Instruction Manual
PN 51-1054BDO/rev.B
April 2003

Model 1054B DO

Dissolved Oxygen Microprocessor Analyzer

ROSEMOUNT® Analytical

EMERSON™ Process Management

ESSENTIAL INSTRUCTIONS

READ THIS PAGE BEFORE PROCEEDING!

Rosemount Analytical designs, manufactures, and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product. If this Instruction Manual is not the correct manual, telephone 1-949-757-8500 and the requested manual will be provided. Save this Instruction Manual for future reference.
- If you do not understand any of the instructions, contact your Rosemount representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Rosemount. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look alike substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

WARNING
ELECTRICAL SHOCK HAZARD

Making cable connections to and servicing this instrument require access to shock hazard level voltages which can cause death or serious injury.

Be sure to disconnect all hazardous voltage before opening the enclosure.

Relay contacts made to separate power sources must be disconnected before servicing.

Electrical installation must be in accordance with the National Electrical Code (ANSI/NFPA-70) and/or any other applicable national or local codes.

Unused cable conduit entries must be securely sealed by non-flammable closures to provide enclosure integrity in compliance with personal safety and environmental protection requirements.

The unused conduit openings need to be sealed with NEMA 4X or IP65 conduit plugs to maintain the ingress protection rating (IP65).

For safety and proper performance this instrument must be connected to a properly grounded three-wire power source.

Proper relay use and configuration is the responsibility of the user.

No external connection to the instrument of more than 69VDC or 43V peak allowed with the exception of power and relay terminals. Any violation will impair the safety protection provided

Do not operate this instrument without front cover secured. Refer installation, operation and servicing to qualified personnel..

WARNING

This product is not intended for use in the light industrial, residential or commercial environment, per the instrument's certification to EN50081-2.

Emerson Process Management

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WARNING

HAZARDOUS VOLTAGE

Can cause severe injury or death. Disconnect power before servicing.

CAUTION

The analyzer has a metalized enclosure. Ground conduit to metal stiffener or to metal enclosure. Use non-flammable watertight conduit fittings/plugs to preserve rating.

VYSTRAHA

NEBEZPECNE NAPETI

Muze zpusobit vazne zraneni nebo smrt. Odpojte napajeni pred udrzbou

VAROVANI

Zemnici vodic musi byt vodive spojen s kostrou pristroje. Pouzivejte nehorlave vodotesne pruchodky, abyste zachovali stupen kryti pristroje.

AVISO

VOLTAJE PELIGROSO

Puede causar severas lesiones o muerte. Desconecte la alimentación antes del mantenimiento.

ATENCION

La toma a tierra debe hacerse a un contrafuerde metal o a la caja metálica.Utilice accesorios/enchufes no inflamables y estancos al agua para preservar las especificaciones de la caja.

ADVARSEL

FARLIG SPÆNDING

Kan forårsage alvorlige kvæstelser eller død.

Afbryd spænding før servicering

FORSIGTIG

Jordforbindelse til metal kapsel.

Brug uantændelig vandtæt forskruning som sikkerhed for bevaring af kapslings klasse.

ATTENTION

HAUTE TENSION

Peut provoquer des blessures graves ou la mort. Déconnecter l'alimentation avant manipulation.

ATTENTION

Raccorder le tube à la masse métallique d'une entretoise ou du coffret.Utiliser des raccords et des bouchons étanches ininflammables afin de preserver la classification du boîtier.

OSTRZEZENIE

NIEBEZPIECZNE NAPIECIE

Moze spowodowac uszkodzenie ciala lub smierc.Odlacz zasilanie przed przystapieniem do prac.

UWAGA

Uziemij przewod do metalowego plaskownika lub obudowy. Aby zachowac stopien szczelnosci obudowy stosuj niepalne, wodoszczelne dlawiki.

WARNUNG

GEFAEHRLICHE SPANNUNG

Am Geraet liegt eine gefaehrliche Spannung an. Schalten Sie immer vor dem Oeffnen des Geraetes alle Zuleitungen spannungsfrei.

ACHTUNG

Der Analysator ist vorschriftsmaessig zu erden. Um die Schutzart des Geraetes sicherzustellen ist es mit den entsprechenden Kabelverschraubungen und Blindkappen auszuruesten.

Waarschuwing

GEVAARLIJKE SPANNING

Kan ernstig of dodelijk letsel veroorzaken. Schakel de voeding uit voordat u onderhoudswerk zaamheden uitvoert.

Voorzichtig

Aardleiding naar metalen profiel of naar metalen behuizing. Gebruik onbrandbare, waterdichte wartels en pluggen orn de beschermingsklasse te handhaven.

Attenzione

ALTA TENSIONE

Può causare grave lesione o morte. Disattivare le tensioni prima di effettuare la manutenzione.

Attenzione

Tubo di protezione per messa a terra con elemento di ingresso in metallo o con custodia in metallo.

Utilizzare accessori/connettori del tubo di protezione a tenuta stagna, non infiammabili, per assicurare i limiti di resistenza della custodia

ADVARSEL

FARLIG SPENNING

Kan føre til alvorlige skader eller dødsulykker. Spenningstilførsel må frakobles før service utføres.

ADVARSEL

Kabelinnføring må jordes til metallavstiver eller til metallkapslingen. Bruk flammesikre og vanntette nipler\plugger slik at kapslingens tetthetsgrad opprettholdes.

VARNING

LIVSFARLIG SPÄNNING

Kan medföra allvarlig skada eller dödsfall.

Bryt spänning innan service utföres.

IAKTTAG FÖRSIKTIGHET

Anslutningspunkt är jordad till chassi. Använd brandsäker, vattentät kabelanslutning för att bevara klassificering av apparatskåp.

AVISO

TENSÃO PERIGOSA

Pode causar lesões graves ou a morte. Desligar a energia antes de proceder a trabalhos de manutenção.

ATENÇÃO

Ligar a conducta de cabos à terra através de suporte ou invólucro metálicos. Utilize bucins e acessórios ignífugos e estanques para preservação da estanquecidade.

MODEL 1054B DO
MICROPROCESSOR ANALYZER

TABLE OF CONTENTS

TABLE OF CONTENTS CONT'D.

LIST OF FIGURES

LIST OF TABLES

SECTION 1.0
DESCRIPTION AND SPECIFICATIONS

1.1 GENERAL DESCRIPTION. The Model 1054B DO Microprocessor Analyzer is designed to continuously measure and control dissolved oxygen in industrial and municipal processes.

Housed in a NEMA 4X (IP65) weatherproof corrosion-resistant, flame retardant enclosure, the Model 1054B is suitable for panel, pipe, or wall mounting. All functions are accessed through the front panel membrane keyboard which features tactile feedback.

The 1054B transmits a user selected isolated current output continuously expandable over the measurement range in either direct or reverse action. The output can be displayed in milliamps or percent of full scale. Output dampening is user selectable.

Dual programmable alarms are a standard feature on the Model 1054B and are programmable for either high or low operation. Alarm 2 may be programmed as a fault alarm. Both alarms feature independent setpoints, adjustable hysteresis, and time delay action. The time delay is convenient when an alarm is used for corrective action. Time delay ignores temporary upsets and prevents relay chatter. An interval timer with relay is also provided.

The 1054B DO analyzer, which is intended for use with a membrane-covered amperometric sensor, automatically compensates for changes in membrane permeability with temperature. Temperature can be displayed in either °C or °F.

Calibrating the analyzer is as simple as exposing the sensor to air and keying in the barometric pressure. If removing the sensor from the process is impractical, the analyzer can also be calibrated against a laboratory measurement made on a grab sample.

Solubility correction factors for liquids containing high concentrations of electrolytes can be programmed into the analyzer. The microprocessor automatically calculates ppm dissolved oxygen or % saturation.

The 1054B DO Microprocessor Analyzer comes with either LCD or LED display. The display indicates dissolved oxygen in ppm or % saturation as well as temperature, alarm status, hold output, and fault conditions.

1.2 PHYSICAL SPECIFICATIONS

Enclosure: Black, ABS, NEMA 4X, IP65
CSA Enclosure 4
144 X 144 X 192 mm (5.7 X 5.7 X 7.6 in.)

Wall Mount Enclosure: NEMA 4X, Heavy duty fiberglass, reinforced thermoplastic.
356 X 450 X 180 mm (14 X 17.7 X 7.1 in.)
Dimensions include latches and mounting feet

Front Panel: Membrane keypad with tactile feedback and user selectable security.

Digital Display: LCD, black on grey, Optional red LED
Character Height: 18 mm (0.7 in.)

Electrical Classification:
FM Class I, Div. 2, Group A thru D
28 Vdc relays - 5.0 amps resistive only
150 mA - Groups A & B; 400 mA - Group C ;
540 mA - Group D; Ci = 0; Li = 0
CSA Class I, Div. 2, Group A thru D.
28 Vdc, 110 Vac & 230 Vac relays
5.0 Amps resistive only
Wall Mount Enclosure: General Purpose

Power: 100 - 127 VAC, 50/60 Hz ± 6%, 4.0 W
200 - 253 VAC, 50/60 Hz ± 6%, 4.0 W

EMI/RFI: EN61326 CE
LVD: EN61010-1

Model option -20 (Wall Mount Enclosure) does not meet CE requirements

Current Output: Isolated, 0-20 mA or 4-20 mA into 600 ohms maximum load at 115/230 Vac *or* 550 ohms maximum load at 100/200 Vac; direct or reverse output; dampening: 0-255 sec

Ambient Temperature: -10 to 65°C (14 to 149°F);
-50 to 65°C (-58 to 149°F) with optional heater in wall mount enclosure.

Ambient Humidity: LED: 0-95% RH
LCD: 0-85% RH @ 50°C

Alarms: Dual, field selectable High/Low, High/High, Low/Low
Alarm 2 configurable as a fault alarm
Time Delay 0 to 255 seconds
Dual Setpoints, continuously adjustable
Hysteresis adjustable up to 2.00 ppm for low side/High Alarm and high side/Low Alarm

Interval Timer: Interval: 10 min. to 2999 days
On Counts: 1 to 60
On Duration: 0.1 to 299.9 seconds
Off Duration: 0.1 to 299.9 seconds
Wait Duration: 0.1 to 299.9 seconds
Controls dedicated relay

Relay Contacts: Epoxy Sealed Form A contacts, SPST, Normally Open.

	Resistive	Inductive
28 VDC	5.0 Amps	3.0 Amps
115 VAC	5.0 Amps	3.0 Amps
230 VAC	5.0 Amps	1.5 Amps

Weight/Shipping Weight: 1.1 kg/1.6 kg (2.5 lb/3.5 lb)

1.3 INSTRUMENT SPECIFICATIONS

Operating Ranges: 0-20 ppm (mg/l); 0-250% saturation; 0-50°C

Accuracy: ±1% full scale

Repeatability: ±0.1% of range

Stability: Zero Drift: ±1% full scale/month
Span Drift: ±1% full scale/month

Response Time: 0-95% full scale in less than 15 secs

Temperature Correction for Membrane Permeability: Automatic between 0-50°C. Temperature compensation can be disabled if desired.

1.4 ORDERING INFORMATION

The Model 1054B Dissolved Oxygen Microprocessor Analyzer: Housed in a NEMA 4X corrosion resistant, weatherproof housing suitable for panel, pipe, or wall mounting. Standard features include isolated digital display, current outputs, dual programmable alarms and timer relay, default settings, and automatic or manual temperature compensation.

MODEL	
1054BDO	**MICROPROCESSOR ANALYZER (3.5 lbs./1.5 kg)**
CODE	STANDARD ENCLOSURE OPTIONS
01	LCD Display
02	LED Display
CODE	OPTIONS
20	Wall Mount Enclosure (wall mount enclosure does not meet CE requirements)
1054BDO 01 20	**EXAMPLE**

TABLE 1-1. Replacement Parts

P/N	DESCRIPTION
22966-00	PCB, LCD Digital Display
23025-01	Panel Mounting Kit
23245-01	PCB, LED Digital Display
32937-00	Gasket, Rear Cover
32938-00	Gasket, Front Cover
9100157	Fuse, .10A, 250V, 3AB, Slo Blo
23739-00	PCB, Power Supply
23740-00	PCB, Motherboard
23695-12	Keyboard Overlay, LCD Version
23695-13	Keyboard Overlay, LED Version
33469-00	Enclosure Body
33470-00	Enclosure, Rear Cover
9100160	Fuse, .250A, 125V, Axial lead PICO II
9100189	Fuse, .750A, 125V, Axial lead PICO II
23666-00	PCB, CPU, Dissolved Oxygen

TABLE 1-2. Accessories

P/N	DESCRIPTION
2001492	Tag, Stainless Steel, Specify Marking
23053-00	Mounting Bracket, 2-inch Pipe
23054-01	Mounting Bracket, Wall, with Junction Box
23268-01	Heater, 115 VAC, 50/60 Hz, 1054B (Code 20 Only)
23268-02	Heater, 230 VAC, 50/60 Hz, 1054B (Code 20 Only)

SECTION 2.0
INSTALLATION

2.1 GENERAL. The analyzer is suitable for outdoor use. However, it should be located in an area where temperature extremes and vibrations are minimized or absent. Installation must be performed by a trained technician.

2.2 UNPACKING AND INSPECTION. Inspect the analyzer for shipping damage. If damaged, notify the carrier immediately. Confirm that all items shown on the packing list are present. Notify Rosemount Analytical if items are missing.

2.3 MECHANICAL INSTALLATION. Select an installation site that is at least one foot from any high voltage conduit, has easy access for operating personnel, and is not in direct sunlight. Mount the analyzer as follows:

1. Remove the four screws that secure the rear cover of the enclosure.
2. Remove the four screws holding the front panel assembly of the enclosure and carefully pull the front panel and connected printed circuit boards straight out.
3. Follow the procedure for the appropriate mounting configuration: Section 2.3.1 for panel mounting, Section 2.3.2 for wall mounting, Section 2.3.3 for pipe mounting.

2.3.1 Panel Mounting (Standard). The Model 1054B is designed to fit into a DIN standard 137.9 mm X 137.9 mm (5.43 in. X 5.43 in.) panel cutout (Refer to Figures 2-1 and 2-2).

1. Prepare the analyzer as described in Section 2.3.
2. Install the mounting latches as described in Figure 2-2 (latches are shown oversize for clarity). If the latches are not installed exactly as shown, they will not work correctly. The screws provided are self-tapping. Tap the screw the full depth of the mounting latch (refer to side view) leaving a gap greater than the thickness of the cutout panel.
3. Align the latches as shown and insert the analyzer enclosure through the front of the panel cutout. Tighten the screws for a firm fit. To avoid damaging the mounting latches, do not use excessive force.
4. Replace the front panel assembly. Circuit boards must align with the slots on the inside of the enclosure. Assure that the continuity wire is connected to the rear cover and the interface board's closest mounting screws. Replace the door and four front panel screws.

