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Instruction Manual
5100054C
July 1999

Model 54C

Conductivity Microprocessor Analyzer



FREE
EXTENDED
WARRANTY!
(See offer at back of manual)

ROSEMOUNT® ANALYTICAL
FISHER-ROSEMOUNT™ Managing The Process Better.™

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 1-800-654-7768 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, therefore, disconnect all hazardous voltage before accessing the electronics.

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. Use NEMA 4X or IP65 conduit plugs supplied with the instrument 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 60VDC or 43V peak allowed with the exception of power and relay terminals. Any violation will impare 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 residential, commercial or light industrial environment per CE certification to EN50081-2.

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SS-MA54

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CAUTION

Ground conduit to metal stiffener or to metal enclosure. Use non-flammable watertight conduit fittings/plugs to preserve enclosure rating.

DANGER



LIVE VOLTAGES MAY BE PRESENT
When fuse or this cover is removed will cause severe injury or death.

CAUTION

For continued protection against fire, replace only with fuses of specificed voltage and current ratings. Fuses are located under this cover.

VAROVANI

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

NEBEZPECI



ZARIZENI POD NAPETIM
Odstraneni pojistky nebo tohoto krytu muze zpusobit vazne zraneni nebo smrt.

VAROVANI

Poskozene pojistky nahrazujte pouze pojistkami se stejnym jmenovitym napetim a proudem. Pojistky jsou umisteny pod timto krytem.

FORSIGTIG

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

Jordforbindelse til metal kapsel.

FARE



UBESKYTTET SPÆNDING
Hvis sikringen eller denne påskrift fjernes kan dette medføre alvorlige kvæstelser eller død.

FORSIGTIG

Brug kun sikringer med nærmere angivet spænding og strømstyrke som sikkerhed for vedvarende beskyttelse mod brandfare. Sikringerne er placeret under denne påskrift.

ATENCION

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

PELIGRO



VOLTAJE PUEDE ESTAR PRESENTE
Cuando los fusibles o esta cubierta son removidos causará severas lesiones o muerte.

ATENCION

Para una proteccion continua contra el fuego,reemplace solamente con fusibles de voltaje y corriente especificados.Los fusibles se encuentran debajo de esta cubierta.

VOORZICHTIG

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

GEVAAR



KAN ONDER SPANNING STAAN
Verwijderen van zekering of dit deksel kan dit leiden tot ernstig of dodelijk letsel.

VOORZICHTIG

Voor duurzame bescherming tegen brand, uitsluitend zekeringen gebruiken met aangegeven nominale spannings - en stroomwaarden. De zekeringen bevinden zich onder dit deksel.

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.

DANGER



POSSIBILITE DE HAUTE TENSION
En cas de démontage de ce capot ou des fusibles. Risques de Blessures graves ou de mort

ATTENTION

Afin d'assurer une protection permanente contre le feu, ne remplacer les fusibles que par des modèles équivalents en tension et en courant. Les fusibles se trouvent derriere cette plaquette.

ADVARSEL

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

FARE



SPENNING KAN VÆRE TIL STEDE
når sikringen eller dette dekslet fjærnes, og kan føre til alvorlige skader eller dødsulykker.

ADVARSEL

For at beskyttelse mot antennelse skal opprettholdes, må sikringer bare erstattes med tilsvarende som har spesifisert spenning- og strømstyrke. Sikringer er plassert under dette dekslet.

ACHTUNG

Der Analysator ist vorschriftsmaessig zu erden.

Um die Schutzart des Geraetes sicherzustellen ist es mit den entsprechenden Kabelverschraubungen und Blindkappen auszuruesten.

ACHTUNG



GEFAEHRLICHE ELEK-TRISCHE SPANNUNG
Ist die Schutzabdeckung oder die Sicherung entfernt, so koennen am Geraet ernsthafte oder toedliche Verletzungen entstehen.

ATTENTION

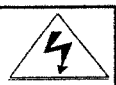
Um die Gefahr von Kurzschluß und Funkenbildung zu verhindern dürfen die Sicherungen nur durch solche gleicher Spannung und Stromwerte ausgetauscht werden. Die Sicherungen befinden sich unter dieser Abdeckung.

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

Pericolo



POSSIBILE PRESENZA DI ALTA TENSIONE
La rimozione del fusibile o del coperchio può causare gravi lesioni o morte.

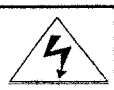
ATTENZIONE

Per garantire una continua protezione contro gli incendi, sostituire solo con fusibili del voltaggio indicato e dell'attuale potenza. I fusibili sono alloggiati sotto il coperchio.

