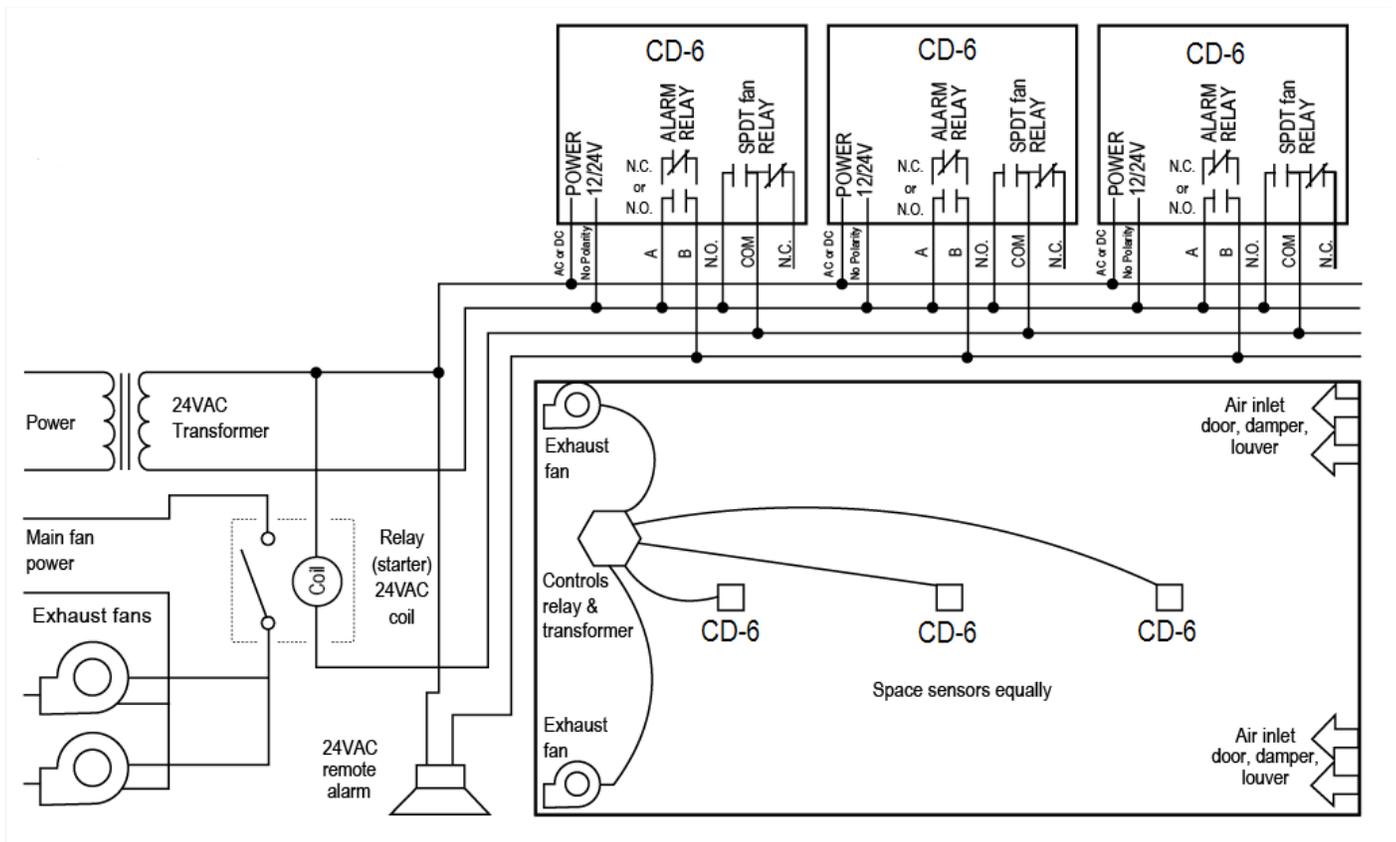


Figure 3-4 6-Series Multiple Device diagram

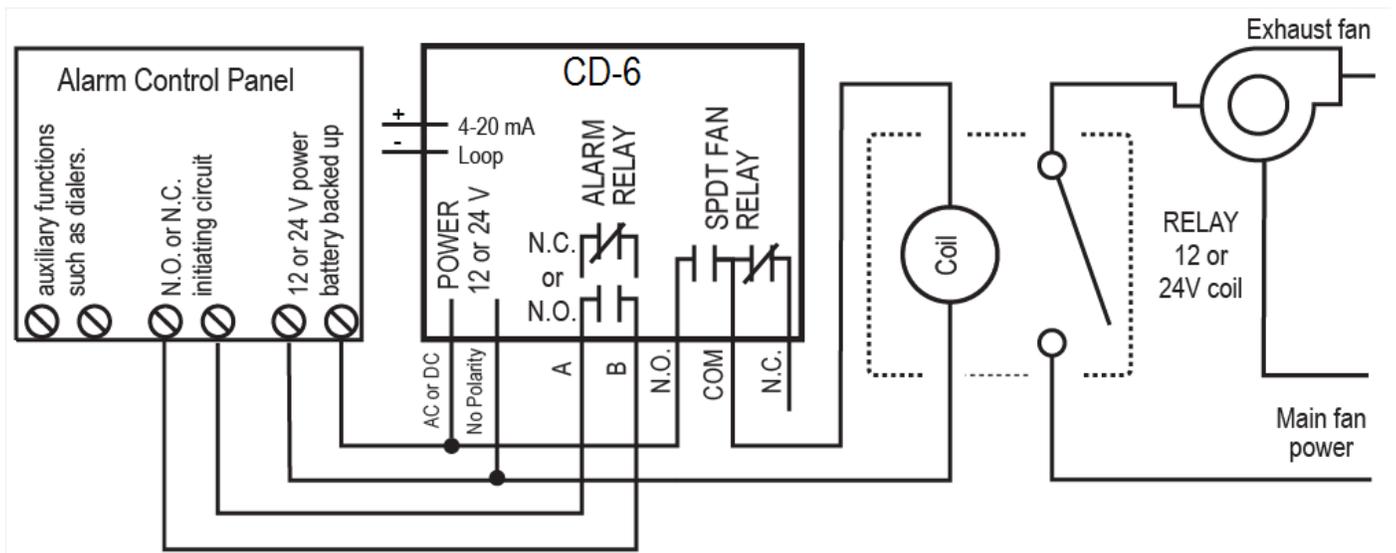


Figure 3-5 6-Series Alarm Control Panel diagram

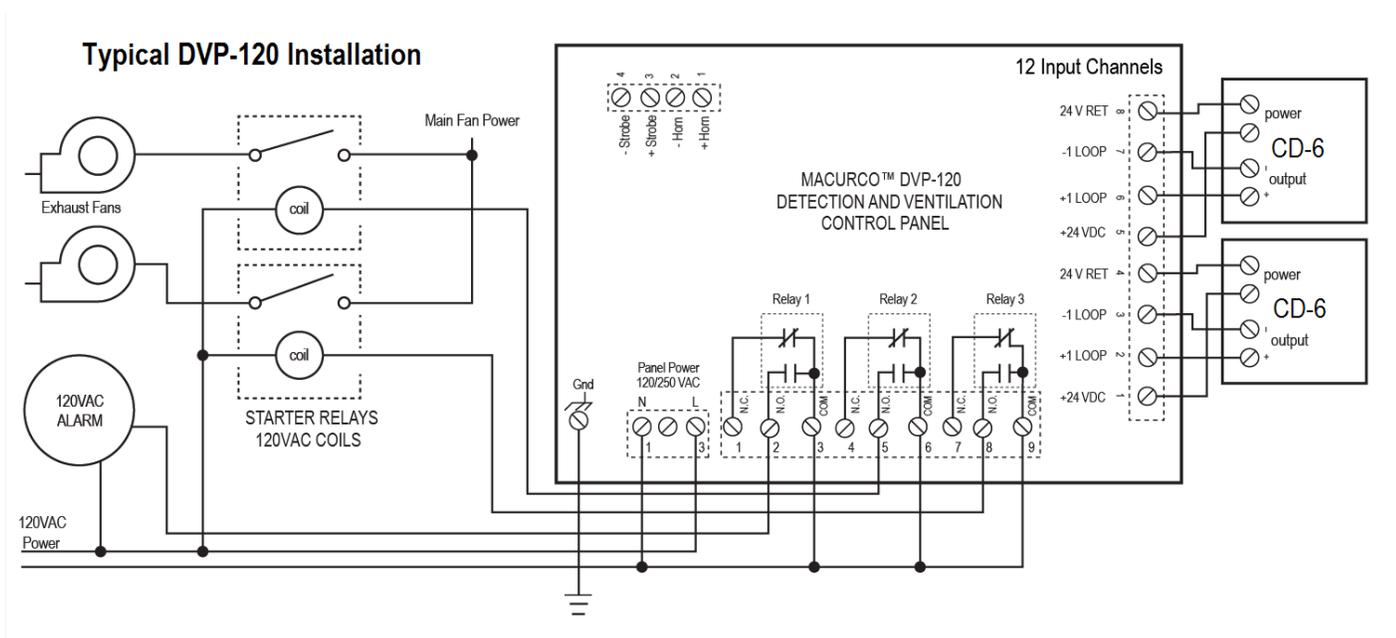


Figure 3-6 6-Series DVP-120 Control Panel

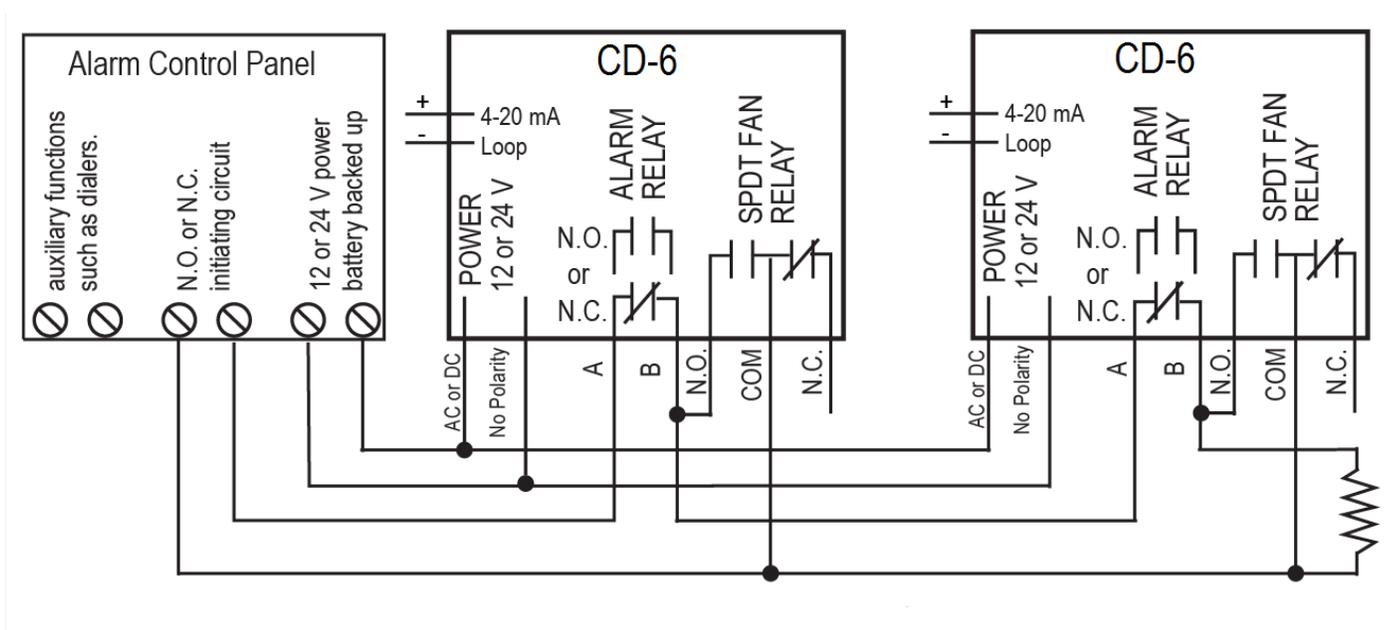


Figure 3-7 6-Series Alternate Alarm Panel

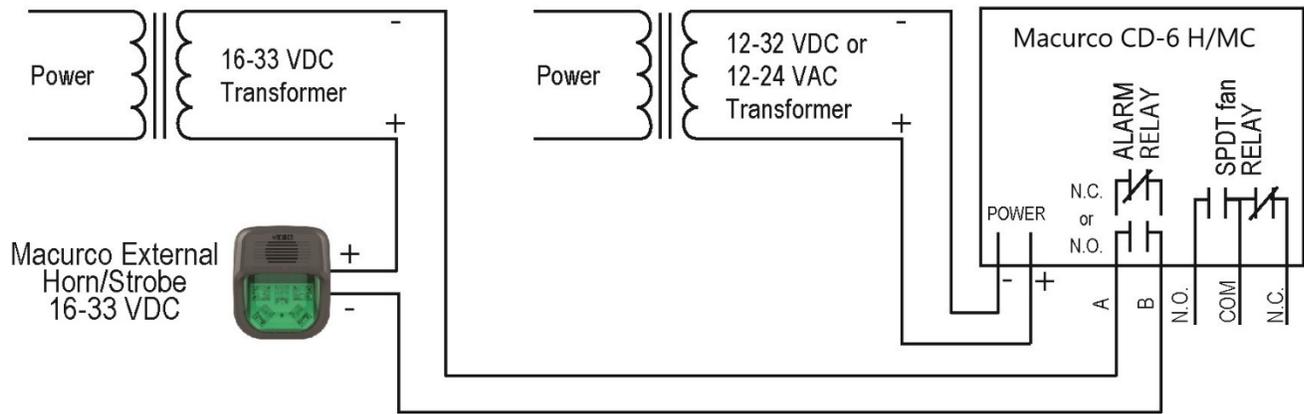


Figure 3-8 6-Series Horn & Strobe Combo Wiring

### 3.2.2 12-Series Line Voltage

1. The CD-12H/MC mounts on a 4" square (or 4x4) electrical box supplied by the contractor. Do not mount the CD-12H/MC inside another box, unless it has good air flow through it.
2. Connect the CD-12H/MC to the control cables with terminal plugs. When making connections, make sure the power is de-energized.
3. There are two terminals for Power: 100-240VAC (50 – 60 HZ)
4. There are two terminals for the dry alarm relay contacts, again with no polarity preference. The alarm relay can switch up to 0.5 A 120 V, or 60 VA. The alarm relay is activated if gas reaches or exceeds the alarm settings. See section [4.5 Default – Factory Settings](#) of these User Instructions for details on relay settings.
5. The alarm relay can be configured to normally open (default) (N.O.) or normally closed (N.C.) and will activate if the gas concentration exceeds alarm set point. It will deactivate once the gas concentration drops below the alarm set point. Note that the “disable” setting will cause the alarm relay not to engage at all.
6. The dry contact, SPDT fan relay has three terminals. The common (COM.), normally open (N.O.) and the normally closed (N.C.) contact. The fan relay can switch up to 5.0 A up to 240 VAC. See section [4.5 Default – Factory Settings](#) of these User Instructions for details on relay settings.
7. The Fan Relay can be configured for latching or non-latching (default) when activated (when the gas concentration exceeds fan relay setpoint). Once latched in, power will need to be interrupted or the “TEST” button pressed to unlatch the relay condition.
8. The Fan Relay will engage if the fan setting Carbon Dioxide concentration is exceeded for longer than the Fan Relay Delay time. Unless it is configured for latching, the fan relay will disengage once both conditions have been met:
  - Carbon Dioxide concentration has dropped below fan setting
  - Fan Relay Runtime has been exceeded

Note that the “disable” fan setting will cause the fan relay to not engage. The fan relay will engage in trouble fault condition (if the Trouble Fan Setting Option is set to “ON”) and will disengage once trouble fault condition is cleared.