2.3.2 Wall Mounting Plate with Junction Box (P/N 23054-01). Refer to Figures 2-3 and 2-4.

1. Prepare the analyzer as described in Section 2.3.
2. Mount the junction box and bracket to the analyzer with the hardware provided. All wiring can be brought to the terminal strip prior to mounting the analyzer.
3. Place the metal stiffener on the inside of the analyzer and mount the two 1/2-inch conduit fittings using two each weather seals as shown. Mount NEMA 4X conduit plug (included) into center conduit hole.
4. Mount the analyzer to the junction box using the 1/2-inch conduit fittings.
5. Complete wiring from the analyzer to the junction box (Refer to Figure 2-4).

NOTE

Run sensor wiring out of the left opening (From front view) to J-Box. All others out right opening to J-Box.

2.3.3 Pipe Mounting (P/N 23053-00). The 2-inch pipe mounting bracket includes a metal plate with a cutout for the analyzer (Refer to Section 2.3 for mounting the analyzer into the plate). Mounting details are shown in Figure 2-5.

2.3.4 Wall Mount Enclosure (option -20). See Figure 2-7 for installation details.

2.4 ELECTRICAL WIRING.

All electrical connections are made to terminal strips on the rear panel (interface board) of the instrument. To access the interface board, remove the four (4) screws securing the rear cover of the enclosure. Gently pull away the rear cover, which is connected to the back panel by a continuity wire. If the continuity wire is disconnected for any reason, it must be reconnected to the nearest interface board mounting screw before the rear enclosure cover is replaced.

The three openings in the bottom rear of the Model 1054B analyzer housing accommodate 1/2-inch conduit fittings. Looking at the analyzer from the front, the conduit opening on the left is for sensor wiring, the center opening is for signal output, and the opening on the right is for timer, alarm, and AC connections. Always run sensor wiring in a separate conduit from power wiring.

NOTE

For best EMI/RFI protection, shield the output cable and enclose it in an earth-grounded, rigid metal conduit. Connect the outer cable shield to the earth ground terminal on TB-A when using the wall mounting junction box (Fig. 2-4) or to terminal 8 on TB3 when wiring directly to the instrument (Fig. 2-6).

The sensor cable should also be shielded. When wiring directly to the instrument, connect the outer shield of the sensor cable to the earth ground of the instrument on terminal 8 of TB2. If the outer shield of the sensor cable is braid, an appropriate metal cable gland fitting may be used to connect the braid to earth ground by way of the instrument case. When wiring to the wall mounting junction box, connect the outer shield of the sensor cable to the earth ground terminal on TB-A.

2.4.1 Power Input Wiring. The Model 1054B can be configured for either 115 VAC or 230 VAC power.

Connect AC power to TB1-8 and -9 (115 VAC) or TB1-7 and -8 (230 VAC) ground to the ground terminal at TB3-8 (refer to Figure 2-6).

CAUTION

The sensitivity and stability of the analyzer will be impaired if the input wiring is not grounded. DO NOT apply power to the analyzer until all electrical connections are verified and secure. The following precautions are a guide using UL 508 as a safeguard for personnel and property.

1. AC connections and grounding must be in compliance with UL 508 and/or local electrical codes.
2. The metal stiffener is required to provide support and proper electrical continuity between conduit fittings.
3. This type 4/4X enclosure requires a conduit hub or equivalent that provides watertight connect, REF UL 508-26.10.
4. Watertight fittings/hubs that comply with the requirements of UL 514B are to be used.
5. Conduit hubs are to be connected to the conduit before the hub is connected to the enclosure, REF UL 508-26.10.
6. If the metal support plate is not used, plastic fittings must be used to prevent structural damage to the enclosure. Also, appropriate grounding lug and awg conductor must be used with the plastic fittings.

2.4.2 Output Wiring. The signal output and alarm connections are made to terminals 1 through 6 of TB1 and TB3-1 and 2. (Refer to Figure 2-6).

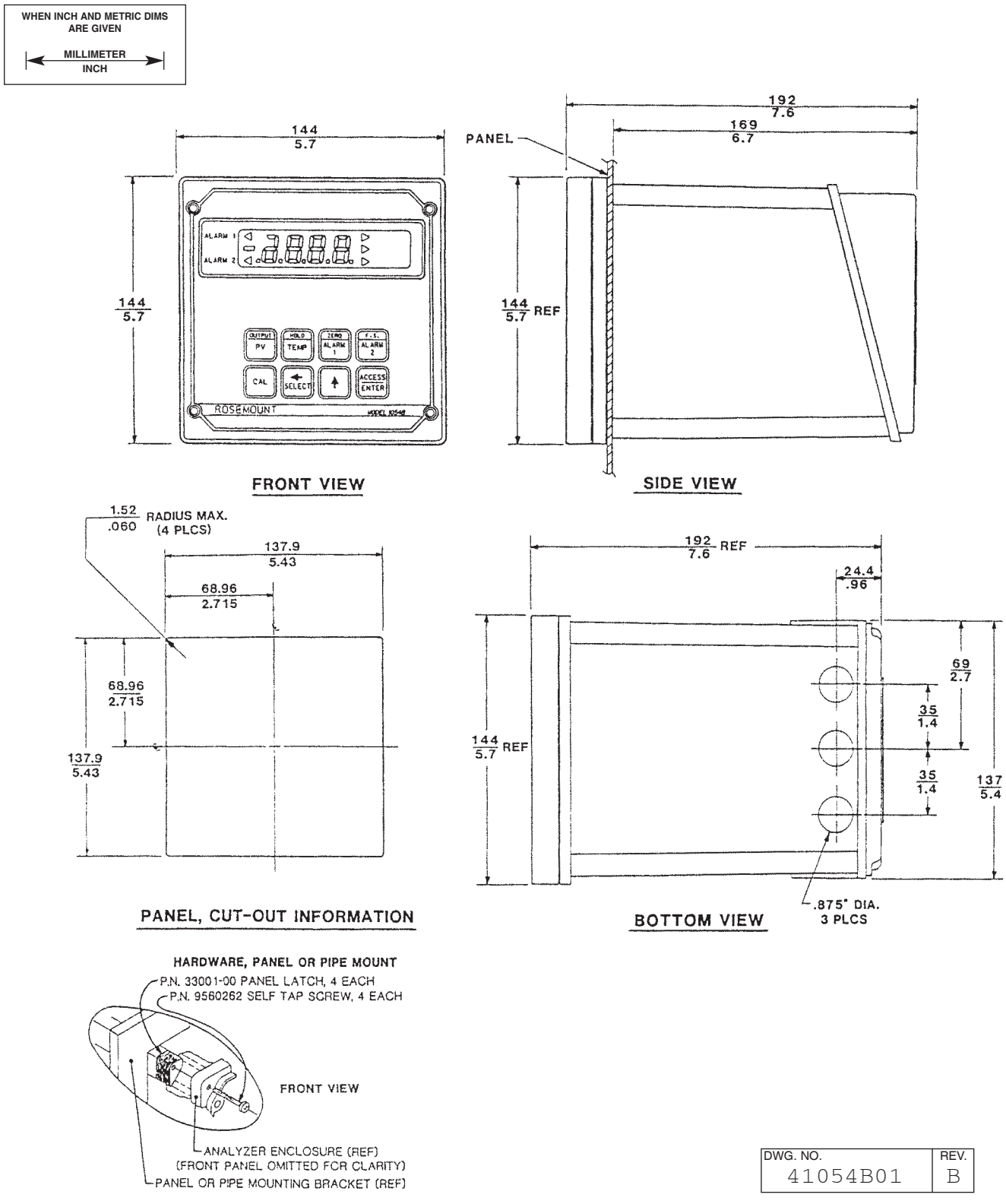
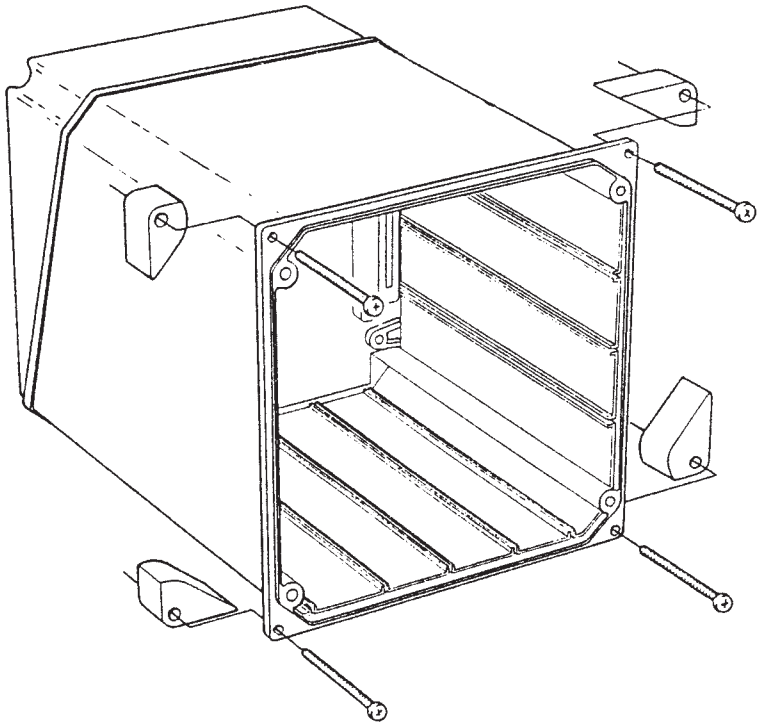
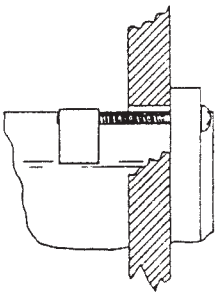


FIGURE 2-1. Panel Mounting Cutout

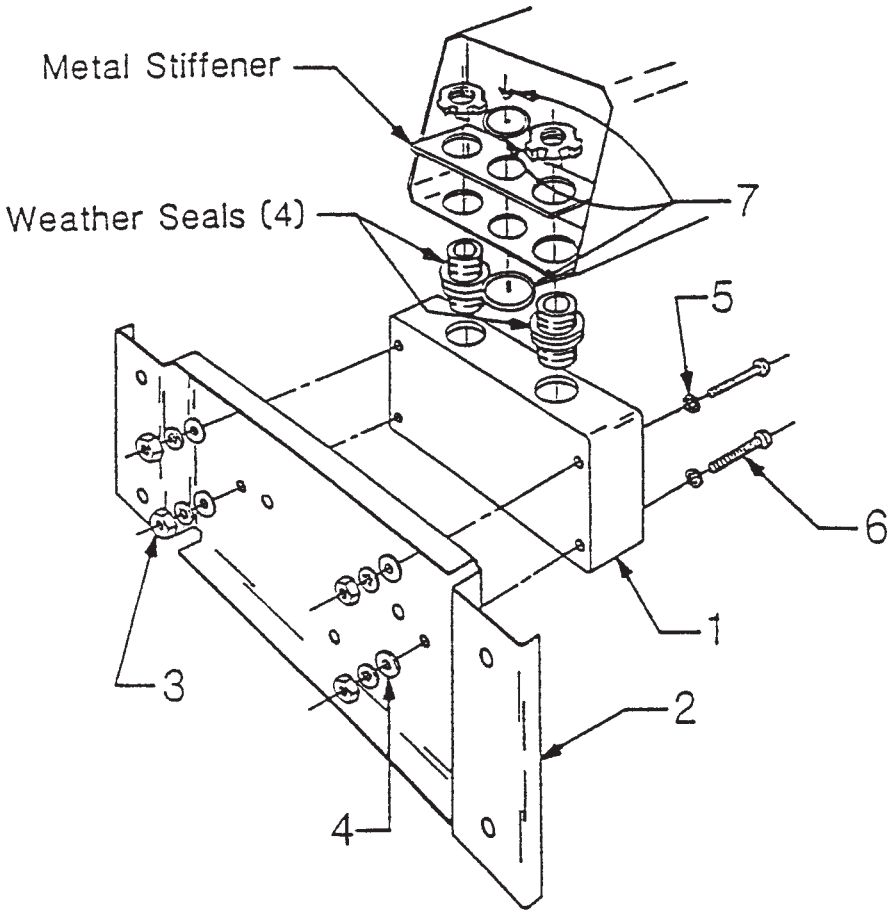




SIDE VIEW

DWG. NO.	REV.
41054A26	A

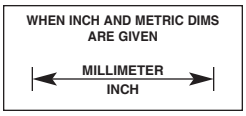
FIGURE 2-2. Panel Mounting Tab Installation