UWAGA

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

NIEBEZPIECZENSTWO



URZADZENIE MOZE BYC POD NAPIECIEM
Gdy bezpieczniki lub ta pokrywa sa usuniete istnieje mozliwosc uszkodzenia ciala lub smierci.

UWAGA

W celu utrzymania zabezpieczenia przed zapaleniem, nalezy stosowac bezpieczniki o identycznym z oryginalnym napieciu i amperazu.

Bezpieczniki sa umieszczone pod ta pokrywa.

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.

PERIGO



POSSIBILIDADE DE TENSÃO PERIGOSA
A remoção do fusível ou desta tampa pode causar lesões graves ou a morte.

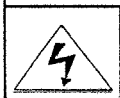
ATENÇÃO

Para manter sempre uma boa proteção contra incêndio, substituir somente por fusíveis com a tensão e corrente especificadas. Os fusíveis encontram-se sob esta tampa.

IAKTTAG FÖRSIKTIGHET

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

FARA



HÖGSPÄNNING KAN FÖREKOMMA
Avlägsnande av säkring eller skyddskåpa kan förorsaka allvarlig skada eller dödsfall

IAKTTAG FÖRSIKTIGHET

För kontinuerligt skydd mot brandfara, ersätt endast med specificerad säkringsstorlek och spänning.

MODEL 54 C
MICROPROCESSOR ANALYZER

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SECTION 1.0
INSTALLATION

1.1 PREPARATION FOR INSTALLATION

1. Upon receipt of analyzer, carefully inspect the shipping container for any evidence of damage. If carton is damaged, notify the carrier immediately.
2. If shipping container is not damaged, remove analyzer and all contents.
3. Confirm that all items shown on the packing list are present. Notify Rosemount Analytical if items are missing.
4. Although the analyzer is suitable for outdoor use, it should be located in an area where temperature extremes, vibrations, electromagnetic and radio frequency interferences are minimized or absent.
5. Select an installation site that is at least one foot from any high voltage conduit, has easy access for operating personnel, has 115 or 230 Vac accessible and is not in direct sunlight.

1.2 ANALYZER INSTALLATION

1.2.1 Panel Mounting (23545-00) The analyzer is designed to fit into a DIN standard 144 X 144 mm (5.7 X 5.7 inch) panel cutout (Figure 1-2). Installation requires both front and rear access (Figure 1-1).

1. Install the analyzer as shown in Figure 1-1 and Figure 1-2. Insert the instrument enclosure through the front of the panel cutout and align the panel mounting brackets as shown.
2. Insert two mounting bracket screws through each of the two mounting brackets and into the tapped holes in the rear of the analyzer enclosure and tighten each screw.
3. Insert four panel mounting screws through each hole in the mounting brackets. Tighten each screw until the mounting bracket holds analyzer firmly in place. To avoid damaging the analyzer mounting brackets, do not use excessive force.