9. The Current Loop is 4 mA in clean air and 4-20 mA for 0-5000 ppm CO<sub>2</sub>



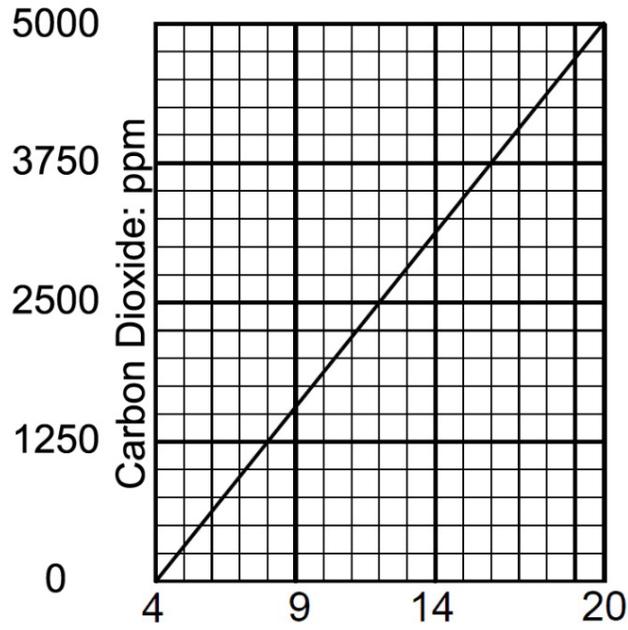


Figure 3-9 12-Series 4-20 mA Output diagram

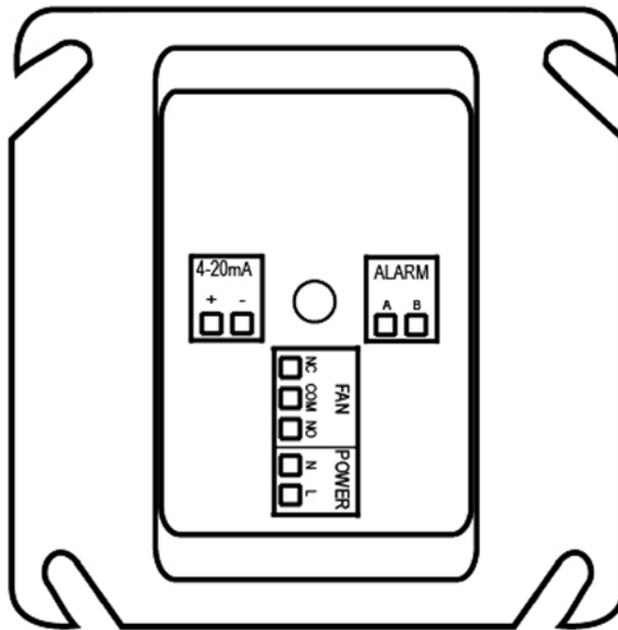


Figure 3-10 12-Series Rear View

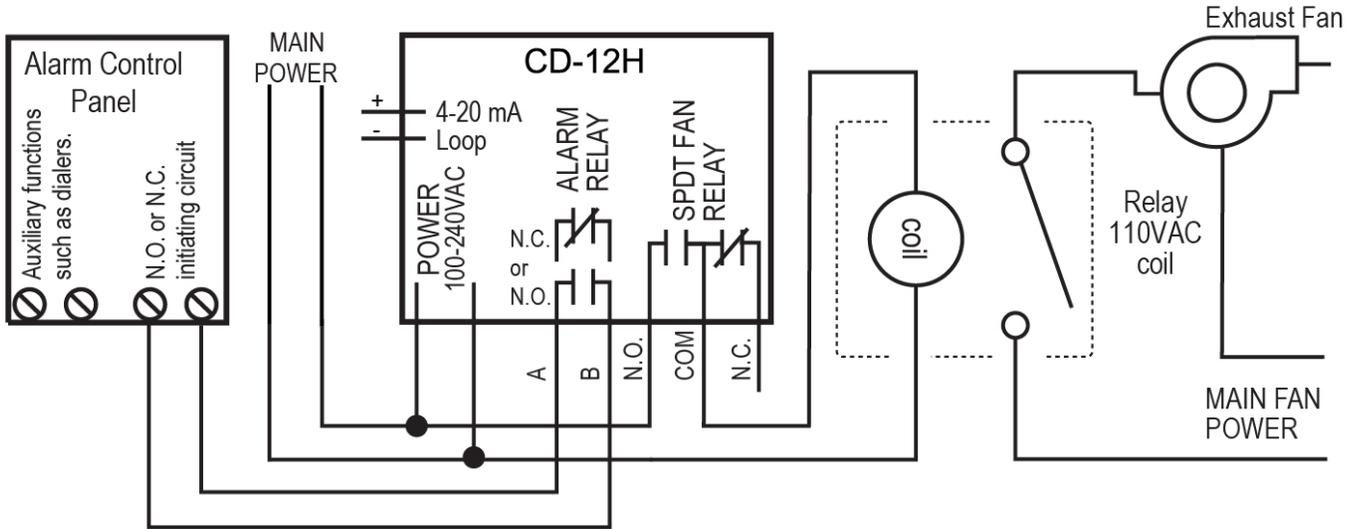


Figure 3-11 12-Series Alarm Control Panel

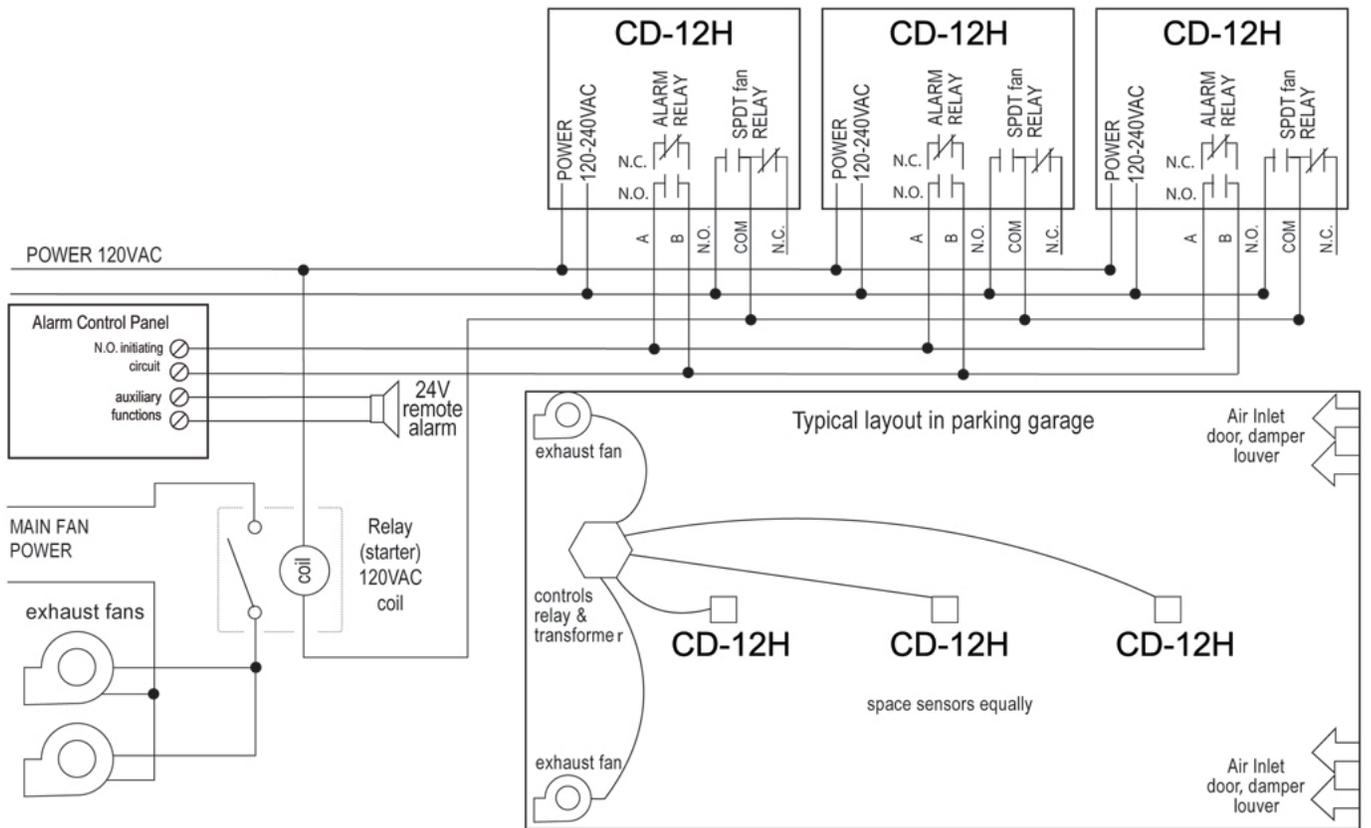


Figure 3-12 12 Series Alarm Control Panel diagram

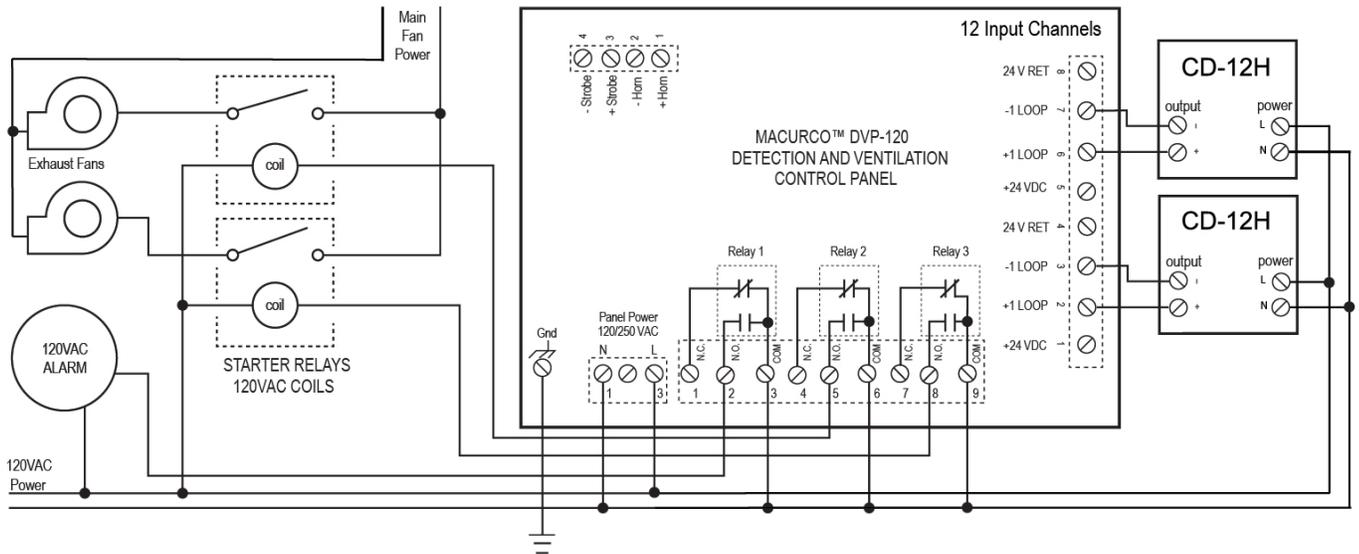


Figure 3-13 12-Series DVP-120 Control Panel

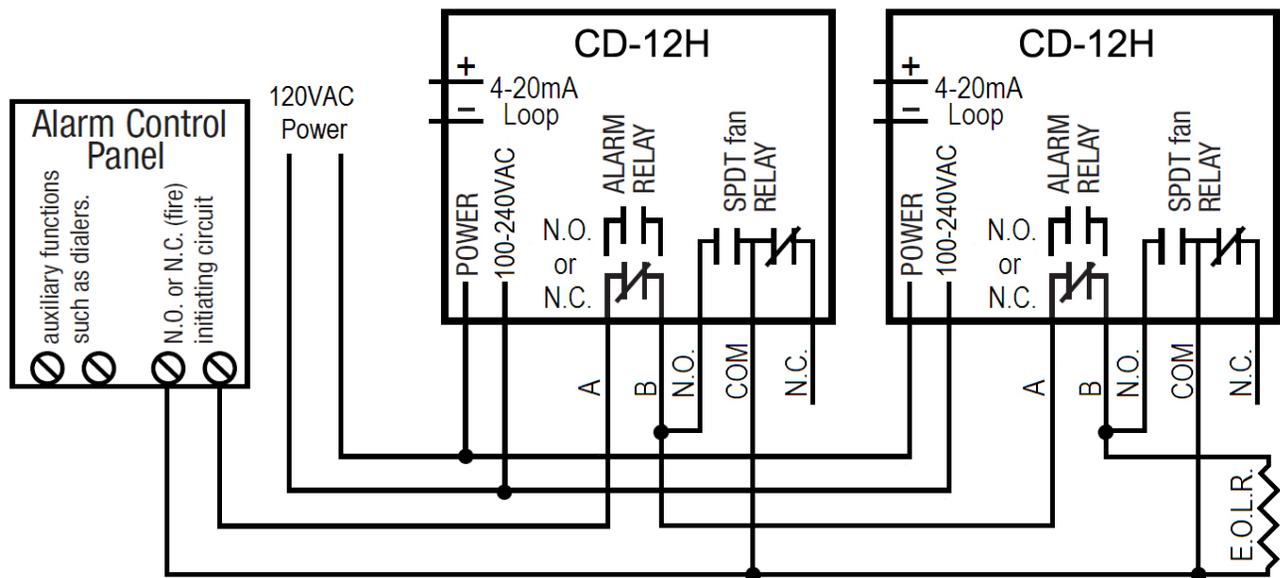


Figure 3-14 12-Series Alternate Alarm Panel

In this application ([Figure 3-14 12-Series Alternate Alarm Panel](#)) the Fan or primary relay is used as a low-level alarm relay. The Alarm or secondary relay is used as a supervisory relay when utilized in the normally closed configuration. The CD-xxH/MC monitors all critical functions of the unit through software diagnostics that continually test and verify its operations. If a problem is found, the unit will switch to a fail-safe/error mode or trouble condition. In this error mode, the Fan\* and Alarm relays will be activated indicating the trouble condition at the panel and the CD-xxH/MC display will flash the error. See section [4.5.11 Trouble Fan Setting – “tFS”](#) for options.

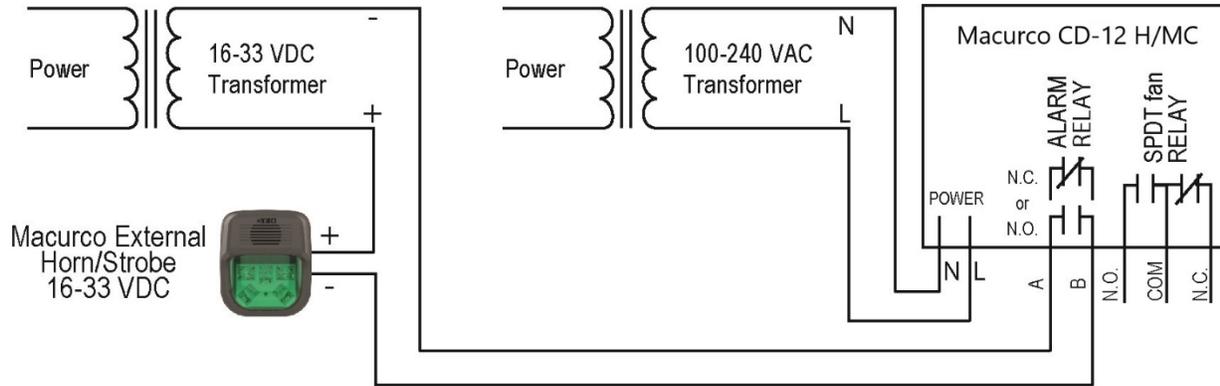


Figure 3-15 12-Series Horn & Strobe Combo Wiring

### 3.3 Wiring Connections

#### 3.3.1 6-Series Low Voltage

With the exception of the safety ground, all field wiring is completed via modular connectors (provided). After wiring, simply plug the modular connectors into the matching connectors on the back side of the detector.

NOTE: 22 to 12 AWG wire shall be used. Wire used shall meet the temperature range of the detector i.e. 0°F to 125° F (-18°C to 52°C).

##### 3.3.1.1 Power Connection

Connect the CD-6H/MC to Class 2 power supply only. It is suggested to use a separate transformer for powering the unit or units because of possible interferences from other devices on the same power supply. Connect the CD-6H/MC to the control cables with terminal plugs. When making connections, make sure the power is off. There are two terminals for Power: 12 to 24 VAC or 12 to 32 VDC, with no polarity preference ensure that the wire cannot be easily pulled from the connector. Plug the modular connection into the Fan/Power connection and ensure that it latches into the header properly.

##### 3.3.1.2 Fan Relay Connection

All the SPDT Fan relay terminals are available at the Fan/Power modular connector. Each fan relay terminal normally open, common and normally closed (NO, COM, and NC) can accommodate a wire size 12 to 24 AWG. To install the wiring for the relays, disconnect the connectors from the header. Strip the insulation off each wire back approximately ¼ inch (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. Plug the modular connection into the Fan/Power connection and ensure that it latches into the header properly.

##### 3.3.1.3 Alarm Relay Connection

The external alarm connections (A and B) are available at the Alarm modular connector. There is no polarity for these connections. To install the wiring for the alarm contacts, disconnect the connector from the header on the detector. Strip the insulation of each wire back approximately 1/4 in. (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. When the wires are connected seat the modular connector into the header ensuring that the latch engages.

##### 3.3.1.4 4-20 mA Output diagram

The positive and negative 4-20mA signal connections (+ and -) are available at the 4-20mA modular connector, a 2-position connector. To install the wiring for the 4-20 mA contacts, disconnect the connector from the header on the detector. Strip the insulation of each wire back approximately 1/4 in. (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp.



Ensure that the wire cannot easily be pulled from the connector. When the wires are connected seat the modular connector into the header ensuring that the latch engages.

### 3.3.2 12-Series Line Voltage

With the exception of the safety ground, all field wiring is completed via modular connectors (provided). After wiring, simply plug the modular connectors into the matching connectors on the back side of the detector.

#### 3.3.2.1 Power Connection

Mains connections should be done in accordance with National and Local Electrical Codes. Only qualified personnel should connect Mains power to any device. Macurco recommends a minimum wire size of AWG18 and the wire insulator must be rated for 140°F (60°C) service. The modular connector will accept wire from 12 to 24 AWG. The safety ground wire should be secured to the ground screw of the metal electrical box. Tighten the screw and make sure the wire is snug. Ensure that the wire cannot be pulled out from under the screw. The Line (L) and Neutral (N) wires should be stripped 1/4 in. (6.5 mm), insert the wire into the "L" and "N" wire positions of the modular Fan/Power connector and tighten the screw clamp. Ensure that the wire cannot be easily pulled from the connector. Plug the modular connection into the Fan/Power connection and ensure that it latches into the header properly.