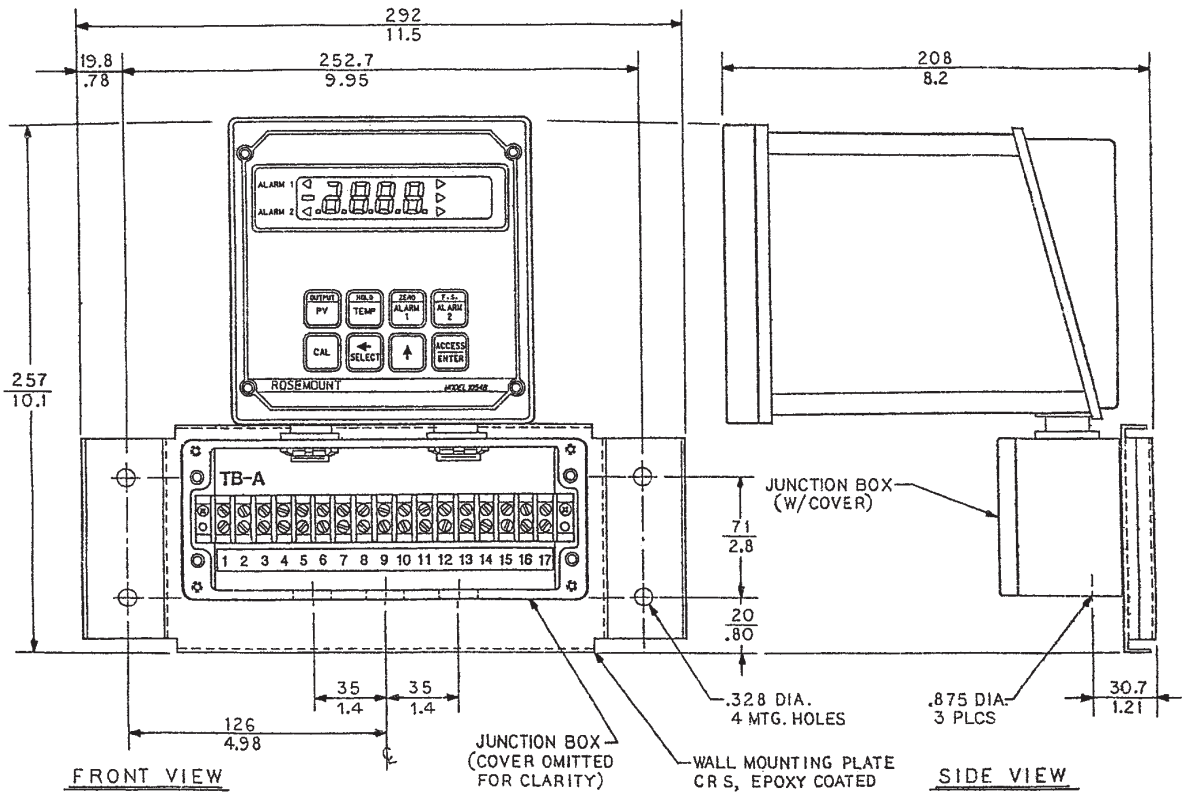


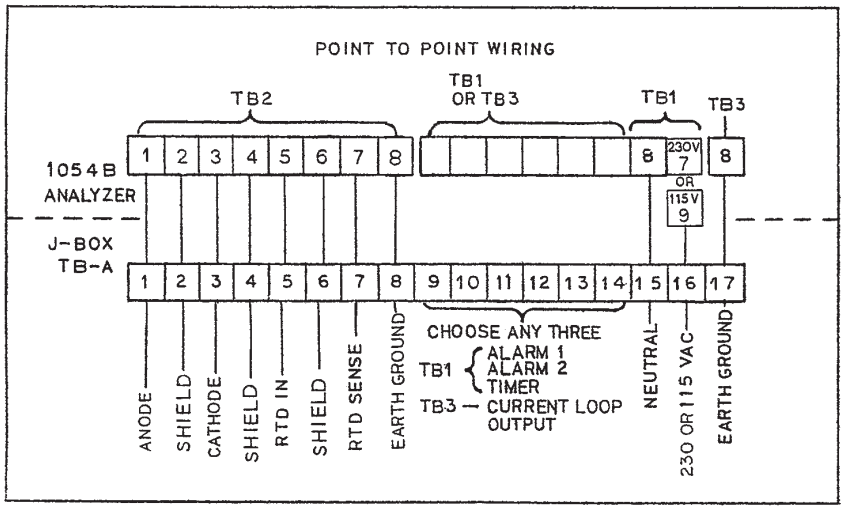
ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	23058-01	S Assy, J-Box	1
2	33030-00	Bracket, wall mtg	1
3	9900600	Nut, 6-32 Hex	4
4	9910600	Washer, Flat #6	4
5	9910610	Washer, Lock Int. #6	8
6	9600612	Screw, 6-32 X .75	4
7	9510048	Seal, Weathertight	1

DWG. NO.	REV.
41054A27	A

FIGURE 2-3. Wall Mounting J-Box Installation







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41054B17	E

FIGURE 2-4. Wall Mounting J-Box Wiring

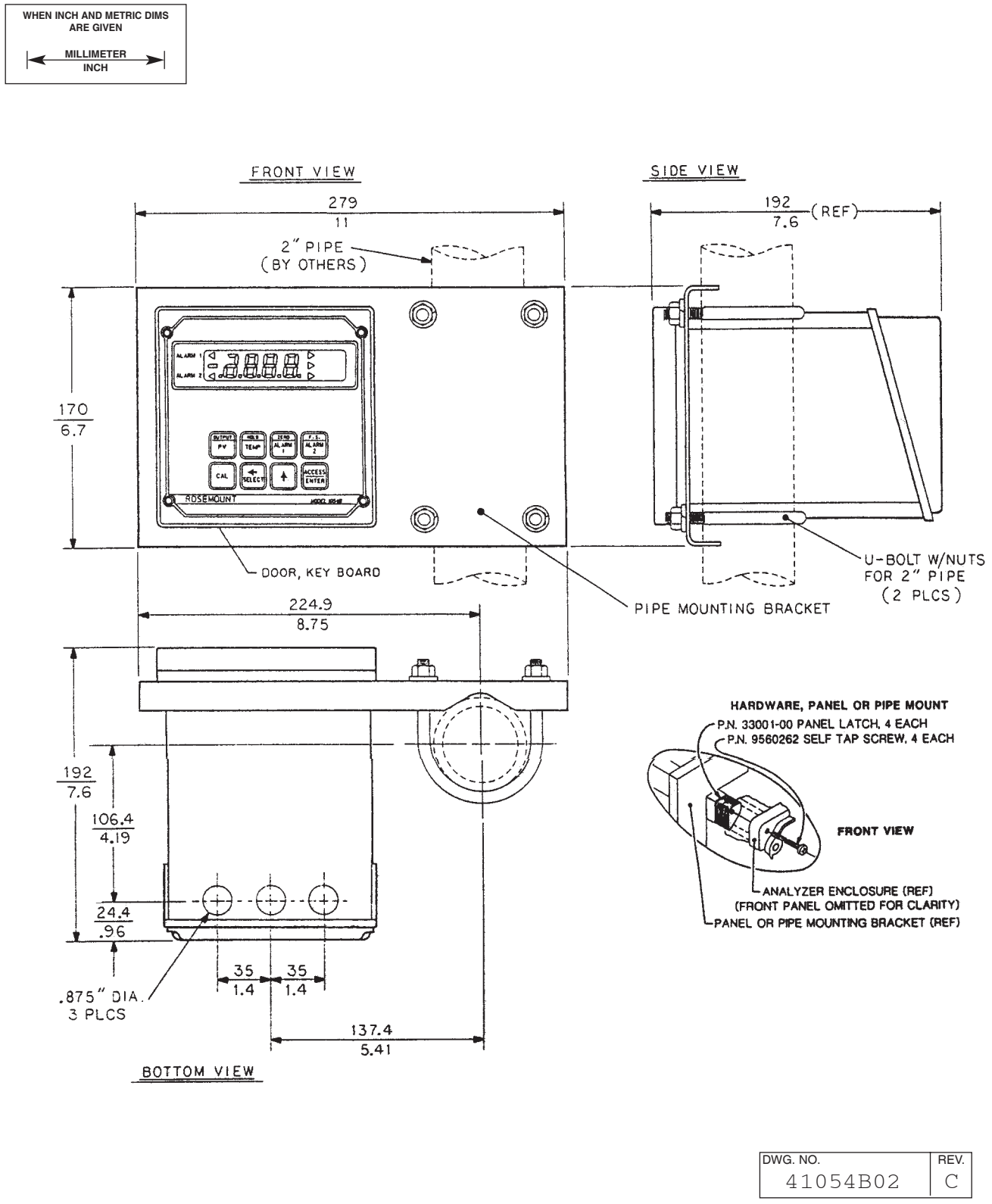
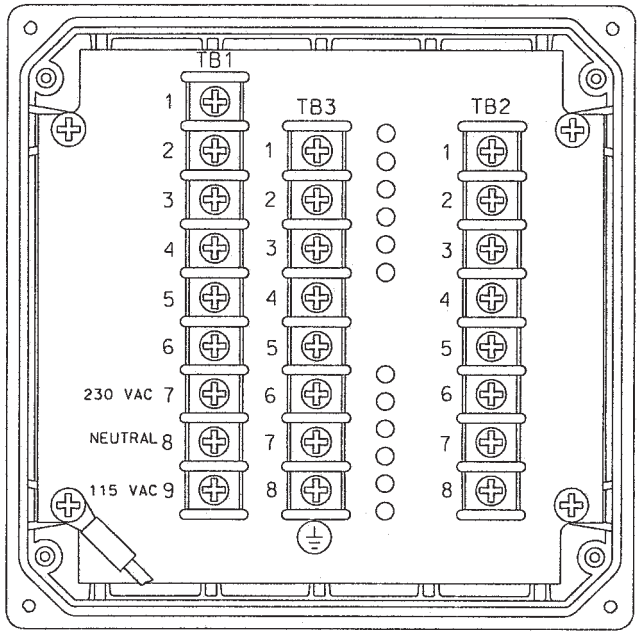


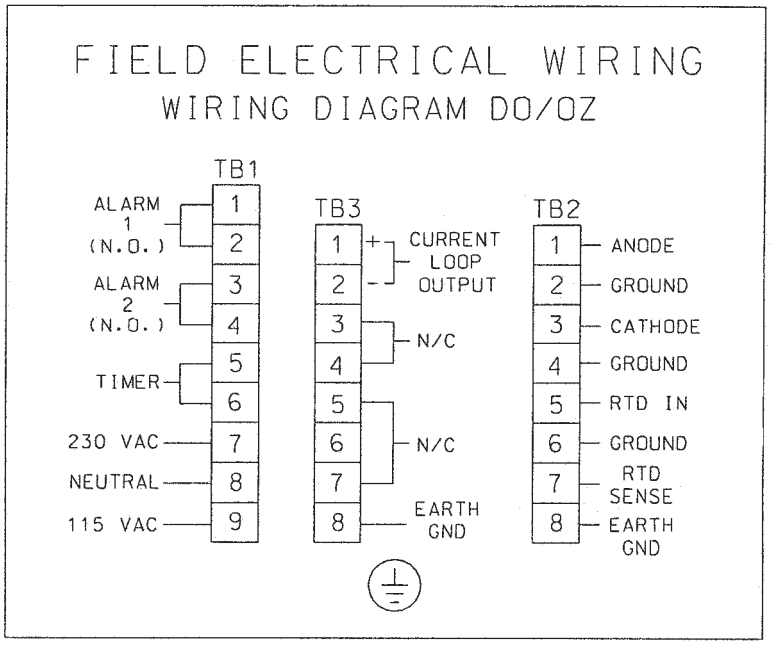
FIGURE 2-5. Pipe Mounting Installation

WHEN INCH AND METRIC DIMS ARE GIVEN

MILLIMETER
INCH



BACK VIEW / COVER OMITTED



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41054B07	B

FIGURE 2-6. Electrical Wiring

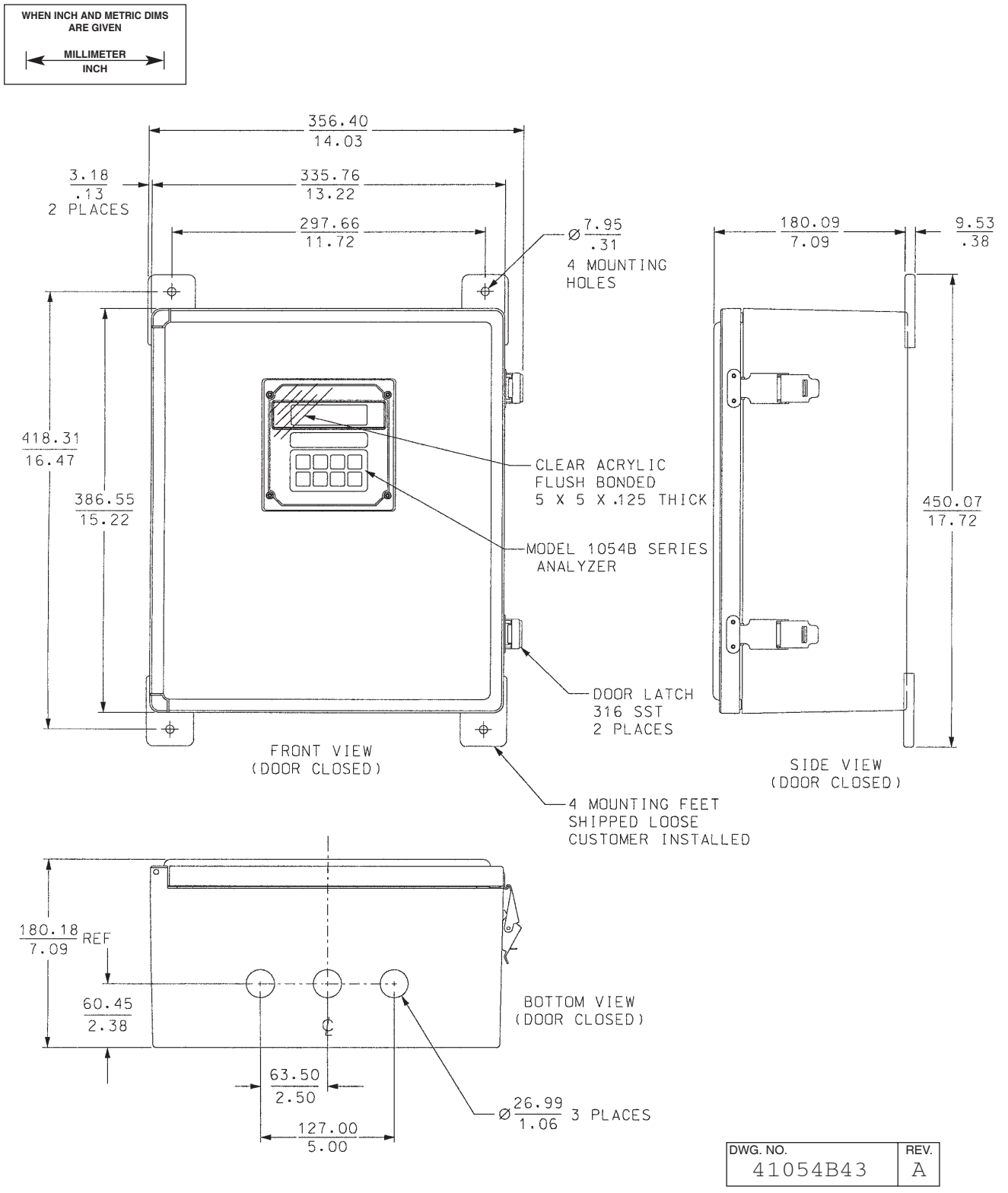


FIGURE 2-7. Wall Mount Enclosure (Option -20)

SECTION 3.0
DESCRIPTION OF CONTROLS

3.1 KEYBOARD FUNCTIONS. All operations of the Model 1054B Microprocessor Analyzer are controlled by the eight (8) keypads on the front of the instrument. These keypads are used to :

1. Display parameters other than the primary parameter.
2. Edit setpoints for alarms, set up specific output current value for simulation, calibrate temperature, conductivity, etc.
3. Configure display for temperature units, for automatic temperature compensation, alarm usage, setting timer functions, security, and output range.

To view, and not change parameters, other than the primary parameter requires only a simple keystroke routine. As shown in Figure 3-1, a single keypress accesses the lower function printed on the keypad. Quick, double keypresses access the top function printed on the keypad.

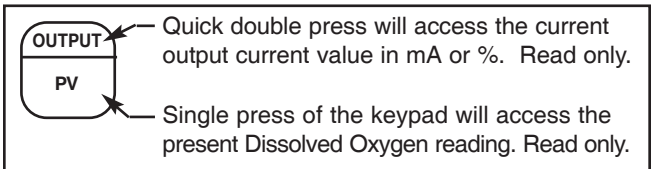


FIGURE 3-1. Function Select on Keypad.