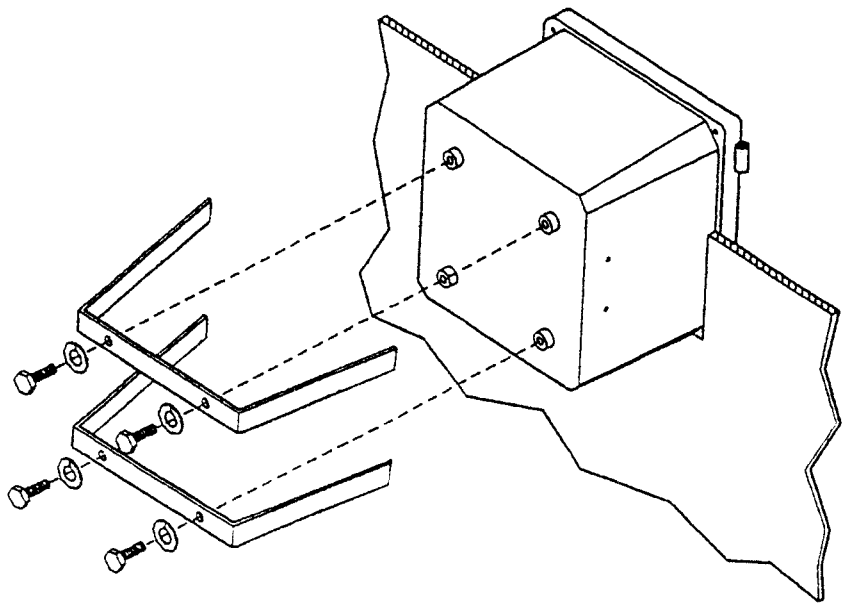


FIGURE 1-1. Panel Mounting

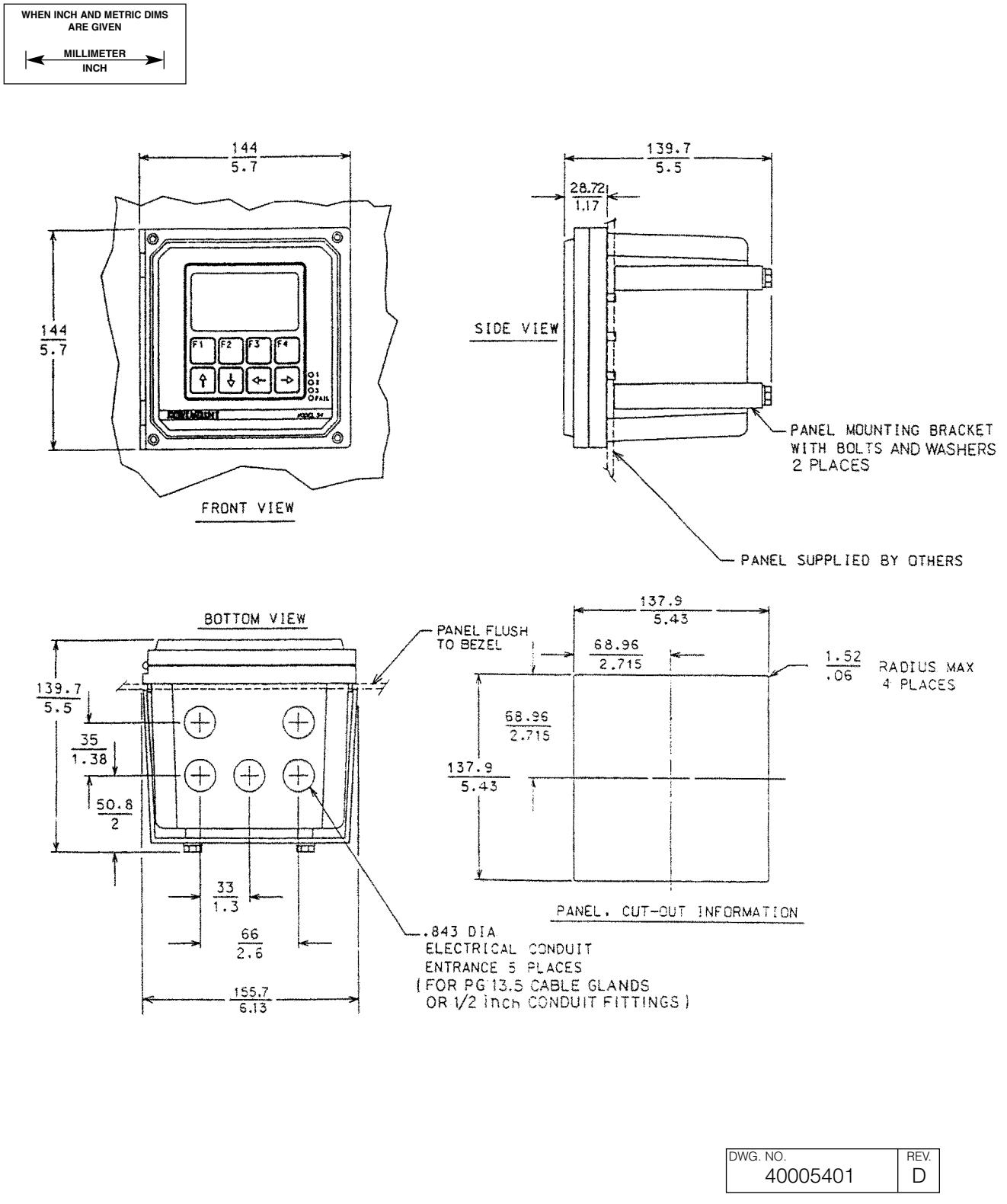


FIGURE 1-2. Panel Mounting Dimensions

1.2.2 Wall or Surface Mounting (P/N 2002577)

1. Mount the bracket to the analyzer as shown in Figure 1-3.
2. Mount the analyzer to the pipe/wall mounting bracket using the four screws provided.
3. Mount analyzer mounting bracket to wall using customer supplied hardware (see Figure 1-4).

1.2.3 Pipe Mounting (P/N 2002577)

1. Attach the mounting bracket to the rear of the analyzer and tighten the four screws as shown in Figure 1-3 and Figure 1-5.
2. Place supplied U bolts around the mounting pipe and through the pipe mounting bracket and mounting bracket. Tighten the U bolt nuts until the analyzer is securely mounted to the pipe.