#### 3.3.2.2 Fan Relay Connection

All the SPDT Fan relay terminals are available at the Fan/Power modular connector. Each fan relay terminal normally open, common and normally closed (NO, COM, and NC) can accommodate a wire size 12 to 24 AWG. To install the wiring for the relays, disconnect the connectors from the header. Strip the insulation off each wire back approximately ¼ inch (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. Plug the modular connection into the Fan/Power connection and ensure that it latches into the header properly.

#### 3.3.2.3 Alarm Relay Connection

The external alarm connections (A and B) are available at the Alarm modular connector. There is no polarity for these connections. To install the wiring for the alarm contacts, disconnect the connector from the header on the detector. Strip the insulation off each wire back approximately 1/4 in. (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. When the wires are connected seat the modular connector into the header ensuring that the latch engages.

#### 3.3.2.4 4-20 mA Signal Connection

The positive and negative 4-20mA signal connections (+ and -) are available at the 4-20mA modular connector, a 2-position connector. To install the wiring for the 4-20 mA contacts, disconnect the connector from the header on the detector. Strip the insulation off each wire back approximately 1/4 in. (6.5 mm), insert the bare wire into the terminal and tighten the screw clamp. Ensure that the wire cannot easily be pulled from the connector. When the wires are connected seat the modular connector into the header ensuring that the latch engages.

**Note:** The 4-20mA current loop outputs may be used with the Macurco DVP-120 control panel or other systems. The 4-20mA signal connections to detectors should be size AWG18 (minimum) for short runs. Refer to the table for recommended wire gauges. Do not bundle detector 4-20mA signal connections with AC power cables to prevent electrical interference. If AC power connections must be bundled with the detector 4-20mA signal cables, the signal connections should be made with a twisted pair of the appropriate gauge, with an overall foil and braid shield. All shields should be terminated at the DVP-120 end of the cable only. A ground stud is provided near the bottom left corner of the DVP-120 panel.



## 4 Operations

1. With the display function turned “On”, the CD-xxH/MC will show the current concentration of CO<sub>2</sub> ppm in the air. Normal outdoor concentration ranges between 350-450 ppm. When the CO<sub>2</sub> concentration reaches the Fan Relay setting (2000 ppm, for example) the display will flash back and forth between “FAn” and “current gas reading”. With the display function turned “Off”, the display does not show the CO<sub>2</sub> concentration but will show “FAn” as long as the fan relay is activated.
2. With the display function turned “On” and the CO<sub>2</sub> concentration reaching the Alarm Relay setting, (4000 ppm, for example) the display will flash back and forth between “ALr” and “current gas reading”. The buzzer will sound indicating “Alarm” if the buzzer is turned “On”. With the display function turned off the display does not show the CO<sub>2</sub> concentration but will show “ALr” when the Alarm relay is activated.
3. With the 4-20 mA function turned “On” and the CO<sub>2</sub> concentration climbing, the 4-20 mA signal will ramp up corresponding to the concentration (0-5000 ppm, for example). The display will show “FAn” and “ALr” and sound as outlined above.

### 4.1 Power up

The CD-xxH/MC cycles through an internal self-test cycle for the first minute that it is powered. The unit will execute the test cycle any time power is dropped and reapplied (i.e. power failure). During the self-test cycle the unit will display the firmware version number, then count down from 60 to 0 (if the display setting is “On”) and finally go into normal operation. The alarm relay will be activated for 10 seconds and the fan relay for 60 seconds during the power-up cycle unless the “Power Up Test” (PUt) option is OFF. The indicator light (LED) will flash green during the self-test cycle. At the end of the 1-minute cycle, the unit will take its first sample of the air and the indicator light will turn solid green.

### 4.2 Display turned “On”

Clean Air – With the display function turned “On”, the CD-xxH/MC will show the current concentration of CO<sub>2</sub> ppm.

Note: CO<sub>2</sub> in “clean air” will not show 0 as normal atmospheric CO<sub>2</sub> levels are between 350 ppm and 450 ppm.

Fan level – When the CO<sub>2</sub> concentration reaches the Fan Relay setting (2000 ppm, for example) the display will flash back and forth between “FAn” and “2000” (or current gas reading).

Alarm level – With the display function turned “On” and the CO<sub>2</sub> concentration reaching the Alarm Relay setting, (4000 ppm, for example) the display will flash back and forth between “ALr” and “current gas reading”. The buzzer will sound indicating “Alarm” if the buzzer is turned “On”.