To edit any of these parameters, requires one more operation. After displaying the value associated with the parameter selected, press the **SELECT** keypad. As seen in Figure 3-2, this will display the numerical value, and the first digit will be flashing to indicate this value may be edited.

All changes to the operating program that set-up the instrument display are made through the set menu program. See Figure 4.1.

FIGURE 3-2. Accessing Editing Function.

Configuration is all accomplished through a series of menus located within the set mode menu. To access these set mode menus the **ACCESS** keypad is pressed **TWICE** in **RAPID** succession.

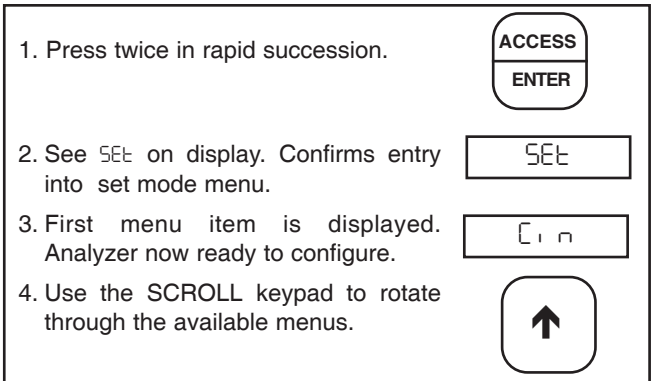


FIGURE 3-3. Accessing Configuration Menus

Once inside the Set mode menu, use the scroll keypad to scroll through the menu list. When the menu desired is displayed, release the scroll keypad.

To enter the submenus press the **SELECT** keypad. If the submenu allows editing, the item will flash that can be edited. If not, use the scroll keypad to scroll through the next list of submenus . **SELECT** will enter this submenu and if it is editable, the field will flash.

To exit the menu and SAVE the new value, press the **ENTER** keypad.

To exit the menu without saving the edited value, press the **PV** keypad to jump out of the set menu program with out saving value. To change other parameters will require re-entering the set menu program.

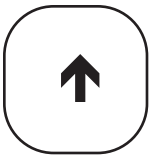
Figure 3-4 explains the various fields surrounding the Primary process on the LC display.

Table 3-1 describes the functions accessible with the 8 keypads, the number of times to press the keypad to access, and its' function when used with the select keypad and set menu.

Tables 3-2 and 3-3 describe the meaning of the various mnemonics used on the display. They are categorized by their use in either menus, or as process information.

3.1.1 Item Selection and Value Adjustment Keys. The three keys located on the lower right side of the keypad are used for menu navigation, value adjustment and entry, and item selection. These keys perform the following functions:

A. SELECT/Shift (←) Key. This key is used to select the displayed menu, or for shifting to the next digit in the Numeric Display.



B. SCROLL Key (↑). This key is used to scroll through menu when selected, or scroll through digits on the active (flashing) Numeric Display, or move the decimal point and ppm/% SAT display. Holding key down auto scrolls display.

C. ACCESS/ENTER Key. This key is used to **ACCESS** the Set Mode (Section 4.1.2) and to **ENTER** the displayed value into memory (from Numeric Display).

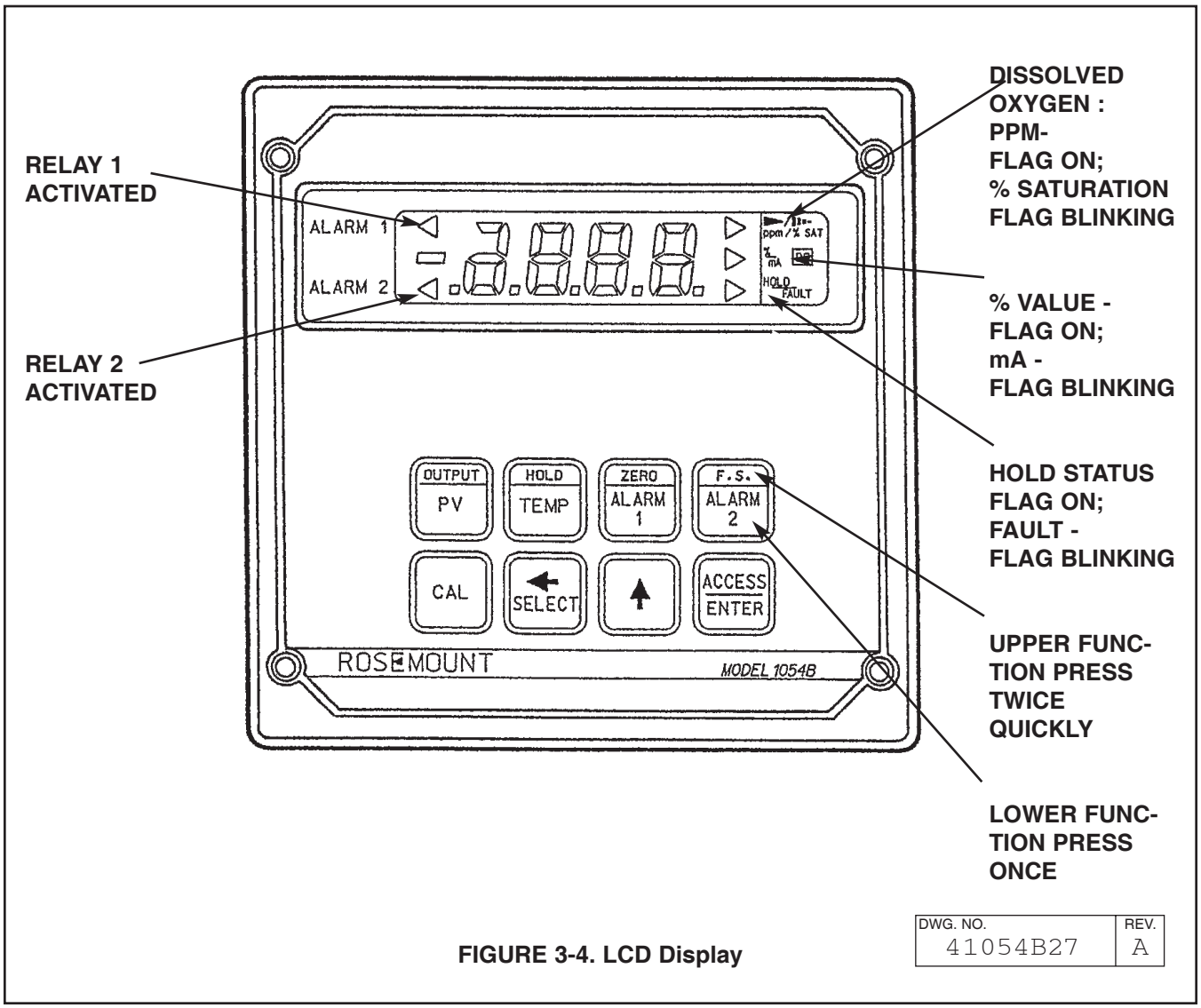


FIGURE 3-4. LCD Display

TABLE 3-1. Key Description

	MAIN FUNCTION (PRESS ONCE)	SECOND FUNCTION (PRESS TWICE QUICKLY)
OUTPUT / **PV**	Displays - DO in ppm or % saturation. Set Function (w/SELECT) - One point standardization of DO. (PV = Process Variable)	Displays - current output (mA or % full scale). Set Function (w/SELECT) - Simulates current output.
HOLD / **TEMP**	Displays - process temperature (°C or °F). Set Function (w/SELECT) - One point standardization of temperature.	Initiates or removes analyzer from hold condition.
ZERO / **ALARM 1**	Displays - Alarm 1 setpoint. Set Function (w/SELECT) - Sets Alarm 1 Setpoint.	Displays – low Lo setpoint; the low end of the dissolved oxygen range that corresponds to 0 or 4 mA DC output.
F.S. / **ALARM 2**	Displays - Alarm 2 setpoint. Set Function (w/SELECT) - Sets Alarm 2 Setpoint.	Displays – high HI setpoint; the high end of the dissolved oxygen range that corresponds to 20 mA DC output.
CAL	Displays - Barometric pressure setting. Used to calibrate the analyzer and the dissolved oxygen sensor loop in air. Set Function (w/select)-One point standardization of % saturation.	**CAUTION** Air calibrate only when the sensor is fully polarized and stabilized in ambient air.
SELECT	Select sub menu (mnemonic display). Shift to next digit (numeric display). Activate decimal point adjustment.	
↑	Scroll through menu (mnemonic display). Scroll digits (numeric display). Holding key down autoscrolls digits or set menu items.	
ACCESS / **ENTER**	Press twice quickly to access set-up menu. Enter displayed value into memory. Enter displayed menu item (flashing) into memory.	

NOTE
When no key is pressed for a period of 60 seconds the analyzer will default to reading DO.

CAUTION
The **HOLD** function and the **CAL** function are not read functions. Refer to Sections 4.16 and 5.0 respectively.

TABLE 3-2. Information Mnemonics

MNEMONIC	DESCRIPTION
AdJ	Adjustment to value reading
bAd	Incorrect entry
HI	Displays high range value for current output
ıtr	Interval timer activated
Lo	Displays low range value for current output
LOC	Access locked - enter security code
SEt	Set mode
Sı C	Simulates current output (mA)
Sı P	Simulates current output (percent)
SP 1	Displays Alarm 1 setpoint
SP2	Displays Alarm 2 setpoint
Std	Standardize DO

TABLE 3-3. Set Function Mnemonics

AL 1	Alarm 1 setup	°F	Temperature °F	rn9	Range units
AL2	Alarm 2 setup	Fct	Solubility factor	rL 1	Relay 1 fault setup
Atc	Automatic temp. comp.	FLt	Fault alarm set	rL2	Relay 2 fault setup
bAr	Bars	Hı	Relay action - high	SAt	% saturation
br	Barometric reset	H-L	Alarm logic	SEC	Seconds
bP	Barometric pressure	hr	Hours	SHO	Show fault history
°C	Temperature °C	HYS	Hysteresis	SI t	Saline solution factor
COd	Security Code	ıH9	Inches mercury	Snr	Sensor type
cnt	Count on times	ın	Display sensor input	SoL	Solubility Correction
CUr	Config. mA output display	ınt	Interval period	t-C	Temperature config.
Cur	Config. fault output	Int	Timer setup	tı L	Display time remaining
cur	Default current setpoint	Lo	Relay action - low	tOn	Timer status
dAY	Days	non	No action on fault	UEr	Display version number
dFt	Fault Configuration	OFF	Alarm off	uH9	Millimeters mercury
do	Dissolved oxygen	oFF	Function off	un	Minutes
d-O	Display output	ont	On time duration	420	4mA to 20mA output
d-t	Display temperature	On	Alarm on	020	0mA to 20mA output
doc	Display output in mA	on	Function on	-0-	Analyzer zero
doF	Delay off time	OFt	Off time duration	1	499 or 491 Sensor Compatible
don	Delay on time	OUt	Current output		
dPn	Dampen output	Pct	Display output in percent	2	492 or 493 Sensor Compatible
dtS	Display test	PPu	Parts per million		
dur	Waiting period duration				

NOTE: See Table 8-1 for Fault Mnemonics.

SECTION 4.0
CONFIGURATION

4.1 GENERAL. This section details all of the items available in the Set Mode and the setpoint adjustment procedures to configure the Model 1054B Dissolved Oxygen Analyzer. Refer to Table 3-3 and Figure 4-1.

4.1.1 Set Mode (SEt). Most of the analyzer's configuration is done while in the Set Mode. Please refer to Figure 4-1 for the layout of all menu items. All menu variables are written to the analyzer's EEPROM (memory) when selected and remain there until changed. As these variables remain in memory even after the analyzer's power is removed, the analyzer configuration may be performed prior to installing it.

1. Make sure the analyzer loop is properly wired. Power up the analyzer. Only power input wiring is required for analyzer configuration. (Refer to Section 5.2 regarding polarization voltage.) The analyzer's display will begin showing values and/or fault mnemonics. All fault mnemonics will be suppressed while the analyzer is in Set Mode (the fault flag will continue to blink).
2. Enter Set Mode. Pressing the **ACCESS** key twice will place the analyzer in Set Mode. The display will show SEt to confirm that it is in Set Mode. It will then display the first item in the set menu br. The analyzer is now ready for user configuration.

NOTE:

If LOC displays, the Keyboard Security Code must be entered to access the Set Mode. (Refer to Section 6.0.) To get out of the Set Mode, press the **PV** key. Refer to the Configuration Worksheet on page 18 for the analyzer ranges and factory settings.

4.1.2 Configuration Work Sheet. The Configuration Worksheet provides the range of the various functions, the factory settings, and a column for user's settings. As you proceed through the configuration procedures for each function of the analyzer, fill in the appropriate information in the USER column. The configuration may be done in any order. However, it is recommended that it be done in the order as shown in the worksheet.

4.1.3 Barometric Pressure. Display Mnemonic br. This function is used to update the barometric pressure setting after the analyzer/sensor loop has been air calibrated and the sensor installed in the process. Refer to Section 5.0, Start-up Calibration. It is only used for the % SAT mode.

4.1.4 Analyzer Zero. Display Mnemonic -0-. This function is used to zero the analyzer/sensor loop. Refer to Section 5.3.2, Analyzer Zero.

4.1.5 Sensor Input. Display Mnemonic in. This function is used to display current input from the sensor. Refer to Section 8.2.4, Sensor Troubleshooting, for more information.