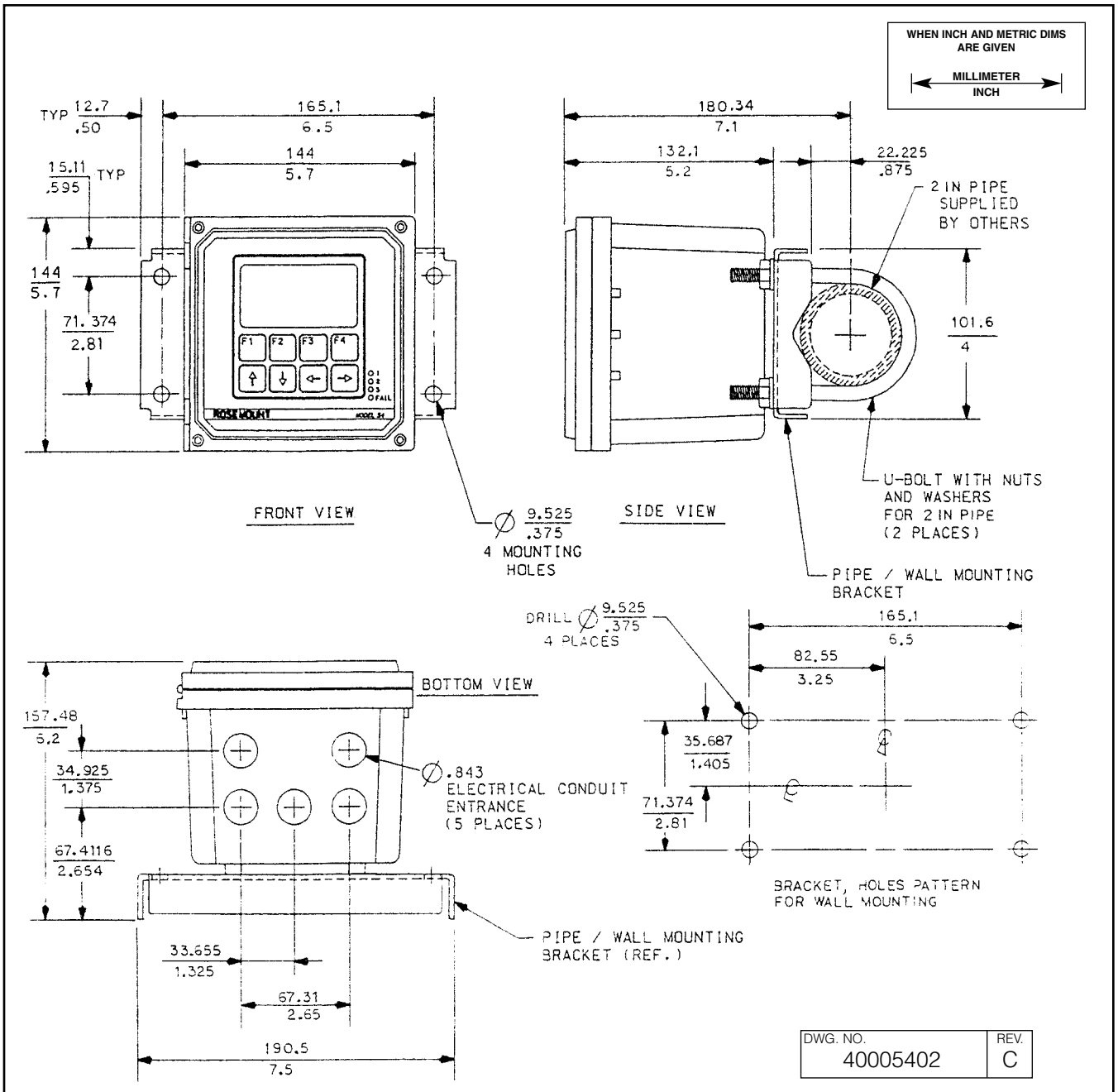


FIGURE 1-3. Two-inch Pipe and Wall Mounting Dimensions

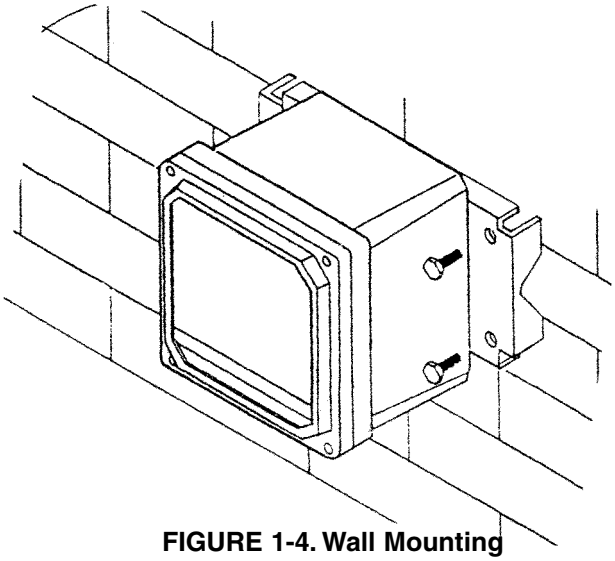


FIGURE 1-4. Wall Mounting

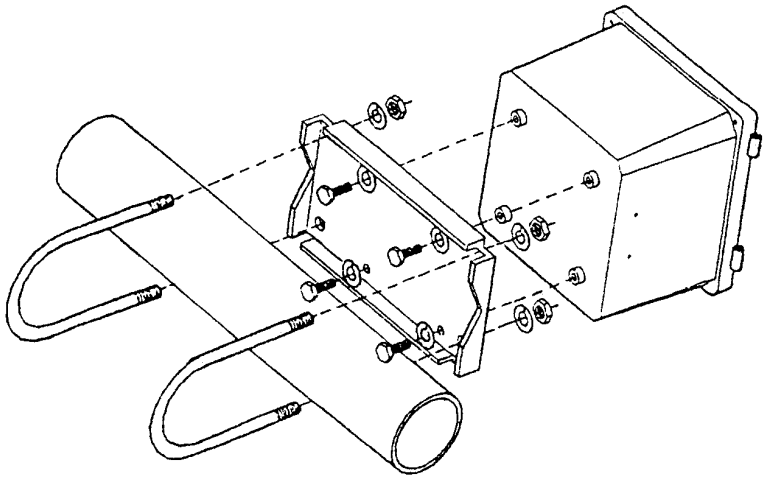


FIGURE 1-5. Pipe Mounting

1.3 WIRING THE ANALYZER

There are five conduit openings in the bottom of the analyzer housing which accommodate 1/2 inch conduit fittings or PG 13.5 cable glands. The conduit opening on the left (rear) is for AC power input; the center (rear) and right (rear) are for relay signal outputs and the opening on the right (front) is for current output wiring and the left (front) is for sensor wiring. Refer to Figure 1-6. AC power wiring should be 14 gauge or greater.

Mount 1/2 inch conduit fittings using weather seals. Bring all wiring through the conduits to the analyzer terminal strips. Mount NEMA 4X or IP65 conduit plugs (supplied) into unused holes in the base of the analyzer.

CAUTION

Be sure to place sensor wiring in a separate conduit from power wiring. Sensitivity and stability of the instrument is impaired if input wiring is not grounded.

CAUTION

DO NOT apply power to the instrument until all electrical connections are verified and secure. AC connections and grounding must be in compliance with UL 508 and/or local electrical code.

NOTE