Trouble – With the display function turned “On” and the device is in a trouble state, the display will display the “t” Error code (t01 for example). If the Trouble Fan Setting is enabled, the Fan relay will switch activating the relay. See section [5.1.2 “t” Error Codes](#) and section [4.5.11 Trouble Fan Setting – “tFS”](#).

### 4.3 Display turned “Off”

Clean Air – With the display function turned “Off”, the display does not show the CO<sub>2</sub> concentration. Only the Power indicator light on will be on.

Fan Level – When the CO<sub>2</sub> concentration reaches the Fan Relay setting (2000 ppm, for example) the display will flash back and forth between “FAn” and “blank” as long as the fan relay is enabled. This appears as slowly flashing “FAn”.

Alarm Level – With the display function turned off the display does not show the CO<sub>2</sub> concentration but will show “ALr” when the Alarm relay is activated.

Trouble – With the display function turned “On” and the device is in a trouble state, the display will display the “t” Error code (t01 for example). If the Trouble Fan Setting is enabled, the Fan relay will switch activating the relay. See section [5.1.2 “t” Error Codes](#) and section [4.5.11 Trouble Fan Setting – “tFS”](#).



#### 4.4 4-20mA Loop

Clean Air – With the 4-20 mA function turned “On” and the current concentration of CO<sub>2</sub> ppm, the 4-20mA loop will output a mA reading equivalent to the current gas reading of the detector.

Fan Level – With the 4-20 mA function turned “On” and the current concentration of CO<sub>2</sub> ppm detected is at or greater than the Fan Relay Setting (Frs), the 4-20mA loop will output between 4 mA and 20 mA depending on the current concentration of CO<sub>2</sub>. See figure [3-1 4-20 mA Output diagram](#) or figure [3-9 12-Series 4-20 mA Output diagram](#)

Alarm Level – With the 4-20 mA function turned “On” and the current concentration of CO<sub>2</sub> ppm detected is at or greater than the Alarm Relay Setting (Ars), the 4-20mA loop will output between 4 mA and 20 mA depending on the current concentration of CO<sub>2</sub>. See figure [3-1 4-20 mA Output diagram](#) or [figure 3-9 12-Series 4-20 mA Output diagram](#)

Trouble – With the 4-20 mA function turned “On” and Trouble Fan Setting enabled. The 4-20mA loop will output less than 4 mA or greater than 20 mA depending on the Trouble condition. See section [5.1 On-Board Diagnostics](#).

#### 4.5 Default – Factory Settings

Setting:	Default:
<b>Power Up Test</b>	<b>On</b>
<b>Display</b>	<b>On</b>
<b>Buzzer</b>	<b>On</b>
<b>Alarm Relay Setting</b>	<b>4000 ppm</b>
<b>Alarm Relay Configuration</b>	<b>Normally Open (NO)</b>
<b>Fan Relay Setting</b>	<b>1000 ppm for CD-xxH 1000 ppm for CD-xxMC</b>
<b>Fan Relay Delay</b>	<b>3 minutes</b>
<b>Fan Relay Minimum Runtime</b>	<b>0 minutes</b>
<b>Fan Relay Latching</b>	<b>Off</b>
<b>Trouble Fan Setting</b>	<b>Off</b>
<b>4-20mA</b>	<b>On</b>

Table 4-1 Default settings



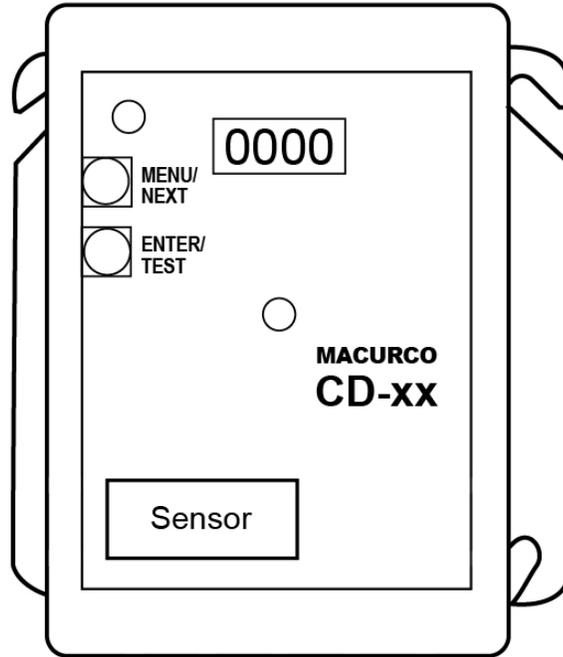


Figure 4-1 Board View

#### 4.5.1 Selecting Default Configuration – “dEF”

To select the Default Configuration, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The first selection is the “dEF” or Default setting. Push **Enter**. If it is already in Default configuration, there will be no action. If it is not already in Default configuration, “nO” will be displayed. Push **Next** to change it to “YES” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “dEF” in the con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.2 Power-Up Test Setting – “PUt”

To select the Power Up Test Configuration, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. Then push the **Next** button to get to the second selection “PUt” or Power Up Test setting. Push **Enter**. If the test is “On” push **Next** to turn it “OFF” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “PUt” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.3 Display Setting – “dSP”

To select the Display Configuration, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. Then push the **Next** button to get to the third selection “dSP” or Display setting. Push **Enter**. If the display is “On” push **Next** to turn it “OFF” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “dSP” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.4 Buzzer Setting – “bUZ”

To select the Buzzer Configuration, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The fourth selection is the “bUZ” or Buzzer setting. Push **Next** twice to get to “bUZ” then **Enter**. If the display is “On” push **Next** to turn it “OFF” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “bUZ” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.



#### 4.5.5 Alarm Relay Setting – “ArS”

To select the Alarm Relay Setting, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The fifth selection is the “ArS” or Alarm Relay Setting. Push **Next** three times to get to “ArS” then **Enter**. If the display is “dIS” (disabled) push **Next** to change it to 900, 1000, 1100, 1200, ..., 4000 (default), ..., 4800, 4900, 5000 ppm (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “ArS” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.6 Alarm Relay Configuration – “Arc”

To select the Alarm Relay Configuration, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The sixth selection is the “Arc” or Alarm Relay Configuration. Push **Next** four times to get to “Arc” then **Enter**. If the relay is “nO” (normally open) push **Next** to turn it to “nC” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “Arc” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.7 Fan Relay Setting – “FrS”

To select the Fan Relay setting, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The seventh selection is the “FrS” or Fan Relay setting. Push **Next** five times to get to “FrS” then **Enter**. If the fan relay is “dIS” (disabled) push **Next** to change it to 600, 700, 800, 900..., 1000 (default)..., 4800, 4900, 5000 ppm (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “FrS” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.8 Fan Relay Delay Setting – “Frd”

To select the Fan Relay Delay setting, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The eighth selection is the “Frd” or Fan Relay Delay. Push **Next** six times to get to “Frd” then **Enter**. If the delay is “0” (disabled) push **Next** to change it to 1, 3, 5, or 10 minutes (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “Frd” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.9 Fan Relay Minimum Runtime Setting – “Frr”

To select the Fan Relay Minimum Runtime setting, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The ninth selection is the “Frr” or Fan Minimum Run Time. Push **Next** seven times to get to “Frr” then **Enter**. If the runtime is “0” (disabled) push **Next** to change it to 3, 5, 10 or 15 minutes (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “Frr” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.10 Fan Relay Latching Setting – “FrL”

To select the Fan Relay Latching Option, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The tenth selection is the “FrL” or Fan Relay Latching Option. Push **Next** nine times to get to “FrL” then **Enter**. If latching is “OFF” push **Next** to turn it to “ON” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “FrL” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

#### 4.5.11 Trouble Fan Setting – “tFS”

To select the Trouble Fan Setting Option, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The eleventh selection is the “tFS” or Trouble Fan Setting Option. Push **Next** ten times to get to “tFS” then **Enter**. If Trouble Fan Setting is “OFF” push **Next** to turn it to “ON” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “tFS” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.



#### 4.5.12 4-20mA Output setting – “420”

To select the 4-20mA Output Option, in normal mode, push the **Next** button to get to “Con” or the Configuration menu. Then push the **Enter** button to enter the Con menu. The twelfth selection is the “420” or 4-20mA Output Option. Push **Next** eleven times to get to “420” then **Enter**. If the 4-20mA is “On” push **Next** to turn it to “OFF” (flashing) then push **Enter** to confirm the change (solid) and push **Enter** again to return to “420” in the Con menu. Push **Next** until “End” is displayed then push **Enter** to get back to normal operation.

## 5 Troubleshooting

### 5.1 On-Board Diagnostics

The CD-xxH/MC monitors all critical functions of the unit through software diagnostics that continuously test and verify unit operations. If a problem is found, the unit will switch to a fail-safe/error mode or trouble condition. In this error mode, the Alarm relay will be activated, the 4-20 mA current loop will go to 24 mA, the unit will display the error code, the green status indicator LED light will flash, and the buzzer will chirp intermittently. The Fan relay will also engage if the Trouble Fan Setting Option is set to “ON”. This is a safety precaution. To clear this mode, simply turn off power to the unit for a few seconds or push the ENTER/TEST switch (inside the unit). This will cause the unit to restart the 1-minute self-test cycle.

#### 5.1.1 4-20mA troubleshooting

- 0 mA is most likely a connection problem
- 4-20 mA is normal gas reading range (0-5000 ppm)
- 24 mA indicates a Trouble condition

#### 5.1.2 “t” Error Codes

The CD-xxH/MC will display trouble codes indicated by alternating every second “tXX” and “tYYY”.

tXX	
t01	Sensor Fatal Error
t02	Sensor Offset Regulation Error
t04	Sensor Algorithm Error
t08	Sensor Output Error
t10	Sensor Self Diagnostic Error
t20	Sensor Out of Range Error
t40	Sensor Memory Error

tYYY	
t001	Missing Sensor (At Power Up only)
t002	At each power-up it checks if that ABC is disabled. If it is not disabled it will try to set it to disable. If it fails it will trigger trouble t002.
t004	EEPROM bad checksum.
t008	Modbus communication error (during normal operation).
t010	Bad EEPROM
t020	Bad Factory calibration.
t040	Never Factory calibrated.
t080	Bad pressure during factory calibration
t100	Under range. Reading is under -100 ppm for more than 15 seconds



t200	Sensor Expired
t400	Trouble Pressure Sensor
t800	Board not tested

\*CD-xxH Only  
 \*\*CD-xxMC Only

If the error mode repeats frequently, check for continuous power and proper voltage. If power is not the problem and a unit has repeating error conditions, it may need to be returned to Macurco for service, per these User Instructions.

**Note:** If multiple error codes are occurring simultaneously, the different error codes will be added together into one combined error code. Example: t08 and T80 occurring simultaneously will display as t88.

If the error mode indicates “Sensor expired” see section [5.3 End-of-life Signal](#) of these User Instructions.

## 5.2 Sensor Poisons

Unlike traditional catalytic bead and electrochemical sensors, IR sensors use a light source and a receptor to detect a specific gas. Therefore, the sensor less likely to be affected by inhibitors or poison significantly enhancing safety and sensor life.

## 5.3 End-of-Life Signal

The CD-xxH/MC has a long life, the non-replaceable infrared sensor (IR Sensor). Fifteen (15) years after the CD-xxH/MC is installed the sensor end-of-life signal will be activated indicating that the CD-xxH/MC has reached the end of its typical usable life. The end-of-life signal will cause an error code t200 “Sensor expired”. See section [5.1.2 “t” Error Codes](#). The end-of-life signal can be silenced for 48 hours by pressing the "ENTER/TEST" button or by temporarily dropping power to the unit. The end-of-life signal provides the user an opportunity to test and/or calibrate the sensor (CD-xxMC only) assuring that it is still performing within acceptable parameters though the sensor is nearing the end of its expected life. The silence function will continue to be available for 29 days after the CD-xxH/MC initiates the initial end-of-life signal. After this 29-day period, the CD-xxH/MC can no longer be silenced, and the unit must be replaced.

 <b>WARNING</b>
Do not disassemble unit or attempt to repair or modify any component of this instrument. This instrument contains no user serviceable parts, and substitution of components may impair product performance.

## 6 Maintenance

The CD-xxH/MC is low maintenance. The unit uses a long life NDIR sensor that has a 15-year life expectancy (in normal conditions). The CD-6H uses an automated background calibration program to set the clean air level on a regular basis. The CD-6H will maintain accuracy if it is exposed to the “clean air reference value” (this reference value is the lowest concentration to which the sensor is exposed) at least once per week.

The CD-6MC does not perform an automated background calibration and will need to be bump tested and calibrated to verify functionality and accuracy of the sensor.

**Note:** This applies when used in the typical indoor ambient air with weekly unoccupied periods.

All maintenance and repair of products manufactured by Macurco are to be performed at the appropriate Macurco manufacturing facility. Macurco does not sanction any third-party repair facilities.

**Note:** There is not a field calibration procedure for the Macurco CD-6H.

## 6.1 Sensor Life Reset

The CD-xxH/MC does not have a sensor life reset option.