FIGURE 4-1. Set Function Menu

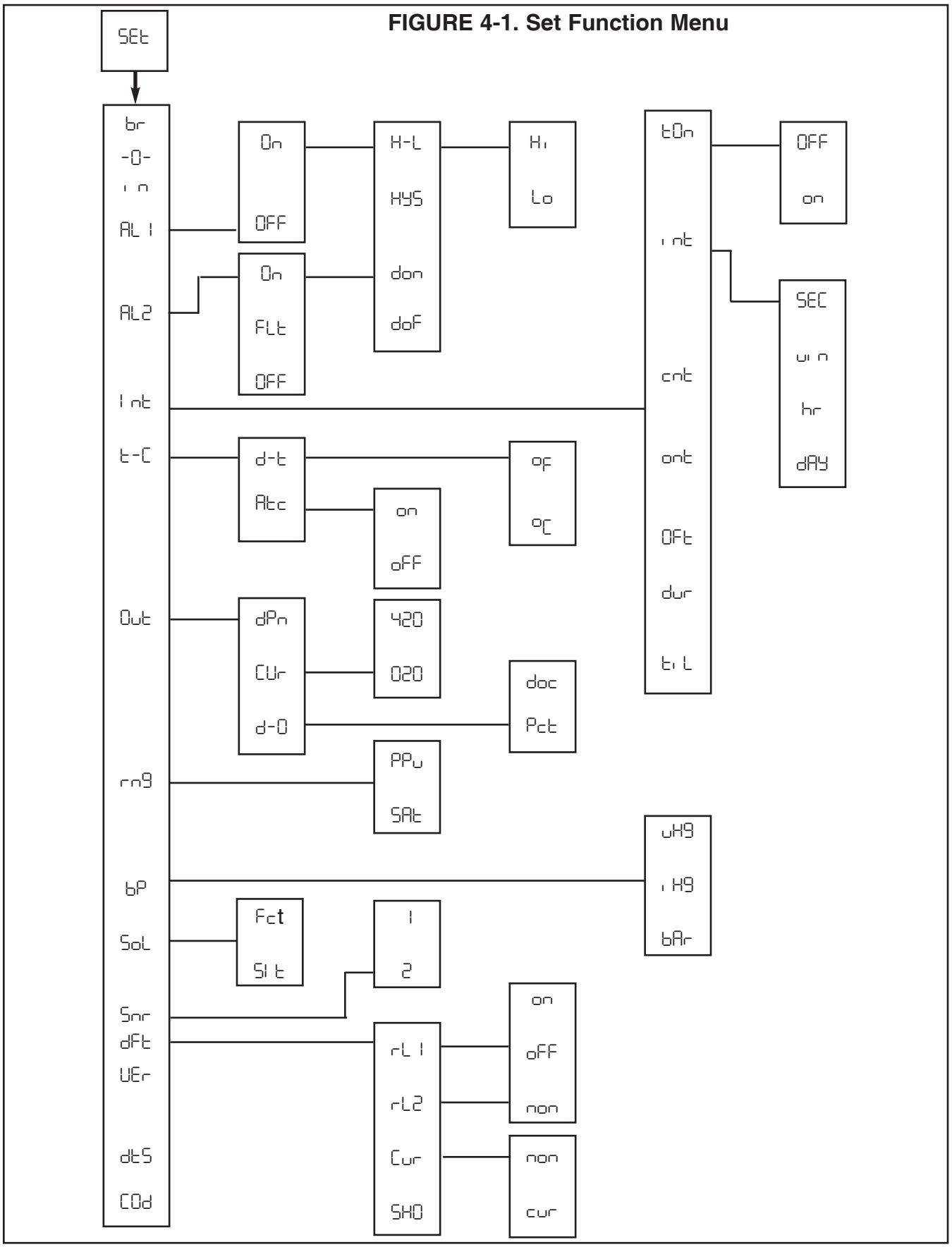


TABLE 4-1. Configuration Worksheet

Use this worksheet to assist in the configuration of the analyzer.

	RANGE	FACTORY SET	USER SET
A. Alarm 1 Setup (AL 1)			
1. Alarm Status (On/OFF)		On	_____
2. High or Low (H-L) (Hi /Lo)		Lo	_____
3. Hysteresis (HYS)	0-2.00	0.00	_____
4. Delay Time On (don)	0-255 sec.	000 Seconds	_____
5. Delay Time Off (doF)	0-255 sec.	000 Seconds	_____
B. Alarm 2 Setup (AL2)			
1. Alarm Status (On/FLt/OFF)		On	_____
2. High or Low (H-L) (Hi /Lo)		Hi	_____
3. Hysteresis (HYS)	0-2.00	0.00	_____
4. Delay Time On (don)	0-255 sec	000 Seconds	_____
5. Delay Time Off (doF)	0-255 sec	000 Seconds	_____
C. Interval Timer (i nt)			
1. Active Status (tOn) (OFF/on)		OFF	_____
2. Interval Time (i nt)	10 min to 2,999 days	1 Day	_____
3. Count (cnt)	1 to 60	5	_____
4. On Time (ont)	0.1 to 299.9 sec	1 Second	_____
5. Off Time (OFt)	0.1 to 299.9 sec	1 Second	_____
6. Duration (dur)	0.1 to 299.9 sec	2 Seconds	_____
D. Temperature Setup (t-C)			
1. Display Temperature (d-t) (°C/°F)		°C	_____
2. Automatic TC (Atc) (on/oFF)		on	_____
a. Manual Temp. Value	0°C to 80°C		_____
E. Current Output Setup (OUt)			
1. mA Output (Cur) (020/420)		420	_____
2. Display Current Output (d-O) (Pct/doc)		doc	_____
3. Dampen Current Output (dPn)	0-255 sec.	0.0 Seconds	_____
F. Output Range Setup (rng)			
1. Parts Per Million (PPu)	0-20	PPu	_____
2. Percent Saturation (SAt)	0-250%		_____
G. Barometric Pressure Setup (bP)			
1. Millimeters Mercury (uHg)	500-1000	uHg	_____
2. Inches Mercury (i Hg)	19.67-39.37		_____
3. Bars (bAr)	0.666-1.333		_____
H. Solubility Correction Factor Setup (SoL)			
1. Solubility Constant (Fct)	0.09 - 9.00	1.00	_____
2. Solubility Factor For Saline Solutions (S lt)	0.00 - 2.00	0.00	_____
I. Sensor compatibility (Snr)			
1. Model 499 or 491(1) / Model 492 or 493 (2)		1	_____
J. Default Setup (dFt)			
1. Relay 1 Default (rL 1) (non/oFF/on)		non	_____
2. Relay 2 Default (rL2) (non/oFF/on)		non	_____
3. Current Output Default (Cur) (non/cur)		non	_____
4. Current Output Held		non	_____
K. Keyboard Security Setup (COd)			
1. Keyboard Security Required	001-999	_	_____
2. Keyboard Security Not Required	000	000	_____
Alarm Setpoints Setup			
1. Alarm 1 (SP 1)	0-20 ppm	0 ppm	_____
2. Alarm 2 (SP2)	0-20 ppm	20 ppm	_____
Current Output Setup			
1. Zero (0 or 4 mA)	0-20 ppm	0 ppm	_____
2. F.S. (20 mA)	0-20 ppm	20 ppm	_____

4.2 ALARM 1 AND 2. Display Mnemonic AL 1 or AL2. Used to set alarm relay logic (See note below). Each alarm is configured separately. Choices are (see note below):

A. On. Display Mnemonic On. Select this item if Alarm 1 or 2 is to be used. If On is selected, AL 1 or AL2 may be configured for either high (Hi) or low (Lo) alarm.

B. Off. Display Mnemonic OFF. Select this item if Alarm 1 or 2 will not be used or to temporarily disable the alarm. Alarm 1 or 2 setpoint will display oFF if this item is selected. All other Alarm 1 or 2 settings are ignored.

C. Fault. (In addition to On and OFF**,** Alarm 2 may be configured to a fault alarm). Display Mnemonic FLt. Select this item to make Alarm 2 a fault alarm. Relay 2 will energize when the analyzer experiences a fault condition. Alarm 2 setpoint will display FLt if this item is selected. All other Alarm 2 settings are ignored.

D. Alarm Logic. Display Mnemonic H-L. Select this item for high or low alarm logic. High alarm logic activates the alarm when the reading is greater than the setpoint value. Low alarm logic activates the alarm when the reading is less than the setpoint value.

E. Relay Hysteresis. Display Mnemonic HYS. Sets the relay hysteresis (dead band) for deactivation after reading has passed the alarm setpoint. May be set from 0 to 2.00. Hysteresis is used to delay the alarm relay deactivation on the low side of the high alarm setpoint, or on the high side of the low alarm setpoint. This feature is used to prevent or minimize alarm chattering.

Example:

High alarm setpoint is 6.00 ppm, and hysteresis is 1.00 ppm. The alarm will activate when the DO reading exceeds 6.00 ppm and will remain activated until the reading drops to below 5.00 ppm.

F. Delay Time On. Display Mnemonic don. Sets time delay for relay activation after alarm setpoint is reached. May be set from 0 to 255 seconds. Normal (no alarm) state restarts time from zero. Use when a fixed time should pass before relay activation occurs.

G. Delay Time Off. Display Mnemonic doF. Sets time delay for relay deactivation after alarm setpoint is reached. May be set from 0 to 255 seconds. Alarm state restarts time from zero. Use when a fixed time should pass before relay deactivation occurs.

4.2.1 Alarm Setup (AL 1/AL2**).** Refer to Figure 4-1 and Table 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. **SCROLL** (↑) until AL 1 or AL2 appears on the display.
3. **SELECT** to move to the next menu level. On, OFF or FLt (AL2 only) will display.
4. **SCROLL** (↑) to display desired item then **SELECT**.
5. If OFF is selected, display will show oFF to acknowledge. Press the **ENTER** key to return to AL 1 or AL2, concluding routine.

   If On is selected, display will show on to acknowledge, then display H-L. Proceed to Step 6.

   If FLt is selected (AL2 only), display will show FLt to acknowledge. Press the **ENTER** key to return to AL2.
6. **SELECT** On. Hi or Lo will display (flashing).
7. **SCROLL** (↑) to the desired item and **ENTER** it into memory. Display will return to H-L. If changes to relay activation logic are desired, proceed to Step 8, otherwise Step 12.
8. **SCROLL** (↑) to display HYS, don or doF then **SELECT**. Numerical display will flash to indicate that a value is required.
9. Use the **SCROLL** (↑) and **SELECT** keys to display the desired value.
10. **ENTER** the value into memory. Analyzer will acknowledge and return to display of last item selected. Repeat Step 8 if further changes are desired, otherwise Step 12.
11. Repeat Step 3 for the other Alarm's settings as required.
12. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.3 INTERVAL TIMER. Display Mnemonic int. This item is used to set the interval timer's relay logic. The timer can be used as a sensor maintenance reminder. Choices are:

A. Interval Timer Enable/Disable. Display Mnemonic tOn. Select this item to begin interval cycle on or disable interval cycle OFF.

B. Interval Period. Display Mnemonic int. Select this item to set the time period between end of wait duration and beginning of new on-off cycle. SEC for seconds, min for minutes, hr for hours, and dAY for days. May be set from 1 second to 2999 days. **Time of less than 10 minutes is not recommended.**

C. On Periods Per Cycle. Display Mnemonic cnt. Select this item to enter the number of on periods per cycle. May be set from 1 to 60 on periods.

D. Duration of On Periods. Display Mnemonic ont. Select this item to enter the relay activation time for each on period. May be set from 0.1 to 299.9 seconds.

E. Duration of Off Periods. Display Mnemonic OFt. Select this item to enter the relay deactivation time between each on period during the control cycle. Valid when cnt is 2 or greater. May be set from 0.1 second to 299.9 seconds.

F. Wait Duration. Display Mnemonic dur. Select this option to enter the wait duration after the last on period in a cycle. May be set from 0.1 to 299.0 seconds. The wait duration can be used for sensor recovery after a cycle to allow the process to stabilize before the next interval time starts again.

NOTE:

The Model 1054B DO is placed *on hold* during the control cycle (from first on period through the wait duration). The analyzer will simulate a fault condition and briefly show itr every eight seconds. The display will continue to show the measured value.

G. Interval Time Remaining. Display Mnemonic tiL. Select this item to display the time remaining to the next control cycle. If selected during the control cycle, display will show ---.

4.3.1 Interval Timer Set Up (int). Refer to Figure 4-1

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until int appears on the display.
3. Press the **SELECT** key to move to the next menu level. tOn will display. Press the **SELECT** key again.
4. Press the **SCROLL** (↑) key to display on (if the interval timer *is to be used*) or OFF (if the interval timer *is not to be used*) and press the **ENTER** key. If interval timer configuration is required, proceed to Step 5, otherwise Step 15.
5. Press the **SCROLL** (↑) key to display the next menu item, int. Press the **SELECT** key.
6. Press the **SCROLL** (↑) key to display desired duration and **SELECT** it.
7. Press the **SCROLL** (↑) key and **SELECT** key to display the desired value and press the **ENTER** key.
8. Repeat Steps 6 and 7 as needed.
9. Press the **ENTER** key to return to the interval period int menu.
10. **SCROLL** (↑) down to cnt (on periods per cycle) Press the **SELECT** key and the current setting will flash. Repeat Step 7.
11. **SCROLL** (↑) down to ont (duration of on times). Press the **SELECT** key and the current setting will flash. Repeat Step 7.
12. **SCROLL** (↑) down to OFt (duration of off times). Press the **SELECT** key and the current setting will flash. Repeat Step 7.
13. **SCROLL** (↑) down to dur (waiting time after the last on cycle). Press the **SELECT** key and the current setting will flash. Repeat Step 7.
14. **SCROLL** (↑) down to tiL (time interval lapse). Press the **SELECT** key to display the time remaining. Press the **ENTER** key to return to tiL.
15. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.4 TEMPERATURE CONFIGURATION. Display Mnemonic t-C. Select this item for temperature reading and compensation choices.

A. Temperature Display. Display Mnemonic d-t. Select this item to toggle between °F and °C temperature display. The analyzer will show all temperatures in the units selected.

B. Automatic Temperature Compensation. Display Mnemonic Atc. The analyzer will use the temperature input from the sensor for temperature compensation when on is selected. When oFF is selected, the analyzer will use the value entered by the user for manual temperature compensation. This manual temperature option is useful if the temperature sensor is faulty or not on line. Temperature specific faults will be disabled (Refer to Table 8-1).

4.4.1 Temperature Setup (t-C). Refer to Figure 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until t-C appears on the display.
3. Press the **SELECT** key to move to the next menu level. d-t will display.
4. Press the **SELECT** key. °C or °F will be displayed flashing. **SCROLL** (↑) to desired unit.
5. Press the **ENTER** key when the desired temperature unit is displayed. The analyzer will now display temperature readings in this unit until changed.
6. **SCROLL** (↑) to Atc then press the **SELECT** key. on or oFF will be displayed flashing. **SCROLL** (↑) to desired condition.
7. Press the **ENTER** key when the desired condition is displayed.
8. If on was entered, proceed to Step 10. If oFF was entered, the last temperature used for manual compensation will be displayed with the right digit flashing.
9. Use **SCROLL** (↑) and **SHIFT** (←) to display the desired value. **ENTER** value into memory.
10. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.5 CURRENT OUTPUT. Display Mnemonic is OUt. This item is used to select signal output configuration.

A. Output Dampening. Display Mnemonic dPn. This function is used to filter out and spread out any change in signal output. The number entered is the sampling time (in seconds). Zero to 255 seconds may be entered. If less than 1 second is entered, the signal output change takes place immediately. If 1 to 255 seconds is entered, 63% of the signal output change takes place in the first sampling time, then 63% of the balance of the signal output change takes place in the next sampling time, etc.

B. mA Output Range. Display Mnemonic CUr. Selection of this item will allow choice of either 0 to 20 mA or 4 to 20 mA output range.