For best EMI/RFI protection the output cable should be shielded and enclosed in an earth grounded rigid metal conduit. Connect the cable's outer shield to either earth ground terminal on TB2, Figure 1-7.

The sensor cable should also be shielded. Connect the outer shield to earth ground via terminal 1 of TB1, Figure 1-7 If the outer shield is braided an appropriate metal cable gland fitting may be used to connect the outer braid to earth ground via the instrument.

NOTE

The user must provide a means to disconnect the main power supply in the form of circuit breaker or switch. The circuit breaker or the switch must be located in close proximity to the instrument and identified as the disconnecting device for the instrument.

NOTE

HART® communications not available. Current output 1 switch must be in single loop position. See Figure 1-7.

1.3.1 Analyzer Wiring. Figure 1-7, Figure 1-8 and Figure 1-9 show how the analyzer should be wired.

A. Connect power input and output wiring per Figure 1-7.

B. Wire inductive (Toroidal) sensors per Figure 1-9 or wire contacting sensor per Figure 1-8.

NOTE

Do not allow earth ground (TB 1-1) to short (contact) TB 1-2 inner drain, if this occurs a ground loop may give inaccurate conductivity readings.

1.3.2 Input Power Selection (Code -08). The Model 54C -08 is field selectable for 115Vac or 230Vac 50/60Hz. Refer to Drawing Number 400054C06.