## 6.2 Cleaning

Cleaning of the external surfaces is best carried out using a damp cloth with a mild detergent or soap. Use a vacuum cleaner with a soft brush to remove dust or contamination under the cover. Do not blow out the sensor with compressed air.

### CAUTION

Avoid the use of harsh cleaning materials, abrasives and other organic solvents. Such materials may permanently scratch the surfaces and damage the display window, labels, sensor or instrument housing. High voltage terminals (100-240VAC) are located within this detector, presenting a hazard to service technicians. Only qualified technicians should open the detector case and service the internal circuits. Ensure power is removed from the detector prior to cleaning the unit.

## 7 Testing

### WARNING

Using a certified gas with a concentration other than the one listed for this detector when conducting a calibration verification test (bump test) will produce inaccurate readings. This means that higher levels of the gas being monitored may be present and could result in overexposure. For proper use, see supervisor or User manual, or contact Technical Support at 1-844-325-3050.

All CD-xxH/MC units are factory calibrated and 100% tested for proper operation. During normal operation, the green status indicator LED light will be on steady, the fan & alarm relay will be in standby mode and the 4-20 mA output will correspond to the gas reading of the detector. Refer to figure [3-1 4-20mA Output diagram](#) or figure [3-9 4-20 mA Output diagram](#), for expected value. The unit also performs a regular automatic self-test during normal operation. If the unit detects an improper voltage or inoperable component, it will default into Error mode. In this error mode, the Alarm relay will be activated, the 4-20 mA current loop will go to 24 mA, the unit will display the error code, the green status indicator LED light will flash, and the buzzer will chirp intermittently. The Fan relay will also engage if the Trouble Fan Setting Option is set to "ON".

### 7.1.1 Operation Test

Check that the green CD-xxH/MC status indicator LED light is illuminated continuously. If not, do not proceed with the tests. If the unit is in error mode, contact your local representative or Macurco technical support representative for information on resolving the problem.

1. Remove the single screw in the middle of the front cover of the CD-xxH/MC.
2. Remove the front cover.
3. Observe the LED light on the front of the CD-xxH/MC.
4. If the light is solid green proceed to step 6.
5. If the green status indicator LED light is off or flashing, refer to the General section above.
6. Locate the switch labeled ENTER/TEST on the left side of the printed circuit board. Press the Test switch once.
7. The CD-xxH/MC will step through a cycle test:
  - a. The display progresses through the BUZ (Buzzer Test), Art (alarm relay test), Frt (fan relay test) then 42t (4-20 mA output test). Make sure that the settings are "on" or not disabled "dis".
  - b. During the first 10 seconds of the test cycle, the display will show BUZ and set off the audible buzzer. The alarm relay will be closed, so any devices connected to that relay will be tested.
  - c. The Fan relay will be activated for the next 1 minute of the test, so if the fan circuits are wired in the normal manner, the fan should run.



- d. The 4-20mA output will then ramp up from 4 to 16 mA over the next 130 seconds of the test, so if the circuit is wired in the normal manner, the control panel or building automation system should respond.
  - e. At the end of the test cycle, the fan & alarm relay will be in standby mode and the 4-20 mA output will correspond to the gas reading of the detector. Refer to section [3-1 4-20mA Output Diagram](#) for expected value.
8. When testing is completed reassemble the unit or units.

### 7.1.2 Manual Operation Test

This option gives the user the opportunity to manually initiate an individual test for each relay, the analog output and the sensor response to gas.

From normal operation mode press the **Next** button 2 times to get to the Test Mode (tSt).

Press the **Enter** button once to get into the Test Menu.

Press the **Next** button to scroll through the Five test options and press **Enter** to initiate the selected test.

Note that if the relay or 4–20 mA output has been disabled, the test selection will not be displayed in the test menu.

**bUZ**- Buzzer Test, 3 seconds

**Art** - Alarm Relay Test, 5 seconds

**FrT** - Fan Relay Test, 60 seconds

**42t** - 420 loop test, 130 seconds

**gtS** - Gas Test, 3 minutes (no output to the panel during the gas test)

The display will flash during the test, or in the case of the gas test, the gas level will alternate with gtS. Once the test is complete, the display will return to a steady display. To exit the test menu, press the Next button until “End” is displayed then, press Enter to return to normal mode.

## 7.2 Calibration and Test Kits

### WARNING

The following steps must be performed when conducting a calibration or calibration verification test (bump test) to ensure proper performance of the monitor. Failure to do so may adversely affect product performance.

- When performing a calibration or calibration verification test (bump test), only use certified calibration gas at the required concentration level.
- Do not test with expired calibration gas.
- Do not cover or obstruct display or visual alarm cover.
- Ensure sensor inlets are unobstructed and are free of debris

Failure to follow instructions outlined in this user manual can result in sickness or death.



### 7.2.1 Field Test Kit

A Field Test Kit, CD6-FTK, is needed to complete a CO<sub>2</sub> gas test. These are available through local distribution.

- CD6-FTK: (1) Gas Cylinders
  - (1) 34L 5000 ppm carbon dioxide (CO<sub>2</sub>) in air
- Gas regulator 0.2 LPM
- About two feet of tubing
- CD-6-TH calibration hood

#### FTK Information

Several detectors can be tested with one FTK. The only limitation is the amount of gas in the cylinder. The 17-liter cylinder has approximately 85 minutes of a continuous test run time. Replacement cylinders are available. The gas cylinder should be replaced when the pressure gauge on the regulator shows 25-psi or less or has reached its expiration date.

**Note:** For optimum test results it is suggested that the unit be in clean air, green light on, and be in a low ambient air flow.

### 7.2.2 Field Calibration Kit

A Field Calibration Kit, CD6-FCK, is needed to complete a CO<sub>2</sub> gas test. These are available through local distribution.

- CD6-FCK: (2) Gas Cylinders
  - (1) 34L 400 ppm carbon dioxide (CO<sub>2</sub>) in air
  - (1) 34L 5000 ppm carbon dioxide (CO<sub>2</sub>) in air
- Gas regulator 0.2 LPM
- About two feet of tubing
- CD-6-TH calibration hood

#### FCK Information

Several detectors can be calibrated with one FCK. The only limitation is the amount of gas in the cylinder. The 34-liter cylinder has approximately 170 minutes of a continuous test run time. Replacement cylinders are available. The gas cylinder should be replaced when the pressure gauge on the regulator shows 25-psi or less or has reached its expiration date.

Note: For optimum test results it is suggested that the unit be in clean air, green light on, and be in a low ambient air flow.

## 7.3 Gas Testing

### 7.3.1 Testing the Fan Relay

1. Remove the Philips screw on the front of the CD-xxH/MC. Remove the front cover.
2. Open the FCK. Connect the 5000 ppm gas cylinder to the regulator.
3. Check the pressure gauge on the regulator. If you have 25-psi or less you will need to replace the gas canister. Check the expiration date on the cylinder, if it has passed the expiration date the cylinder should be replaced.
4. Assemble regulator, hose, and Test Hood and place the Test Hood over the CO<sub>2</sub> sensor.

Note: The time to activate the Fan relay depends on the delay setting. See section [4.5.8 Fan Relay Delay – “Frd”](#)



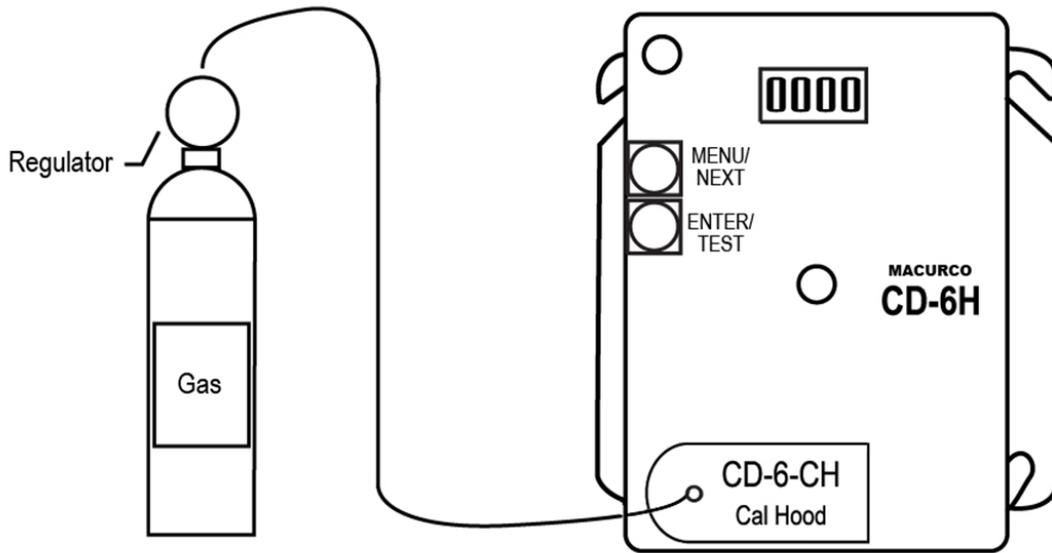


Figure 7-1 Calibration Connection

5. Turn on the regulator to start the gas flow and wait with the gas applied continuously.
6. With the display function turned “On”, the CD-xxH/MC will show the current concentration of CO<sub>2</sub> in the air. When the CO<sub>2</sub> concentration reaches the Fan Relay setting (2000 ppm, for example) the display will flash back and forth between “FAn” and “current gas reading”. With the display function turned “Off”, the display does not show the CO<sub>2</sub> concentration but will show “FAn” as long as the fan relay is activated.

Note: If the Fan relay does not close within 2 minutes, there are five possibilities:

- a. The gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25psi or less.
- b. Gas cylinder has reached its expiration date. Replace the gas cylinder.
- c. Unit needs to be re-calibrated (automated background calibration for CD-6H, Manual Calibration for CD-6MC) then re-test. The detector is in need of servicing (contact Technical Support for at 1-844-325-3050 servicing options).
- d. The detector has fan relay set to disable (diS). Set fan relay to 2000 ppm and repeat the test.
- e. The detector has fan relay delay set to 3 minutes. Set fan relay delay to 0 and repeat the test.
- f. Remove the gas from the sensor. Proceed to Test the Alarm relay or replace the top cover.

### 7.3.2 Testing the Alarm Relay

**Note:** The CO<sub>2</sub> concentration to activate the Alarm relay depends on the setting.

1. Connect the 5000 ppm cylinder of carbon dioxide to the regulator.
2. Check the pressure gauge on the regulator. If you have 25-psi or less, you will need to replace the gas canister. Check the expiration date on the cylinder, if it has passed the expiration date the cylinder should be replaced.
3. Place the Test Hood over the CO<sub>2</sub> sensor. Turn on the regulator to start the gas flow.
4. The Fan relay should activate according to the settings.
5. With the display function turned “On” and the CO<sub>2</sub> concentration reaching the Alarm Relay setting, (4000 ppm, for example) the display will flash back and forth between “ALr” and “current gas reading”. The buzzer will sound indicating “Alarm” if the buzzer is turned “On”. With the display function turned off the display does not show the CO<sub>2</sub> concentration but will show “ALr” when the Alarm relay is activated.

**Note:** If the Alarm relay fails to operate within 2 minutes, there are four possibilities:

- a. The gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25-psi or less.
  - b. Unit needs to be re-calibrated (automated background calibration and re-test).
  - c. The detector is in need of servicing (return unit to the factory for servicing).
  - d. The detector has Alarm relay set to disable (diS). Set Alarm relay to 4000 ppm and repeat the test.
6. Remove the gas from the sensor after Test. Proceed to Test the 4-20mA output or replace the top cover.

### 7.3.3 Testing the 4-20mA loop

1. Connect the 5000 ppm cylinder of carbon dioxide to the regulator.
2. Check the pressure gauge. If there is 25-psi or less the cylinder should be replaced.
3. Place the cap from the regulator over the CO<sub>2</sub> sensor. Turn on the regulator to start the gas flow.
4. The Fan relay should activate according to the settings.
5. The Alarm relay should activate according to the settings.
6. The 4-20 mA output should ramp up to output 20 mA at 5000 ppm. See 4-20 mA diagram.

Note: If the 4-20mA output does not ramp up within 2 minutes, there are four possibilities:

- a. The gas cylinder is empty, check the pressure gauge. Replace the gas cylinder if 25-psi or less.
  - b. Unit needs to be re-calibrated (automated background calibration and re-test).
  - c. The detector is in need of servicing (return unit to the factory for servicing).
  - d. The detector has 4-20 mA option set to "OFF". Set 4-20mA option to "On" and repeat the test.
7. Remove the gas from the sensor. Re-assemble the CD-xxH/MC (make sure the LED is aligned with the front case hole). You are done.

### 7.3.4 Aerosol Test

Macurco does not have an Aerosol Option for testing the CD-xxH/MC at this time.

## 7.4 Field Calibration Procedure

### 7.4.1 CD-xxH

The CD-6H uses an automated background calibration program to set the clean air level on a regular basis. The CD-xxH does not have the option for performing a calibration.