C. Display Output. Display Mnemonic d-O. This item is used to select output display logic. Selecting this item will allow the analyzer to display current output in mA (when doc is entered) or in percent of full scale output range (when Pct is entered). When the **OUTPUT** key is pressed, a steady flag indicates that the value displayed is percent output. A flashing flag indicates mA output.

4.5.1 Output Setup (OUt). Refer to Figure 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until OUt appears on the display.
3. Press the **SELECT** key to move to the next menu level. dPn will display.
4. Press the **SCROLL** (↑) key then **SELECT** desired item.
5. If dPn is selected, numerical display will flash indicating that a value is required. Proceed to Step 6.

   If CUr or d-O is selected, proceed to Step 7.
6. Use **SCROLL** (↑) and **SELECT** keys to display the desired value. **ENTER** into memory. Proceed to Step 11.
7. If CUr is selected, 420 or 020 is displayed flashing.

8. **SCROLL** (↑) to the desired mA choice and press **ENTER**. Proceed to Step 11.
9. If d-O is selected, Pct or doc is displayed flashing.
10. **SCROLL** (↑) to the desired output unit and press **ENTER**.
11. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.6 DISSOLVED OXYGEN RANGE UNITS. Display Mnemonic rn9. This function is used to select the desired dissolved oxygen range units. One of the following two range units may be chosen:

A. (ppm) Display Mnemonic (PPu). Selecting this item is for parts per million by weight of dissolved oxygen concentration.

B. Percent (%) Saturation Display Mnemonic (SAt). Percent (%) saturation is the percent of dissolved oxygen in solution compared to the maximum amount of dissolved oxygen the solution can hold at a given temperature and partial pressure of oxygen.

NOTE

Dissolved oxygen values will be displayed in the unit selected until changed.

4.6.1 Dissolved Oxygen Analyzer Set Up (rn9)**.** Refer to Figure 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until rn9 appears on the display.
3. Press the **SELECT** key. PPu or SAt will be displayed.
4. Press the **SCROLL** (↑) key to display the desired range unit.
5. Press the **ENTER** key to enter the desired unit into memory.
6. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.7 BAROMETRIC PRESSURE UNITS. Display Mnemonic bP. This function is used to select the barometric pressure units needed by the microprocessor during the air calibration step. One of the following three range units may be chosen:

A. bAr if the barometric pressure is given in bars.

B. inHg if the barometric pressure is given in inches of mercury.

C. uHg if the barometric pressure is given in millimeters of mercury.

4.7.1 Barometric Pressure Unit Set Up (bP)**.** Refer to Figure 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until bP appears on the display.
3. Press the **SELECT** key. uHg inHg or bAr will be displayed flashing.
4. Press the **SCROLL** (↑) key to display the desired barometric pressure unit.
5. Press the **ENTER** key to enter the desired unit into memory.
6. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.8 SOLUBILITY CORRECTION FACTOR. Display Mnemonic SOL. This function is used to correct for the solubility of oxygen in the process liquid which is other than fresh water or is unique to the customer. One of the following two factors may be chosen:

A. FCt – Solubility constant of the process liquid. **For fresh water, enter a value of 1.00.** (The solubility constant FCt range is 0.09 to 9.00.)

B. SLt – The salinity of the liquid measured in parts per thousand by weight of salt. **For fresh water, enter a value of 0.00.** (The typical parts per thousand salt by weight range is 0.00 to 2.00.)

NOTE

10 ppt of salt is equivalent to 1.00 percent salt.

4.8.1 Solubility Correction Factor Set Up (SOL**).** Refer to Figure 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until SOL appears on the display.
3. Press the **SELECT** key. FCt or SLt will be displayed. Press the **SCROLL** (↑) key to display the desired choice.
4. Press **SELECT** key. The last choice used will be displayed flashing.
5. Use the **SCROLL** (↑) and **SELECT** keys to display the desired value. Press the **ENTER** key to enter the value into memory.
6. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

NOTE

Dissolved oxygen values will now be corrected according to the current factor value entered until new values are entered.

4.9 SENSOR COMPATIBILITY. Display mnemonic SNR. This item is used to select the proper sensor compatibility. There are to menu choices.

A. 1 - For use with the Model 499DO or Model 491.

B. 2 - For use with the Model 492 or Model 493.

The correct selection must be made to match the Model 1054B DO to the output characteristics of the sensor to be used.

4.9.1 Sensor Compatibility Set Up (SNR**).** Refer to Figure 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until SNR appears on the display.
3. Press the **SELECT** key. 1 or 2 will be displayed. Press the **SCROLL** (↑) key to display the appropriate choice.
4. Press the **ENTER** key to enter the value into memory.
5. Press the **ENTER** key to return to the first level of the set menu, or press the **PV** key to return to normal operation.

4.10 DEFAULTS. Display Mnemonic dFt. This function is used to set the configuration of relay and output conditions during a FAULT or HOLD status. A flashing flag beside the HOLD/FAULT label indicates a fault condition.

A. Relays 1 and 2. Display Mnemonic rL1 and rL2. The relays can be set to activate on, deactivate oFF, or hold present status non.

When on is chosen, the relay will be activated at a FAULT or HOLD condition.

When oFF is chosen, the relay will be deactivated at a FAULT or HOLD condition.

When non is chosen, the relay will maintain its status during a FAULT or HOLD condition.

B. Current Output. Display Mnemonic Cur. This item is used to configure the analyzer's output during a FAULT or a HOLD condition. There are two selections: non and cur. When non is chosen, the present output is frozen at a FAULT or HOLD condition. When cur is chosen, the analyzer uses the milliamp value the user has entered to be the output during a FAULT or HOLD condition.

C. Fault History. Display Mnemonic SHO. Selecting this item will allow the user to view all the faults of the two most recent fault conditions that have occurred since the last reset viewing.

4.10.1 Default Setup (dFt). Refer to Figure 4-1.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until dFt appears on the display.
3. Press the **SELECT** key to move to the next menu level. rL 1 will display.
4. Press the **SCROLL** (↑) key to display desired item then press the **SELECT** key.
5. When rL 1 or rL2 is selected, non, OFF, or on is displayed flashing. Press the **SCROLL** (↑) key to display the desired condition and press the **ENTER** key to enter the selection into memory.
6. When Cur is selected, non or cur is displayed flashing. Press the **SCROLL** (↑) key to display the desired condition and press the **ENTER** key to enter the selection into memory. When cur is entered, the mA value in memory is displayed with the right digit flashing. Use **SCROLL** (↑) and **SELECT** to display the desired value and press the **ENTER** key to enter this value into memory.
7. When SHO is selected, press the **SELECT** key to view the fault history. Pressing the **ENTER** key will erase the list from memory. A new list is started as new faults occur.
8. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.11 SOFTWARE VERSION NUMBER. Display Mnemonic UEr. This function displays the software version number used in the particular analyzer being used. This information may be very important in servicing the analyzer.

4.11.1 To Display Software Version Number.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until UEr appears on the display.
3. Press the **SELECT** key and the software version number will be displayed.
4. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.12 DISPLAY TEST. Display Mnemonic dtS. This function allows the user to visually test the LCD display segments. If the display is functioning properly, all the LCD segments are activated.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until dtS appears on the display.
3. Press the **SELECT** key and all the LCD segments will be displayed for about 5 seconds.
4. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.

4.13 ALARM SETPOINT. The alarm setpoints should be adjusted after completing the configuration procedure as outlined in Sections 4.2 to 4.10.

1. Press the **PV** key to ensure that the analyzer is not in Set Mode.
2. Press the **ALARM 1** or **ALARM 2** key. SP 1 or SP2 will show briefly, followed by the Alarm 1 or Alarm 2 setpoint currently in memory.

NOTE

If the alarm is set to OFF or FAULT (AL2 only), the analyzer will display OFF or FLt respectively. No setpoint value can be entered unless on has been selected in the set menu (Refer to Section 4.2, Alarm Setup).

3. Press the **SELECT** key to adjust the value. The display will acknowledge briefly with AdJ followed by the numeric display with right digit flashing.
4. **SCROLL** (↑) and **SELECT** to display the desired setpoint.
5. Press **ENTER.** SP 1 or SP2 will show briefly, then the desired setpoint is displayed.

NOTE

Alarm logic may be changed from normally open (N.O.) to normally closed (N.C.) by cutting circuits (W5, W7, W9) on the power supply PCB and adding jumpers (W4, W6, W8).

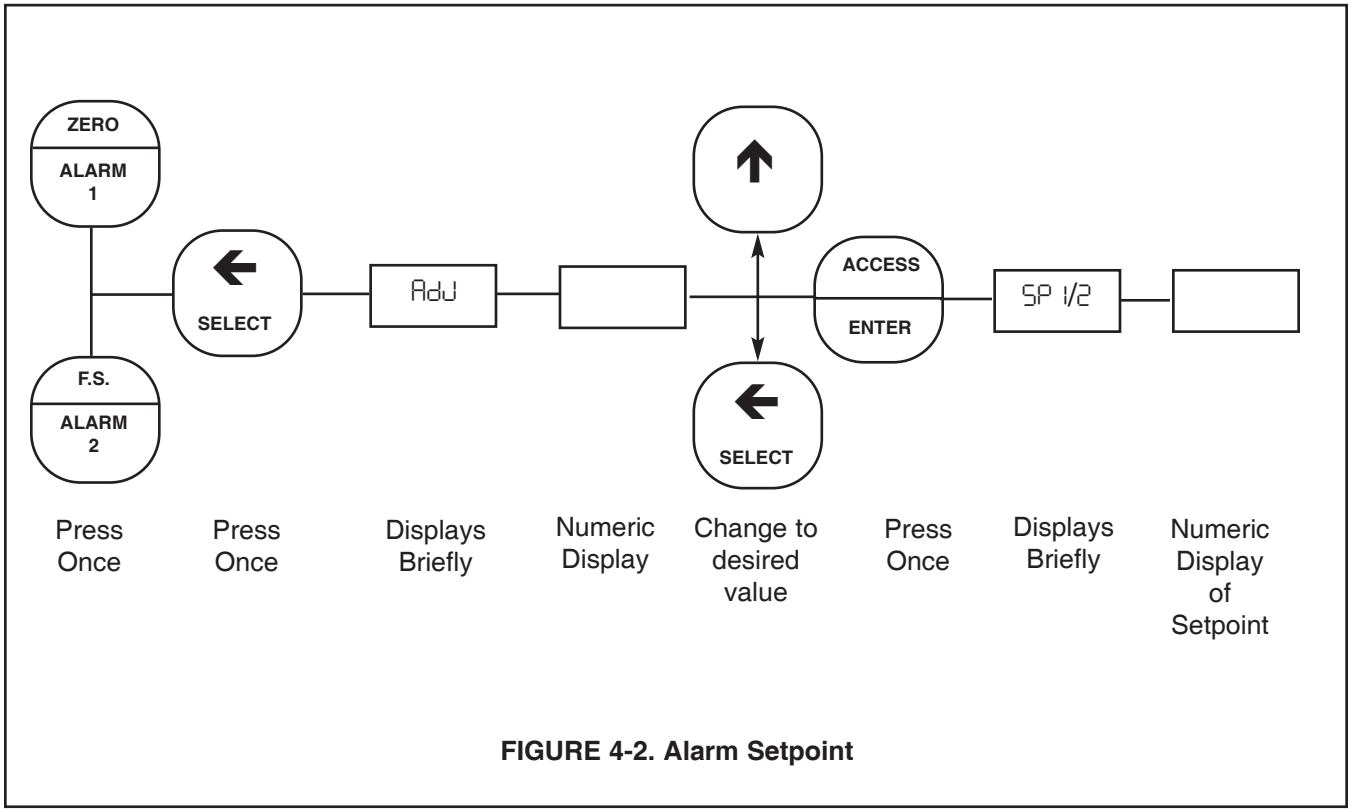


FIGURE 4-2. Alarm Setpoint

4.14 OUTPUT SCALE EXPANSION. This section should be followed only if the current output needs to be scaled to an operating range other than the factory setting of 0-20 ppm dissolved oxygen. The output ZERO and FULL SCALE value should be adjusted after completing the configuration procedure as outlined in Sections 4.2 to 4.10.

A. Zero Setpoint. This is the low dissolved oxygen value that the user wants to correspond to 0 or 4 mA DC output. To change the setpoint, perform the following steps:

1. Press the **PV** key to ensure that the analyzer is not in Set Mode.
2. Press the **ZERO** key. LO will show briefly, followed by the ZERO DO value in memory.
3. Press the **SELECT** key to adjust the value. The display will acknowledge briefly with AdJ followed by the numeric display with right digit flashing.
4. **SCROLL** (↑) and **SELECT** to display the desired setpoint.
5. Press **ENTER.** LO will show briefly, then the desired DO valve is entered into memory and displayed.

B. Full Scale Setpoint. This is the high dissolved oxygen value that the user wants to correspond to 20 mA DC output. To change the setpoint, perform the following steps:

1. Press the **PV** key to ensure that the analyzer is not in Set Mode.
2. Press the **F.S.** key. HI will show briefly, followed by the FULL SCALE DO value.
3. Press the **SELECT** key to adjust the value. The display will acknowledge briefly with AdJ followed by the numeric display with right digit flashing.
4. **SCROLL** (↑) and **SELECT** to display the desired setpoint.
5. Press **ENTER.** HI will show briefly, then the desired DO value is entered into memory and displayed.

NOTE
For reverse output, enter the higher value for zero, and the lower value for the F.S.

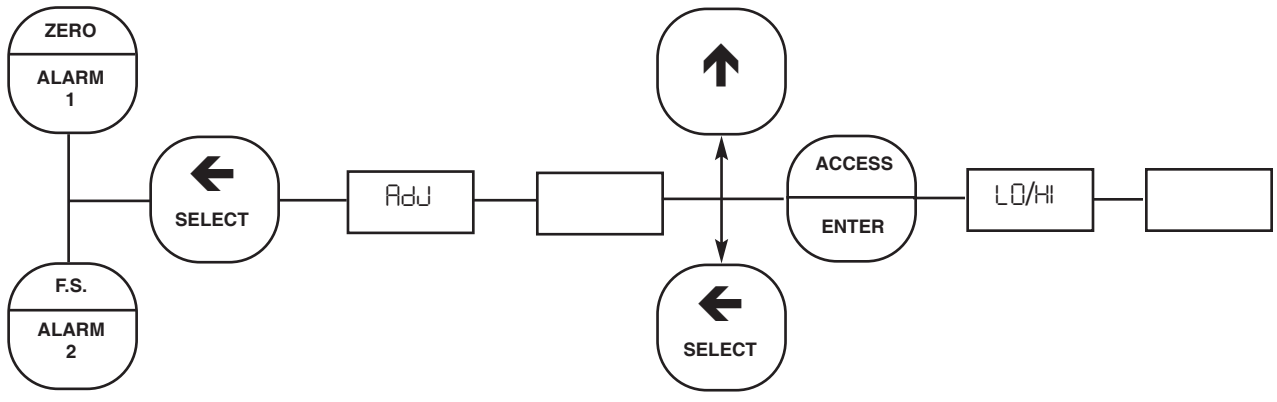


FIGURE 4-3. Output Scale Expansion

4.15 OUTPUT DISPLAY/OUTPUT SIMULATION. The output may be displayed by pressing the **OUTPUT** key. The output is displayed in either milliamp DC or in percent, depending on the output unit selected in the OUt/d-O menu. Refer to Section 4.5.1.