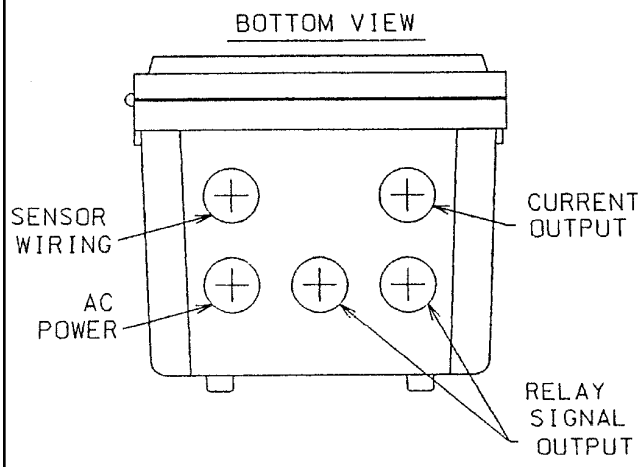
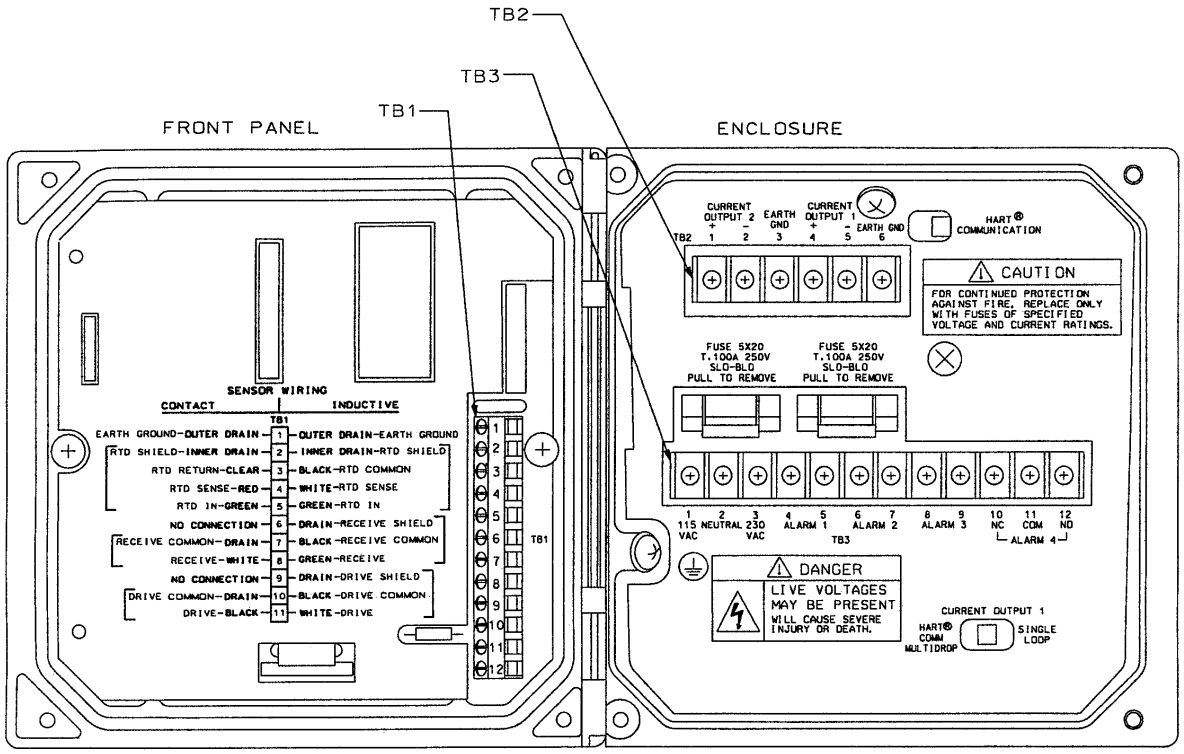
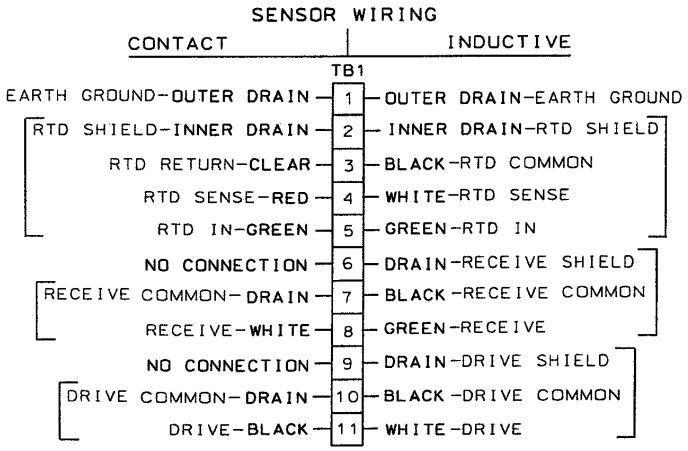
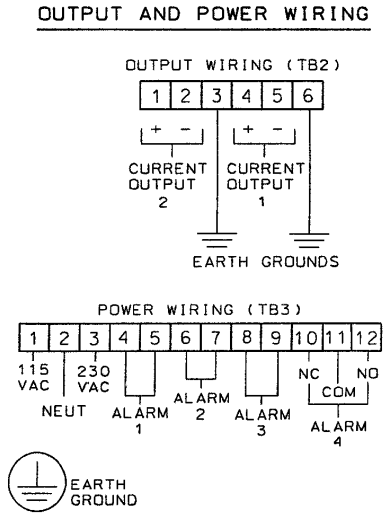