### 7.4.2 CD-xxMC

**Note:** For optimum calibration results the unit should be in clean air and be in a low ambient air flow.

1. Remove the Philips screw on the front of the CD-6MC. Remove the front cover.
2. Open the FCK. Connect the 400 ppm carbon dioxide gas cylinder to the regulator.
3. Check the pressure gauge on the regulator. If you have 25-psi or less, you will need to replace the gas canister. Check the expiration date on the cylinder, if it has passed the expiration date the cylinder should be replaced.
4. Assemble regulator, hose, and Calibration Hood and place the hood over the CO<sub>2</sub> sensor.
5. Turn on the regulator to start the gas flow and wait with the gas applied continuously.
6. On the detector press the Menu / Next button three times to get to the CAL menu. Press Enter / Test button
7. The display will alternate between "GAS.S" and "400" for 60 seconds.
8. The display will then show "Spn.4" alternating with the "current gas reading" for 60 seconds.
9. The display will then show "Spn.3" alternating with the "current gas reading" for 60 seconds.
10. The display will then show "Spn.2" alternating with the "current gas reading" for 60 seconds.
11. The display will then show "Spn.1" alternating with the "current gas reading" for 60 seconds.
12. The display will then show "CAL7, CAL6, CAL5, CAL4, CAL3, CAL2, CAL1, then CAL0" counting down.
13. The display will show "PASS" alternating with "400" for about 30 seconds before changing back to CAL and Current gas reading after 30 seconds.



14. If the calibration fails, the display will show "CAL6" for 1 second and then change to "Fail.3" for 30 seconds before changing back to CAL for 30 seconds and then displays "t00/t020"

**Note:** this Trouble code will only be cleared by a successful calibration of the sensor.

If this occurs, check the pressure gauge on the regulator. If the pressure is less than 25 psi the flow of gas may not be adequate to properly calibrate the unit. If there is proper pressure in the cylinder repeat steps 5 through 12. If the unit fails to calibrate twice contact Technical Support: 1-844-325-3050.

**Note:** It is critical to confirm to use 400 ppm CO<sub>2</sub> gas calibration be used.

15. Once the calibration has passed, remove gas and disassemble the cylinder and regulator.
16. Re-assemble the CD-6MC (make sure the LED is aligned with the front case hole).
17. See Calibration Flowchart on the inside of the housing, or section [9.5 CAL Menu](#).



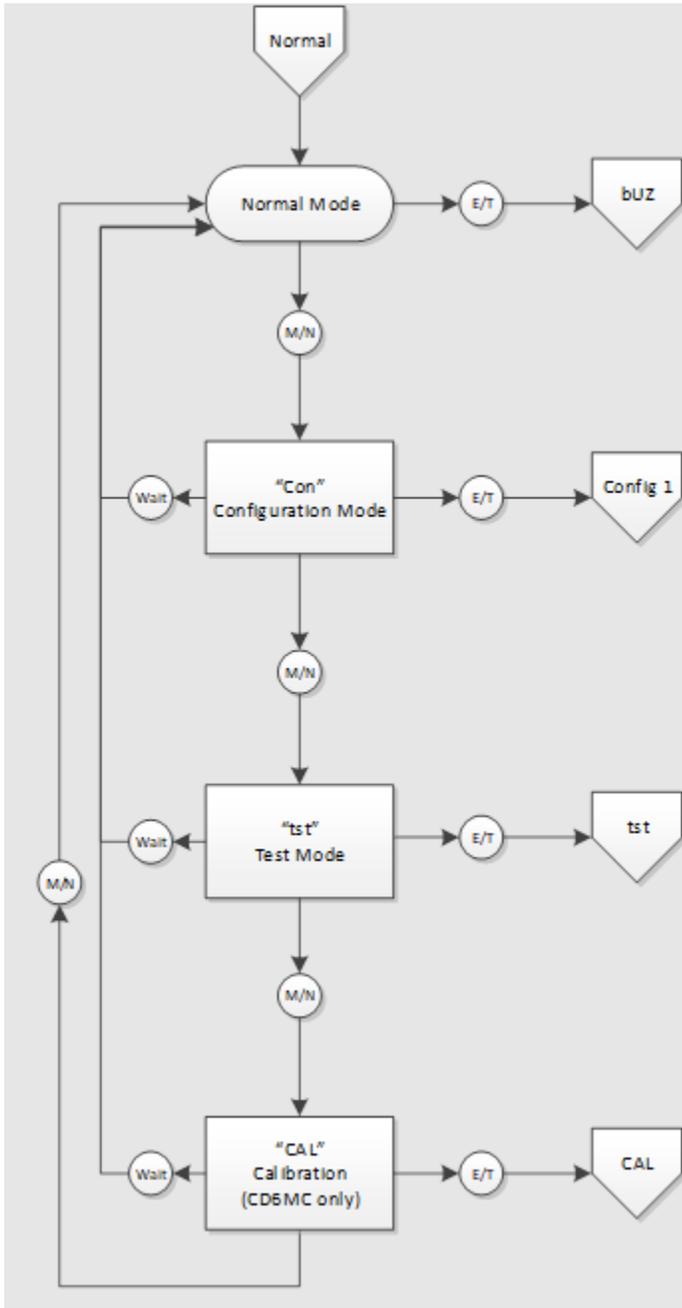
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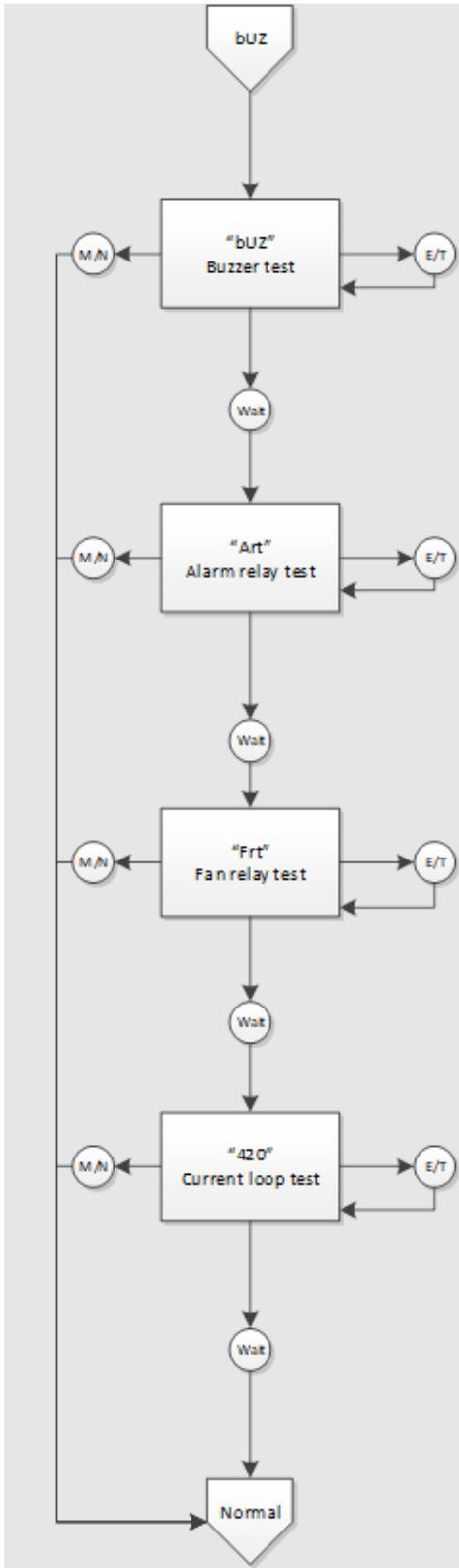