Output simulation allows the user to simulate the current output to test the operation of the devices connected to the output terminals TB3-1 and TB3-2.

Perform the following steps to display output and to simulate output:

1. Press the **OUTPUT** key to display the output. dOC or PCt will show briefly; then the output is displayed either in milliamp DC or in percent output.

   CAUTION

   Pressing the **SELECT** key to enter the simulation mode will make the analyzer immediately transmit an output equivalent to the simulation value in memory.

2. Press the **SELECT** key once. S, C (for current output simulation) or S, P (for percent output simulation) will show briefly, then the simulation value in memory is displayed with right digit flashing. The analyzer is put on HOLD at this time.
3. **SCROLL** (↑) and **SELECT** to display the desired simulation value.
4. Press **ENTER.** dOC or PCt will show briefly, then the desired simulation value is displayed flashing and takes effect until the analyzer is taken out of HOLD status. Press **HOLD** twice to remove the analyzer from HOLD status.

4.16 HOLD. Press **HOLD** twice to put the analyzer on HOLD, or to get the analyzer out of HOLD. The analyzer is on HOLD when the HOLD/FAULT flag is steady.

Putting the analyzer on HOLD will result in the following:

A. If non was chosen in the dFt/Cur menu, the present process current output is frozen until the analyzer is out of HOLD status.

B. If cur was chosen in the dFt/Cur menu, the present current output will switch (default) to the value entered for current output default.

During a HOLD status, the analyzer may be calibrated or configured. The new values will take effect only after the analyzer is taken out of the HOLD condition.

SECTION 5.0
START-UP AND CALIBRATION

5.1 GENERAL. This section provides the start-up and calibration procedures for the Model 1054B Dissolved Oxygen Analyzer with its compatible Rosemount Analytical Models 491, 492, 493 and 499 DO Sensors. The start-up and calibration procedures must be performed only after the installation (Section 2.0) and Configuration (Section 4.0) sections have been properly carried out .

5.2 START-UP. The start-up procedure for the1054B DO involves the configuration of the analyzer to your particular process requirements and logging the various setpoints in the user column of the Configuration Worksheet. Also involved is the complete polarization of the DO sensor.

When the analyzer is powered up, a polarizing voltage is applied between the sensor's anode and cathode. The sensor (electrode) current is initially very high, then quickly falls off and settles to a steady state after a few hours.

It is recommended that the analyzer remains powered up to the sensor while preparing for calibration or while undergoing routine maintenance. Sensor life will not be shortened under these conditions because only a very small current flows through the sensor. If for any reason the sensor has to be disconnected (or the analyzer switched off) the sensor will have to be polarized before it can be ready for further operation.

IMPORTANT NOTE

The first time the analyzer is powered up with a sensor installed, Orn may be flashing. Press the **CAL** key, then the **SELECT** key, and then press **ENTER** to remove this fault.

5.3 CALIBRATION.

5.3.1 Temperature Calibration. For accurate temperature compensation and temperature readings, the TEMP function of the analyzer must be calibrated.

1. Place the sensor in a container filled adequately with process sample or any known solution.
2. Place a calibrated temperature reading device in the sample container.
3. Allow the readings to stabilize.
4. When the readings are stable, compare the analyzer's reading to that of the calibrated temperature indicating device.

If the analyzer's reading requires adjusting, follow these steps:

1. Press the **PV** key to ensure that the analyzer is not in Set Mode.
2. Press the **TEMP** key once. °F or °C will show briefly, then the present temperature is displayed in either °F or °C (depending on the unit selected in the t-C/d-t menu).
3. Press the **SELECT** key to adjust the value. The display will acknowledge briefly with AdJ followed by the numeric display with right digit flashing.
4. **SCROLL** (↑) and **SELECT** to display the desired correct temperature.
5. Press **ENTER.** °F or °C will show briefly, then the solution temperature is displayed.

5.3.2 Analyzer Zero. This procedure is required to electronically zero the analyzer/sensor loop. In order to eliminate any residual current in the loop the sensor must be placed in a zero Dissolved Oxygen solution and remain there for a minimum of 12 to 24 hours before adjusting the analyzer zero (0 ppm or 0% saturation).

1. Place the sensor in a sodium sulfite solution (1 gram or about 1/10 teaspoonful to a liter of water) or in pure nitrogen gas.
2. Allow the sensor to stabilize in the zero DO environment.
3. Press the **ACCESS** key twice to enter the Set Mode.
4. Press the **SCROLL** (↑) key until -0- is displayed.
5. Press the **SELECT** key. -0- will flash for about five seconds and then freeze. The analyzer loop is now zeroed.
6. Press the **ENTER** key to return to the first level of the Set Menu, or press the **PV** key to get out of the Set Mode.
7. Remove the sensor from the solution. Gently clean and dry the sensor.
8. Proceed to Section 5.3.3, ppm Calibration, or Section 5.3.4, % Saturation Calibration.

5.3.3 ppm Calibration.

5.3.3.1 Air Calibration The Model 1054B DO Analyzer and the appropriate DO Sensor loop may be air calibrated quite easily.

1. Place the sensor in ambient air.
2. Make sure the sensor is clean, dry and in good condition. Make sure the sensor is completely polarized (at least 2 hours). For optimum results, the loop should be powered overnight.
3. Determine the present barometric pressure in your area in one of the following units: bars, inches of mercury, or millimeters of mercury.
4. Press the **CAL** key. The units of pressure selected in the bP menu appears briefly and then the value in memory is displayed (Refer to Section 4.7.1).
5. Press the **SELECT** key. Std appears briefly and then the barometric pressure value in memory is displayed with the right digit flashing.
6. Use **SCROLL** (↑) and **SELECT** keys to display the correct barometric pressure.
7. Press **ENTER.** Press the **PV** key. The oxygen concentration in air is then displayed in ppm as selected on the output range rng menu. This value has been corrected for process solubility. Refer to Section 4.8.
8. The sensor may now be installed in the process. Please refer to the sensor instruction manual for proper installation of the sensor.

NOTE

1 atmosphere = 760 mmHg = 29.92 inches mercury = 1.013 bars

CAUTION

NEVER air calibrate with the sensor in process. This will result in erroneous readings.

5.3.3.2 Grab Sample ppm Standardization.

Air calibration is sufficient for most applications. For greater accuracy, the sensor may be standardized using a grab sample. Single point standardization when ppm (PPb) is chosen is done with the **PV** key.

Procedure:

1. Place the sensor in process or in a grab sample. Allow it to stabilize.
2. When the analyzer's reading is stable, note the reading. Perform a chemical analysis of the process or grab sample as quickly as possible, making sure that the sample is protected from exposure to air.
3. Note the current DO reading. If it has not changed from the time the sample was taken, proceed to step 5.
4. If the DO reading has changed from the time the sample was taken, use the formula shown in Figure 5-1 to determine the calibration value used in Step 5 C.
5. Standardize the unit loop to the value obtained from the chemical analysis as follows:
   - **A.** Press the **PV** key.
   - **B.** Press the **SELECT** key. Std appears briefly and then the last dissolved oxygen value is displayed with the right digit flashing.
   - **C.** Use **SCROLL** (↑) and **SELECT** keys to display the true value from the chemical analysis.
   - **D.** Press the **ENTER** key. The loop is now standardized.

$$\text{DO Calibration Value} = \frac{\text{Analyzer DO Reading at Calibration}}{\text{Analyzer DO Reading at Sampling}} \times \text{DO from Chemical Analysis}$$

FIGURE 5-1. DO Standardization Formula

5.3.4 % Saturation Calibration.

5.3.4.1 Air Calibration. The Model 1054B DO Analyzer and the appropriate DO Sensor loop may be air calibrated quite easily.

1. Place the sensor in ambient air.
2. Make sure the sensor is clean, dry and in good condition. Make sure the sensor is completely polarized (at least 2 hours). For optimum results, the loop should be powered overnight.
3. Determine the present barometric pressure in your area in one of the following units: bars, inches of mercury, or millimeters of mercury.
4. Press the **CAL** key. The units of pressure selected in bP menu appears briefly and then the value in memory is displayed (Refer to Section 4.7.1).
5. Press the **SELECT** key. Std appears briefly and then the barometric pressure value in memory is displayed with the right digit flashing.
6. Use **SCROLL** (↑) and **SELECT** keys to display the correct barometric pressure.
7. Press **ENTER.** Press the **DO** key. The oxygen concentration in air is then displayed in % saturation, as selected on the output range rng menu. This value has been corrected for process solubility. Refer to Section 4.8.
8. The sensor may now be installed in the process. Please refer to the sensor instruction manual for proper installation of the sensor.

NOTE

1 atmosphere = 760 mmHg = 29.92 inches mercury = 1.013 bars

CAUTION

NEVER air calibrate with the sensor in process. This will result in erroneous readings.

5.3.4.2 Update Barometric Pressure. This function is used to update the barometric pressure after the analyzer/sensor loop has been air calibrated and the sensor is installed in the process.

1. Allow the reading to stabilize.
2. Press the **ACCESS** key twice to enter the Set Mode. SEt will show briefly, then br.
3. Press the **SELECT** key. The barometric pressure value in memory will be displayed with the right digit flashing.
4. Use the **SCROLL** and **SELECT** key to display the current barometric pressure value. Press the **ENTER** key.

5.3.4.3 % Saturation Standardization.

Air calibration is sufficient for many applications. For greater accuracy, the sensor may be standardized in process.

1. Install the sensor and perform a barometric update.
   a. Allow the reading to stabilize.
   b. Press the **ACCESS** key twice to enter the Set Mode. SEt will show briefly, then br.
   c. Press the **SELECT** key. The barometric pressure value in memory entered will be displayed with the right digit flashing.
   d. Use the **SCROLL** and **SELECT** key to display the current barometric pressure value. Press the **ENTER** key.
2. To standardize the sensor, the % saturation of the process must be known.
3. When the analyzer's reading is stable, perform the standardization as follows:
   A. Press the **PV** key.
   B. Press the **SELECT** key. Std appears briefly and the last % saturation value is displayed with the right digit flashing.
   C. Use **SCROLL** (↑) and **SELECT** keys as required to display the processes % saturation.
   D. Press the **ENTER** key. The loop is now standardized.

SECTION 6.0
KEYBOARD SECURITY

KEYBOARD SECURITY. Display Mnemonic COd. Select this feature to display the user defined security code. Any three digit number may be used for this code. 000 will disable the security feature. This item is used to prevent accidental changes to the calibration and configuration of the analyzer. When activated, the analyzer will allow all read functions to read normally. If an attempt is made to change a value, LOC will display followed by the Numeric Display ready for the code to be entered. A proper code will unlock the analyzer and the analyzer will return to the last function attempted. Any incorrect value will result in bAd briefly displaying. The analyzer will then return to numeric display and await the entry of the code. Once unlocked, the analyzer will allow access to all functions until the analyzer is either powered down or no keystrokes are made for a period of 2 minutes. If the code should be forgotten, pressing and holding the **ACCESS** key for 5 seconds will result in display of the code. Releasing the **ACCESS** key, then pressing **ENTER** will unlock the analyzer.

Keyboard Security Procedure (COd).

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until COd appears on the display.
3. Press the **SELECT** key.
4. Use the **SCROLL** (↑) and **SHIFT** (←) keys to display the desired value, then **ENTER** it into memory.

NOTE

Entering 000 disables the keyboard security.

NOTE

Security feature will not activate until 2 minutes without keyboard activity or power is removed from the analyzer, then restored.

SECTION 7.0
THEORY OF OPERATION

7.1 GENERAL. The Model 1054B Dissolved Oxygen Analyzer automatically and continuously measures concentrations of dissolved oxygen in water or aqueous solutions. The determination is based on the measurement of the electrical current developed by the DO Sensor in contact with the sample.

7.1.1 Basic DO Measurement.

1. Dissolved Oxygen - The amount of gaseous oxygen, in mg/l, or ppm by weight, dissolved in a liquid (usually H_2O). The presence of dissolved solids affects the solubility of oxygen in water.

2. The amount of oxygen dissolved in fresh water at 100% saturation is inversely proportional to the temperature, and is directly proportional to the pressure.

3. At sea level and a temperature of 20°C, an oxygen saturated solution of water contains 9.2 ppm (parts per million) of oxygen. The figure of 9.2 ppm represents the weight of oxygen with respect to the weight of water.

4. A polarographic oxygen sensor measures oxygen in air as well as in water. In fact, most sensors are air calibrated prior to water measurements.

5. The mineral content of water solution will also alter the amount of dissolved oxygen. For example, salt water in the ocean at 20°C contains only 7.4 ppm of dissolved oxygen compared to fresh water which contains 9.2 ppm. This difference may account for the fact that some fish cannot survive when moved from fresh to salt water and vice versa.

7.2 MEASUREMENT VARIABLES. Variables that influence the dissolved oxygen measurement include barometric pressure, relative humidity, sample temperature, interfering gases and composition of the liquid medium.

7.2.1 Barometric Pressure and Relative Humidity. Rate of oxygen diffusion through the sensor membrane, and therefore the sensor response, is linear with respect to oxygen partial pressure (assuming constant sample temperature).

At the normal sea-level barometric pressure of 760 mm Hg, the oxygen partial pressure of dry air is 160 mm Hg. As atmospheric pressure deviates from the standard value, the oxygen partial pressure varies proportionally. Accordingly, the solubility of oxygen in water varies in proportion to the change in the partial pressure of oxygen in air. Barometric pressure is therefore a significant factor in analyzer calibration.

In the PPM mode the barometric pressure is only important for air calibration, so the instrument can calculate the sensor's output at a known partial pressure. In process, the direct measurement of ppm is not affected by partial pressure.

In the % SAT mode barometric pressure must be known for air calibration and for process measurement at atmospheric pressure.

7.2.2 Relative Humidity. In calibration for dissolved oxygen measurement, one method is to expose the sensor to a gaseous sample, typically dry air, of accurately known oxygen content. The known gaseous oxygen concentration value is then related to a corresponding dissolved oxygen value.