FIGURE 1-6. Conduit Openings







DWG. NO.	REV.
40054C06	A

FIGURE 1-7. Output, Power Input and Sensor Wiring (Code -08)

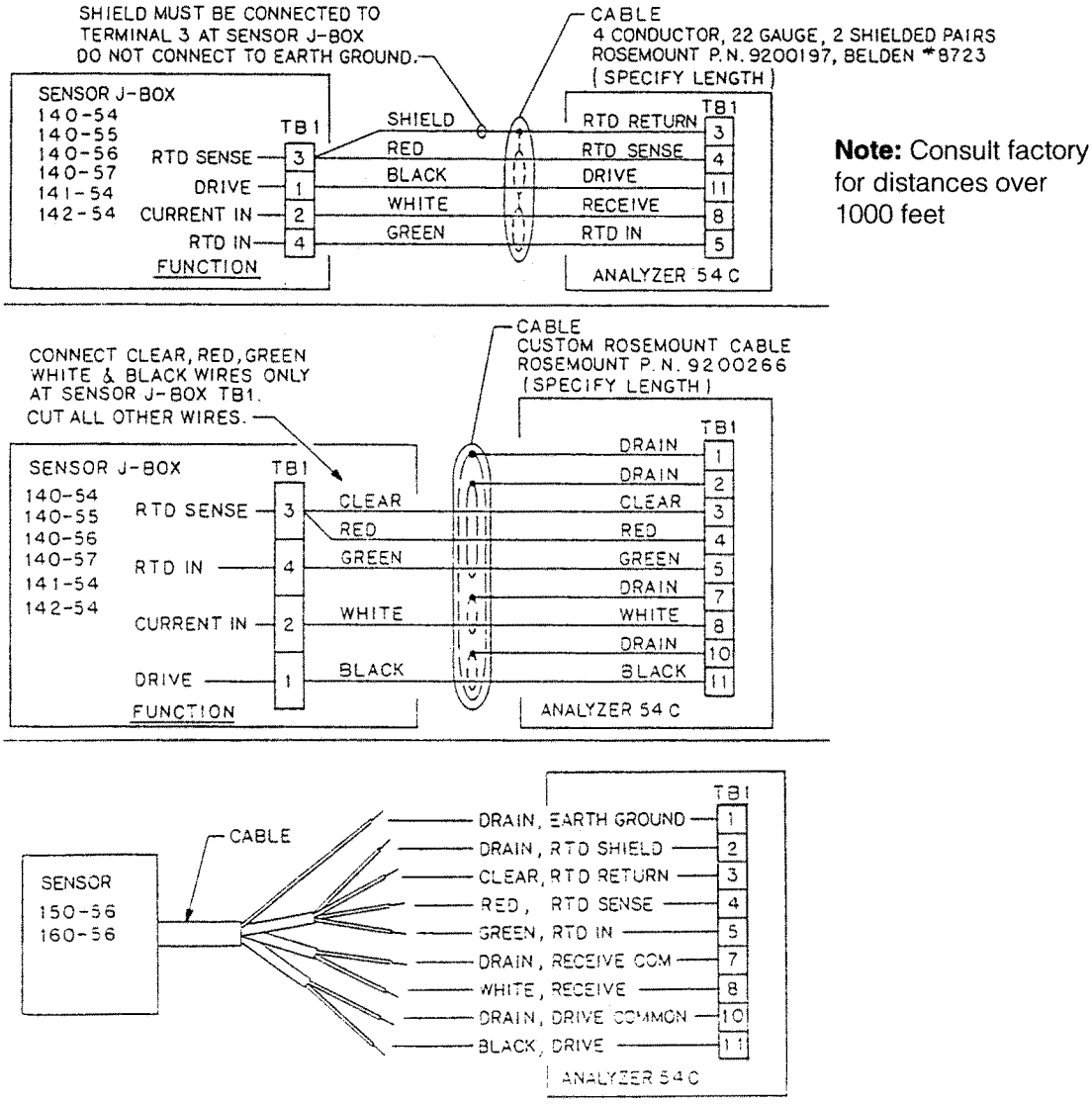
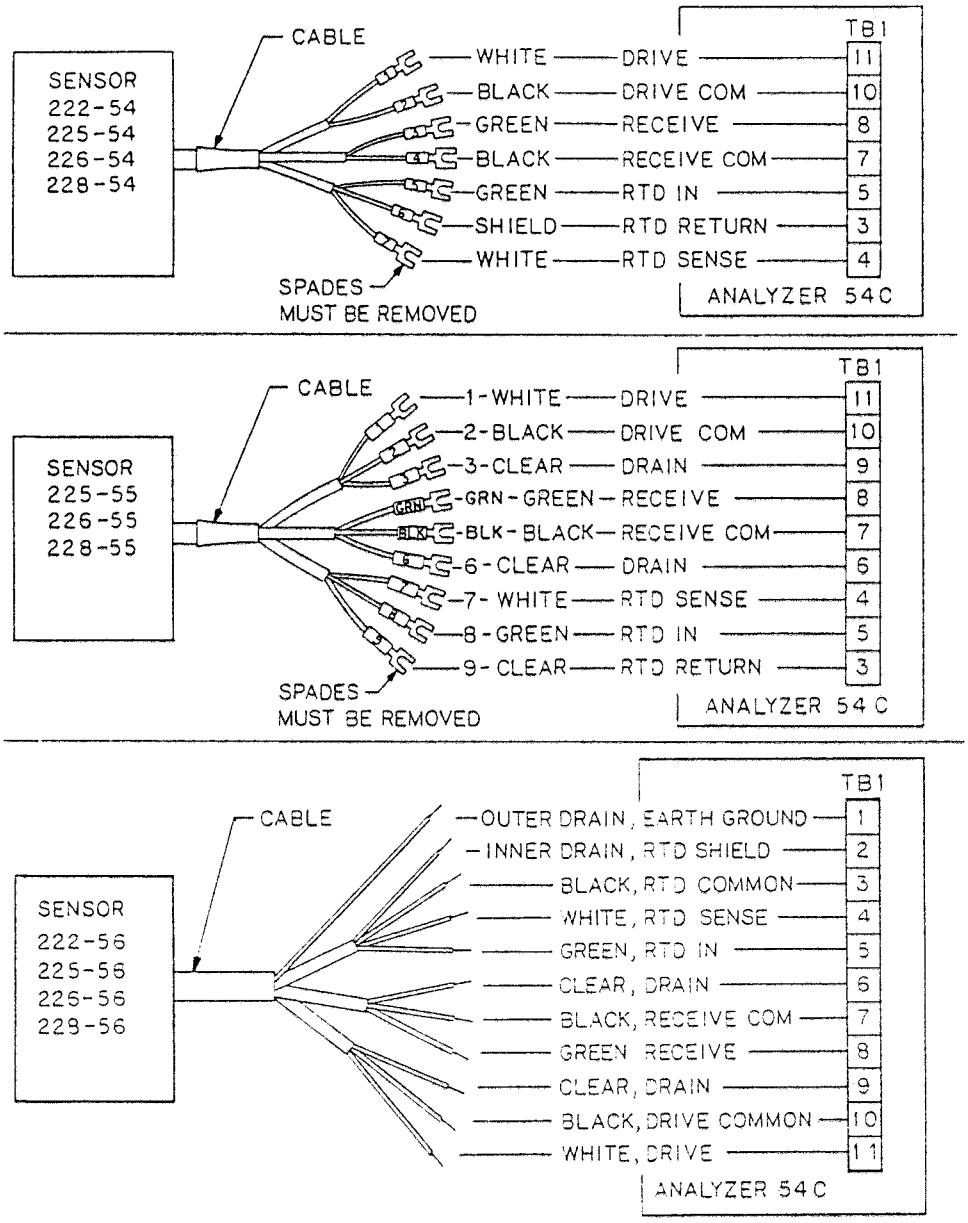