## 9 Appendix B – Menu Structure

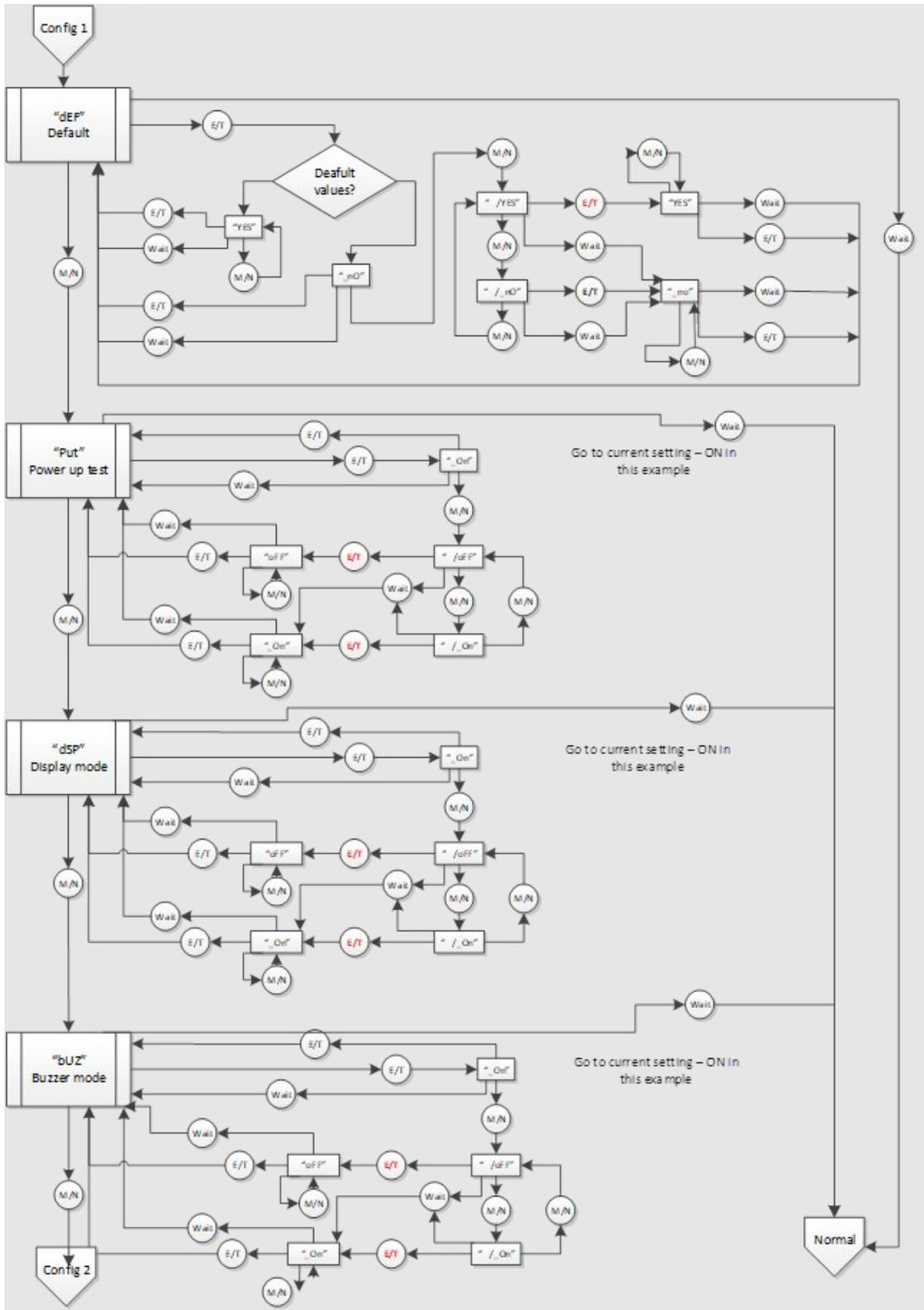
### 9.1 Main Menu

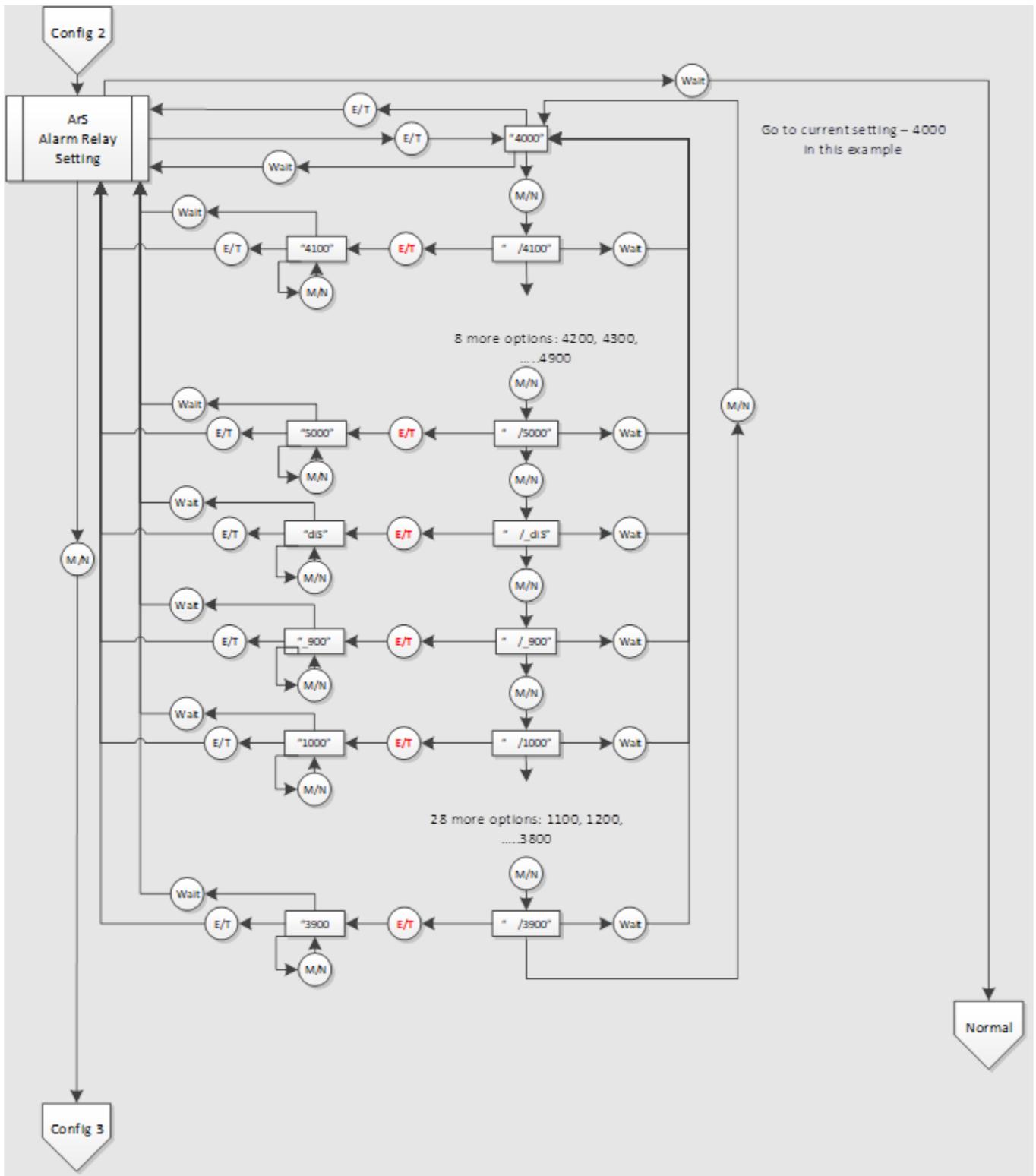


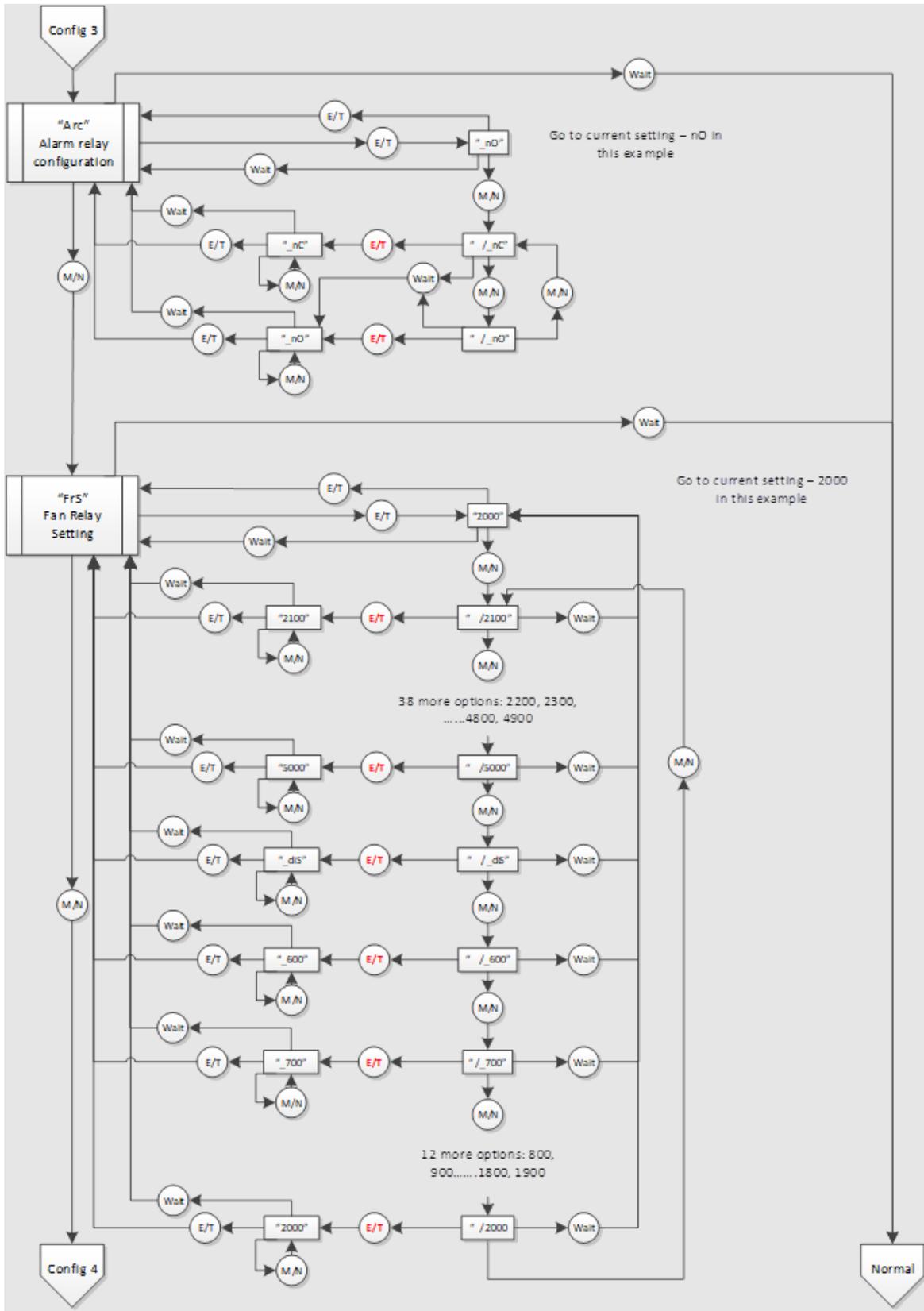
## 9.2 Auto Test Menu "bUZ"

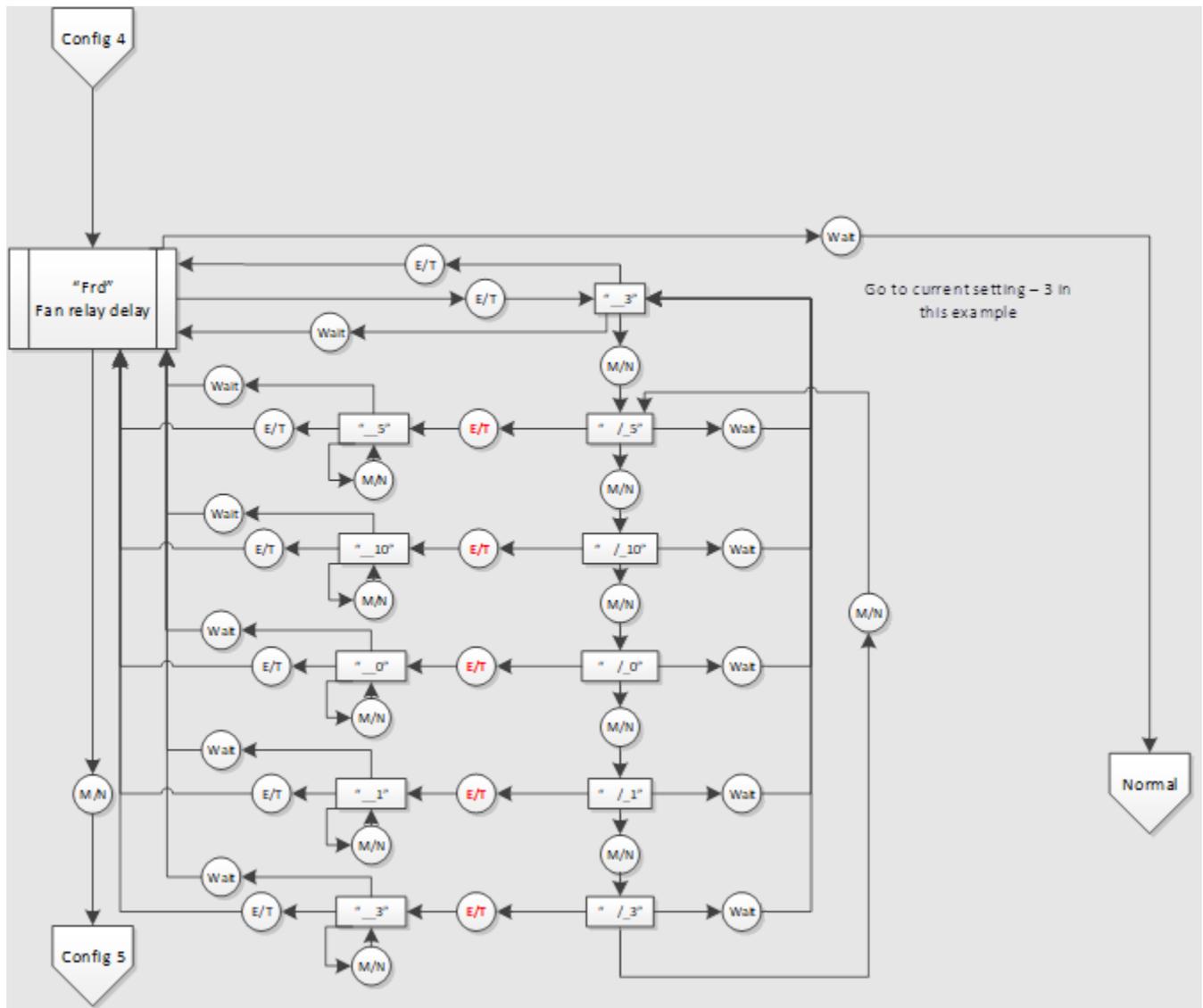


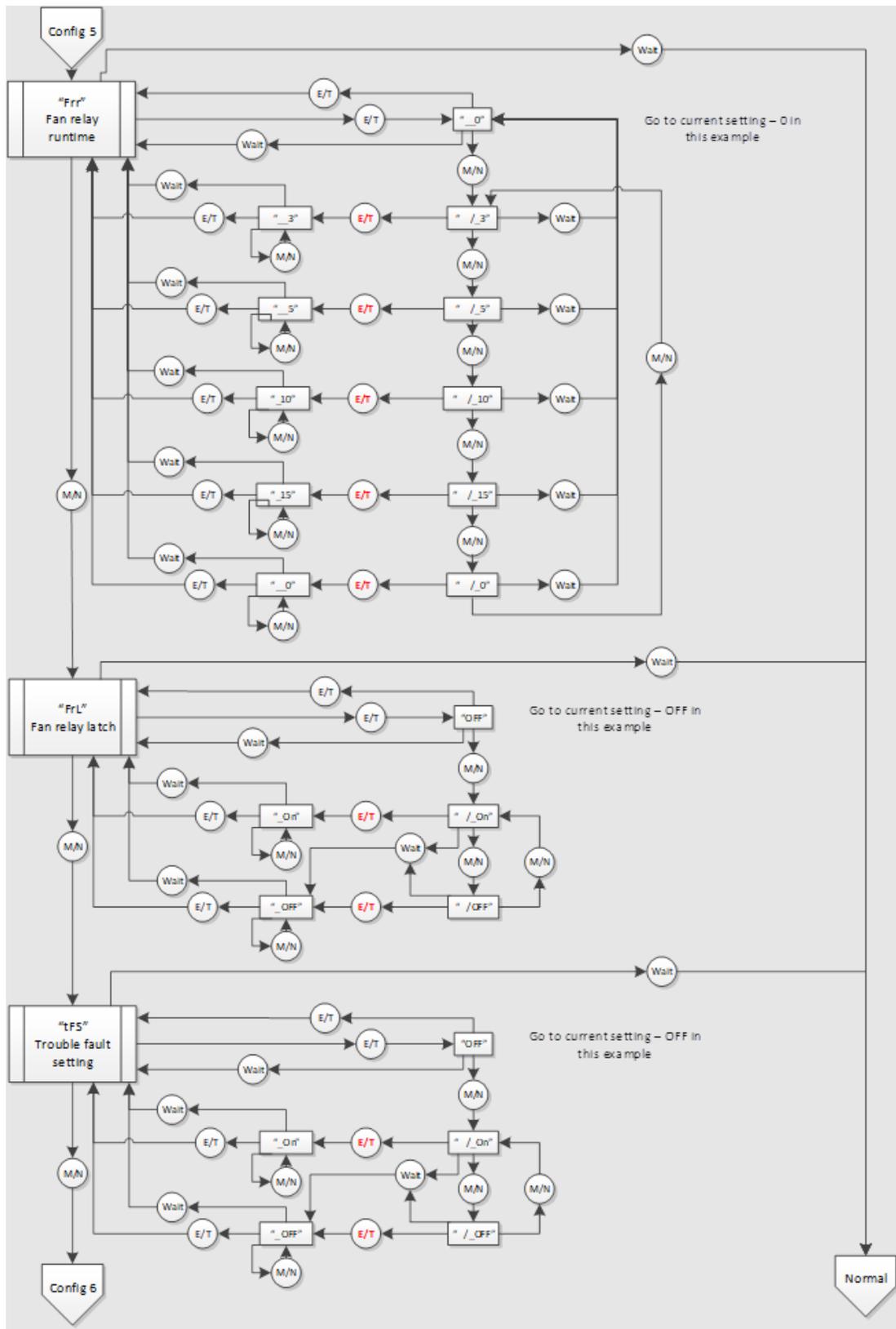
### 9.3 Configuration Menu "CON"