Since dry air contains 20.95% oxygen by volume, regardless of the barometric pressure, oxygen can be shown to be directly proportional to the total barometric pressure, according to Dalton's law of partial pressures. Thus for dry air, if the total barometric pressure is known, the partial pressure of oxygen can be computed. However, this procedure is valid only for dry air conditions. Humid air has the effect of reducing the partial pressure of oxygen and the other gases in the air without affecting the total barometric pressure.

Thus, for constant barometric pressure, if the humidity in the air is other than zero, the partial pressure of oxygen is less than the value for dry air. For most measurements taken below 80°F (26.7°C), the effect of water vapor may be ignored.

To determine the partial pressure of oxygen in air at various levels of humidity and barometric pressure, the partial pressure of water is subtracted from the total barometric pressure and the difference is multiplied by 20.95%.

EXAMPLE:

If the Barometric pressure = 740 mm Hg
and the Partial Pressure H_2O = 20 mm Hg
then the Partial pressure O_2 = [740 - 20] x 0.2095 mm Hg
= 150 mm Hg (19.95 kPa)

7.2.3 Sample Temperature. The temperature of the sample affects sensor response in two ways:

1. Oxygen Diffusion Rate — The rate of oxygen diffusion through the sensor membrane varies with temperature at a coefficient of about +3% per degree Celsius, causing a corresponding change in sensor current.

2. Oxygen Solubility — In an oxygen-saturated liquid, partial pressure of dissolved oxygen is equal to the partial pressure of oxygen in the atmosphere above liquid. This relationship holds true regardless of the oxygen concentration. As sample temperature increases, oxygen partial pressure remains unchanged (except as influenced by vapor pressure of the liquid); however, the dissolved oxygen concentration is reduced.

To compensate for temperature, the analyzer uses the Pt-100 RTD incorporated in the DO Sensor. The Model 1054B DO then corrects for process temperature changes.

7.2.4 Interfering Gases. Gases that are reduced or oxidized at about 0.67 VDC, and thus contribute to sensor current, may cause a readout error. Only a few gases have this characteristic. Common gases that should be avoided include SO_2, Cl_2 and oxides of nitrogen. Low-level concentrations of hydrogen-sulfide tend to contaminate the sensor, but do not seriously affect dissolved oxygen measurement. If contaminated, the sensor must be rejuvenated.

7.2.5 Composition of the Liquid Medium. A significant change in the composition of the solution may change the solubility of oxygen. If the solvent is water, the addition or presence of any water soluble components, such as sodium chloride, may change the dissolved oxygen concentration.

In an open equilibrating system, where gas of constant oxygen partial pressure is in direct contact with a salt solution, the solubility of oxygen decreases as salinity increases.

SECTION 8.0
DIAGNOSTICS AND TROUBLESHOOTING

8.1 DIAGNOSTICS. The 1054B DO Analyzer has a diagnostic feature which automatically searches for fault conditions that would cause an error in the measured dissolved oxygen value. If such a condition occurs, the current output and relays will act as configured in default and the fault flag and display will flash. A fault code mnemonic will display at frequent intervals. If more than one fault condition exists, the display will sequence the faults at eight second intervals. This will continue until the cause of the fault has been corrected. Display of fault mnemonics is suppressed when in Set Mode. Selecting the SHO item will display a history of the two most recent fault conditions unless SHO was cleared. Refer to Section 4.10.

NOTE

If the analyzer is in hold and a fault occurs, the mnemonic HLd will display during the fault sequence.

8.1.1 Fault Mnemonics. Table 8-1 lists the fault mnemonics and describes the meaning of each.

8.1.2 Temperature Compensation. Table 8-2 is a ready reference of RTD resistance values at various temperatures. These are used for test and evaluation of the sensor.

NOTE

Ohmic values are read across the RTD element and are based on the manufacturer's stated values (± 1%). Allow enough time for the RTD element to stabilize to the surrounding temperature.

TABLE 8-1. Fault Mnemonics

Display	Description	Display	Description
EEP	**EEPROM write error (bad EEPROM chip).**	tcH	**High temperature compensation error.**
CHS	**ROM failure (check sum error) (bad ROM chip).**	tcL	**Low temperature compensation error.**
rCi	**Reverse current input.**	Orn	**Overrange error (+20.00 ppm).**
SEn	**Sensor line error or wire length error.**	Eci	**Excessive current input.**
COP	**Computer not operating properly.**	FAC	**Factory calibration required.**

TABLE 8-2. RTD Resistance Values

Temperature	Resistance
0°C	100 ohms
10°C	104 ohms
20°C	108 ohms
30°C	112 ohms
40°C	116 ohms
50°C	119 ohms
60°C	123 ohms
70°C	127 ohms
80°C	131 ohms
90°C	135 ohms
100°C	139 ohms

8.2 TROUBLESHOOTING. The Model 1054B DO Analyzer is designed with state-of-the-art microprocessor circuitry, making troubleshooting simple and direct. Subassembly replacement, i.e. printed circuit board replacement, is all that is usually required.

8.2.1 Installation Failure. If failure does occur, complete the following steps:

1. Check for sensor failure first.
2. Check for a fault flag. If a fault condition exists, refer to Table 8-1 for the fault mnemonic explanation.
3. Check wiring connections for proper installation.
4. Refer to Troubleshooting Table 8-3. The table is arranged with the most common problems listed first.

8.2.2 Display Test. Display Mnemonic dtS. Selecting this option will activate all the display segments. This item is used if a faulty display is suspected. Refer to Section 4.14.

8.2.3 Software Version. Display Mnemonic UEr. Selection of this item will display the software revision level of the CPU. This number may be requested by factory service personnel if troubleshooting is required. Refer to Section 4.13.

8.2.4 Sensor Troubleshooting. In addition to the fault mnemonics that directly relate to a possible sensor problem (SLP, tcH, tcL), the analyzer can display the microamp input from the sensor. This information can aid in sensor and application problems.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. Press the **SCROLL** (↑) key until ı ∩ appears on the display.
3. Press the **SELECT** key. The current input from the sensor will be displayed in microamps. A properly operating sensor will produce approximately 2.5 microamps per ppm at 25°C.
4. Press the **ENTER** key to return to the first level of the Set Menu, or press the DO key to get out of the Set Mode.

8.2.5 CPU Board Replacement. If there is a problem with the CPU board resulting in its replacement, specific procedures (included with the order) for calibrating the new board must be followed exactly or the microprocessor will be improperly programmed. Should this occur, it will be necessary to return the analyzer to the factory for reprogramming.

8.2.6 Power Board Replacement. If it becomes necessary to replace the power board, the CPU board will need to be recalibrated following specific procedures that are included with the power board. Failure to follow these procedures exactly will cause the microprocessor to be improperly programmed and require the return of the analyzer to the factory for reprogramming.

8.3 INSTRUMENT MAINTENANCE. To maintain the appearance and extend the life of the enclosure, it should be cleaned on a regular basis using a mild soap and water solution followed by a clean water rinse.

TABLE 8-3. Troubleshooting Guide

SYMPTOM	PROBLEM	ACTION
Fault code tcH/tcL	1. Miswire. 2. Open or shorted RTD.	1. Check wiring between the sensor and analyzer. 2. Replace sensor.
Fault code Orn/Ec1	1. Overrange error.	1a. Pull the sensor out of the process clean, and check membrane. 1b. Recalibrate.
Fault code SEn	1. Open wire between sensor and analyzer. 2. Cable length has been exceeded. Maximum length: consult factory.	1. Repair wire. 2. Check wiring.
Fault code EEP	1. Defective EEPROM.	1. Replace CPU PCB.
Fault code CHS	1. Defective CPU.	1. Replace CPU PCB.
Alarm relay will not close	1. Defective power card. 2. Defective CPU.	1. Replace power PCB. 2. Replace CPU PCB.
No output current	1. Defective output board. 2. Miswire.	1. Replace power PCB. 2. Check for short.
Low output current	1. Circuit loading with excessive.	1. Consult output loading limits. resistance on output. Analyzer specifications (600 ohms max load).
Reading loses accuracy as process temp. changes	1. Incorrect temp. compensation.	1. Verify Snr menu selection (Refer to Section 4.9.1).

SECTION 9.0
RETURN OF MATERIALS

9.1 GENERAL. To expedite the repair and return of instruments, proper communication between the customer and the factory is important. A return material authorization number is required. Call (949) 757-8500. The Return of Materials Request form is provided for you to copy and use in case the situation arises. The accuracy and completeness of this form will affect the processing time of your materials.

9.2 WARRANTY REPAIR. The following is the procedure for returning products still under warranty.

1. Contact the factory for authorization.
2. Complete a copy of the Return of Materials Request form as completely and accurately as possible.
3. To verify warranty, supply the factory sales order number or the original purchase order number. In the case of individual parts or sub-assemblies, the serial number on the mother unit must be supplied.
4. Carefully package the materials and enclose your Letter of Transmittal and the completed copy of the Return of Materials Request form. If possible, pack the materials in the same manner as it was received.

IMPORTANT

Please see second section of Return of Materials Request Form. Compliance to the OSHA requirements is mandatory for the safety of all personnel. MSDS forms and a certification that the instruments have been disinfected or detoxified are required.

5. Send the package prepaid to:

   Rosemount Analytical Inc.
   2400 Barranca Parkway
   Irvine, CA 92606

   Attn: Factory Repair

   Mark the package:

   Returned for Repair RMA No. _____

   Model No. _____

9.3 NON-WARRANTY REPAIR.

1. Contact the factory for authorization.
2. Fill out a copy of the Return of Materials Request form as completely and accurately as possible.
3. Include a purchase order number and make sure to include the name and telephone number of the right individual to be contacted should additional information be needed.
4. Do Steps 4 and 5 of Section 9.2.

NOTE

Consult the factory for additional information regarding service or repair.

RETURN OF MATERIALS REQUEST

•IMPORTANT!
This form must be completed to ensure expedient factory service.

CUSTOMER

FROM:	RETURN	BILL TO:
_____	_____	_____
_____	_____	_____
_____	_____	_____

NOTICE TO SENDER

CUSTOMER/USER MUST SUBMIT MATERIAL SAFETY SHEET (MSDS) OR COMPLETE STREAM COMPOSITION, AND/OR LETTER CERTIFYING THE MATERIALS HAVE BEEN DISINFECTED AND/OR DETOXIFIED WHEN RETURNING ANY PRODUCT, SAMPLE OR MATERIAL THAT HAVE BEEN EXPOSED TO OR USED IN AN ENVIRONMENT OR PROCESS THAT CONTAINS A HAZARDOUS MATERIAL **ANY OF THE ABOVE THAT IS SUBMITTED TO ROSEMOUNT ANALYTICAL WITHOUT THE MSDS WILL BE RETURNED TO SENDER C.O.D.** FOR THE SAFETY AND HEALTH OF OUR EMPLOYEES. WE THANK YOU IN ADVANCE FOR COMPLIANCE TO THIS SUBJECT.

SENSOR OR CIRCUIT BOARD ONLY:
(Please reference where from in MODEL / SER. NO. Column)

1. PART NO._____	1. MODEL_____	1. SER. NO._____
2. PART NO._____	2. MODEL_____	2. SER. NO._____
3. PART NO._____	3. MODEL_____	3. SER. NO._____
4. PART NO._____	4. MODEL_____	4. SER. NO._____

REASON FOR RETURN

PLEASE CHECK ONE:

☐ REPAIR AND CALIBRATE
☐ EVALUATION
☐ REPLACEMENT REQUIRED? ☐ YES ☐ NO
☐ DEMO EQUIPMENT NO. _____
☐ OTHER (EXPLAIN) _____
_____

DESCRIPTION OF MALFUNCTION:

_____
_____
_____

REPAIR STATUS

WARRANTY REPAIR REQUESTED:

☐ YES-REFERENCE ORIGINAL ROSEMOUNT ANALYTICAL ORDER NO. _____
CUSTOMER PURCHASE ORDER NO. _____
☐ NO-PROCEED WITH REPAIRS-INVOICE AGAINST P.O. NO. _____
☐ NO-CONTACT WITH ESTIMATE OF REPAIR CHARGES: LETTER ☐ _____
PHONE ☐ _____

NAME _____ PHONE _____

ADDRESS _____

_____ ZIP _____

RETURN AUTHORITY FOR CREDIT ADJUSTMENT [Please check appropriate box(s)]

☐ WRONG PART RECEIVED
☐ DUPLICATE SHIPMENT
☐ RETURN FOR CREDIT
☐ REPLACEMENT RECEIVED
REFERENCE ROSEMOUNT ANALYTICAL SALES ORDER NO. _____
RETURN AUTHORIZED BY: _____
WARRANTY DEFECT_____

_____

24-6047

Emerson Process Management

Rosemount Analytical Inc.
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: (949) 757-8500
Fax: (949) 474-7250

http://www.RAuniloc.com

EMERSON
Process Management

WARRANTY

Seller warrants that the firmware will execute the programming instructions provided by Seller, and that the Goods manufactured or Services provided by Seller will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller, whichever period expires first. **Consumables, such as glass electrodes, membranes, liquid junctions, electrolyte, o-rings, catalytic beads, etc., and Services are warranted for a period of 90 days from the date of shipment or provision.**

Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products.

If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, promptly correct any errors that are found by Seller in the firmware or Services, or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services.

All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources, unsuitable environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by an authorized Seller representative. All costs of dismantling, reinstallation and freight and the time and expenses of Seller's personnel for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller.

Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller. Except as otherwise expressly provided in the Agreement, THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

RETURN OF MATERIAL

Material returned for repair, whether in or out of warranty, should be shipped prepaid to:

Emerson Process Management
Liquid Division
2400 Barranca Parkway
Irvine, CA 92606

The shipping container should be marked:

Return for Repair
Model _____

The returned material should be accompanied by a letter of transmittal which should include the following information (make a copy of the "Return of Materials Request" found on the last page of the Manual and provide the following thereon):

1. Location type of service, and length of time of service of the device.
2. Description of the faulty operation of the device and the circumstances of the failure.
3. Name and telephone number of the person to contact if there are questions about the returned material.
4. Statement as to whether warranty or non-warranty service is requested.
5. Complete shipping instructions for return of the material.

Adherence to these procedures will expedite handling of the returned material and will prevent unnecessary additional charges for inspection and testing to determine the problem with the device.

If the material is returned for out-of-warranty repairs, a purchase order for repairs should be enclosed.

The right people,
the right answers,
right now.

ROSEMOUNT ANALYTICAL
CUSTOMER SUPPORT CENTER
1-800-854-8257

ON-LINE ORDERING NOW AVAILABLE ON OUR WEB SITE
http://www.raihome.com

Credit Cards for U.S. Purchases Only.

Emerson Process Management

Liquid Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: (949) 757-8500
Fax: (949) 474-7250

http://www.raihome.com

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