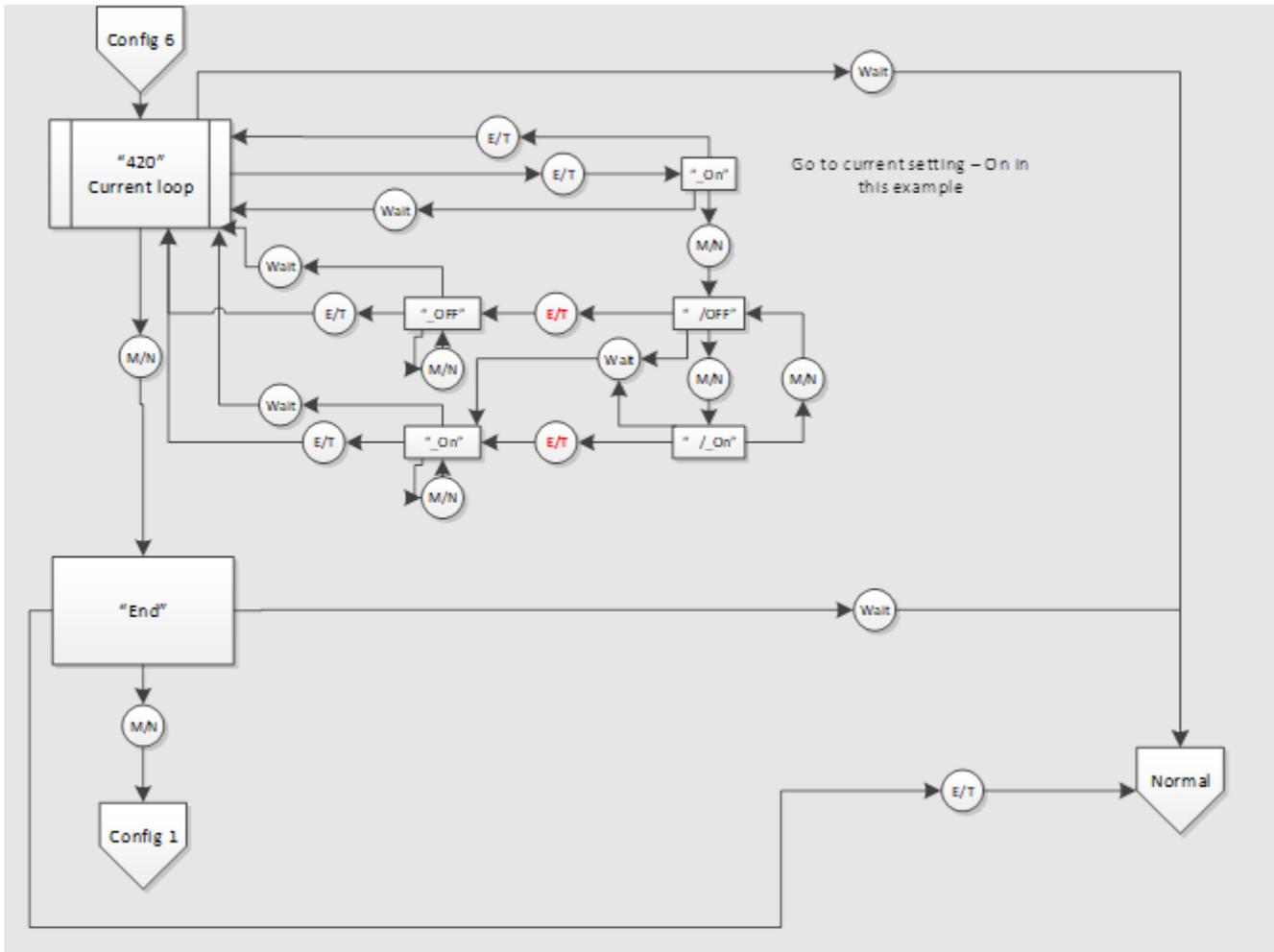




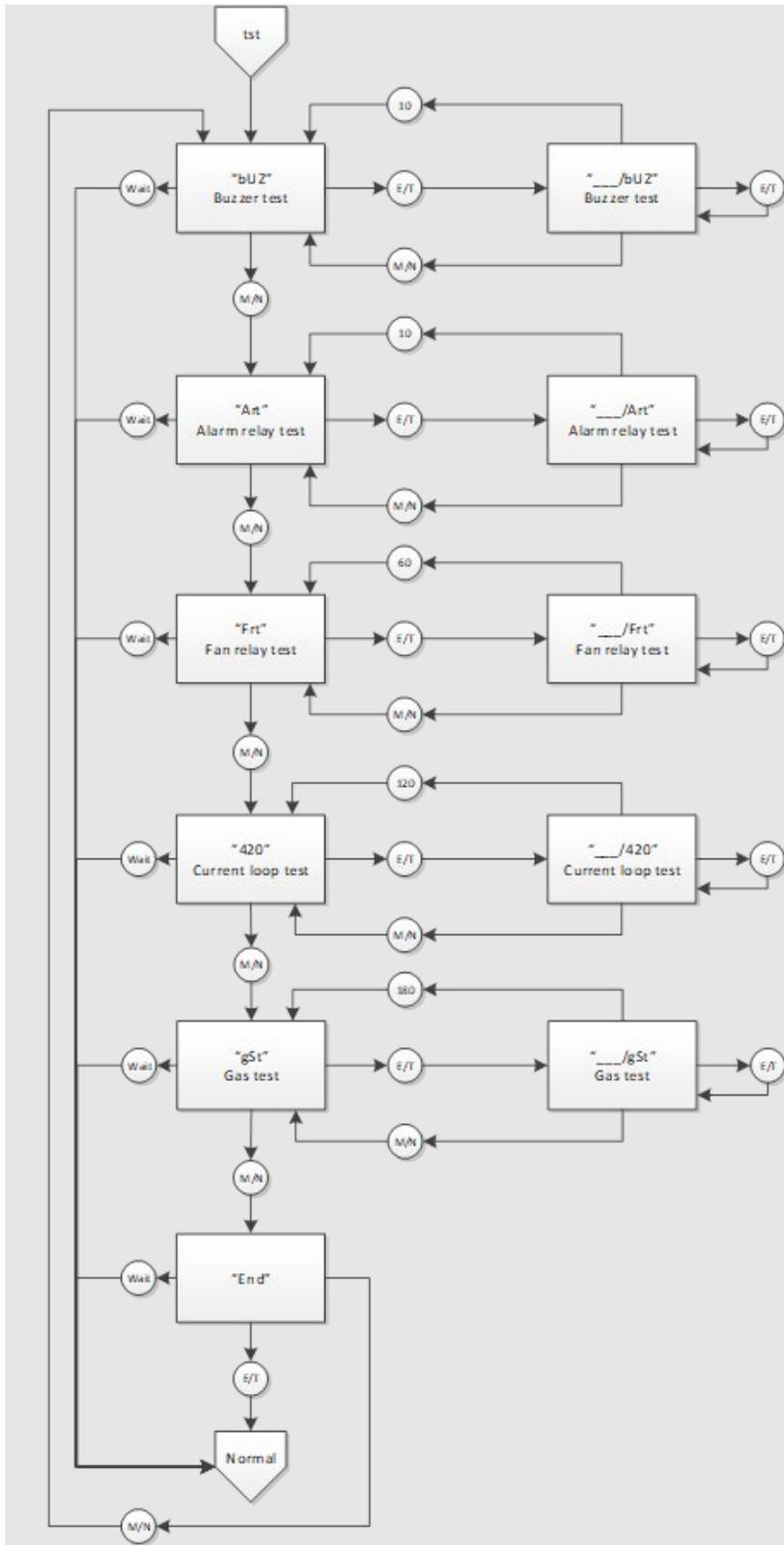




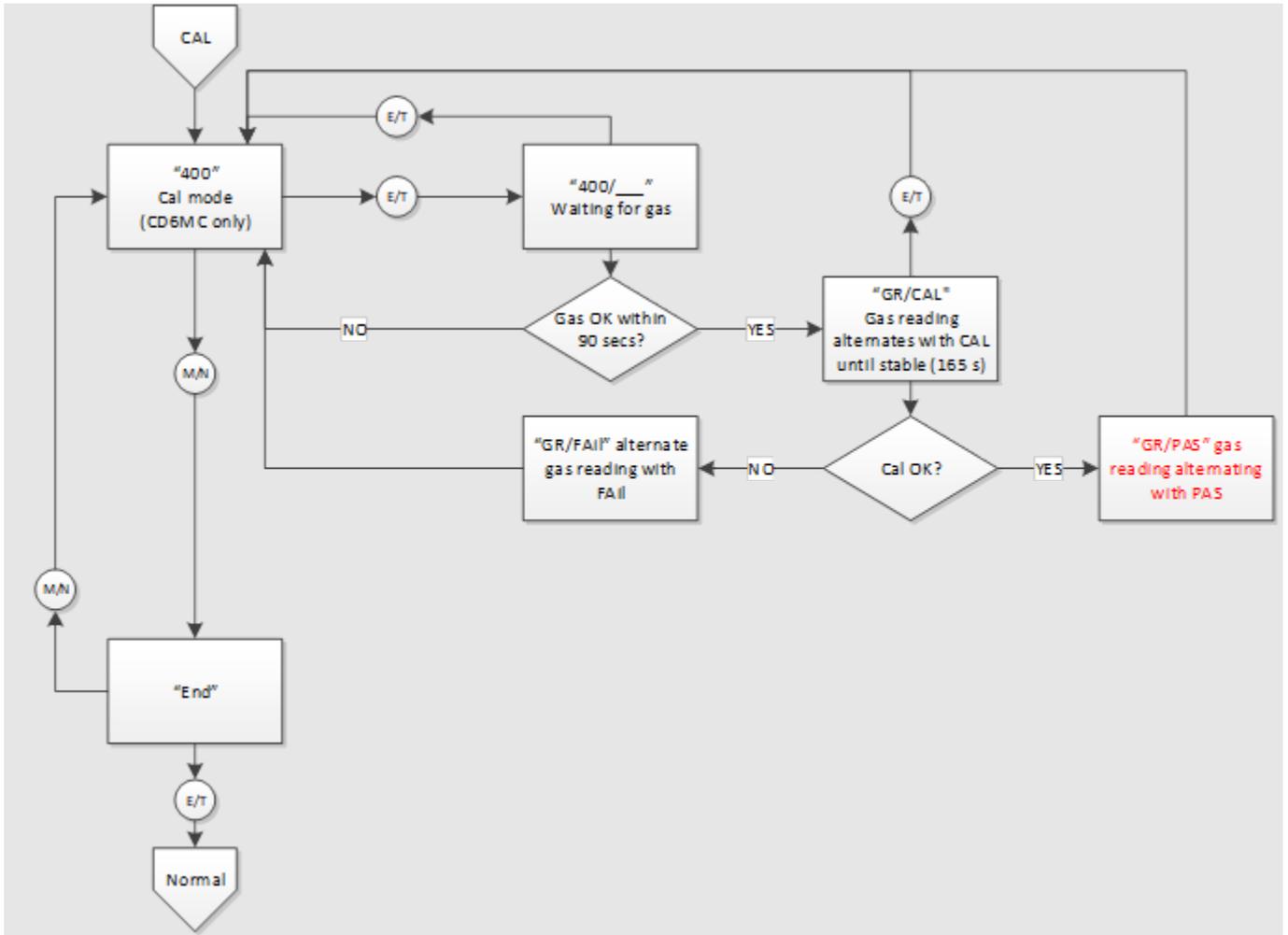




### 9.4 Select Test Menu "tst"



### 9.5 CAL Menu \*CD-xxMC Only



## 10 Macurco Gas Detection Product limited warranty

Macurco warrants the CD-6H / CD-6MC / CD-12H / CD-12MC gas detector will be free from defective materials and workmanship for a period of two (2) years from the date of manufacture (indicated on the inside cover of the CD-6H / CD-6MC), provided it is maintained and used in accordance with Macurco instructions and/or recommendations. If any component becomes defective during the warranty period, it will be replaced or repaired free of charge, if the unit is returned in accordance with the instructions below. This warranty does not apply to units that have been altered or had repair attempted, or that have been subjected to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations or liabilities. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE LIMITED TO A PERIOD OF TWO (2) YEARS FROM THE PURCHASE DATE. Macurco shall not be liable for any incidental or consequential damages for breach of this or any other warranty, express or implied, arising out of or related to the use of said gas detector. The manufacturer or its agent's liability shall be limited to replacement or repair as set forth above. Buyer's sole and exclusive remedies are the return of the goods and repayment of the price, or repair and replacement of non-conforming goods or parts.

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