FIGURE 1-8. Wiring of Contacting Conductivity Sensors



DWG. NO.	REV.
40054C03	B

FIGURE 1-9. Wiring of Inductive Conductivity Sensors

SECTION 2.0
DESCRIPTION OF CONTROLS AND INDICATORS

2.1 OPERATING DISPLAY

Figure 2-1 shows the Model 54 C Analyzer front panel with the operating display screen shown. The conductivity is continuously displayed in large numerals. The process temperature and primary current output value are always displayed on the second line of the operating display screen. The third line is customer configurable.

2.2 FUNCTION KEYS

Function key F1 will always be the (Exit) key. Exit returns the display to the previous level. Changes made to display are **not sent** to memory if Exit is pressed.

Function key F4 (Enter) must be pressed to record changes made to memory. This key then moves the reverse video highlite (cursor) to the next enterable field, or menu.

Function keys F2 & F3 are multifunctional. The discription shown in the display just above each corresponds to a specific operation for that key in the function being used.

2.3 ARROW KEYS

The up and down arrow keys move the reverse video highlite up and down within the various menu screens, or increase or decrease numeric values.

The right and left arrow keys move the reverse video highlite to the next entry field.

2.4 ALARM LEDS

Green LEDs (labeled 1, 2 and 3) indicate when each of the three relays are energized. A red LED (labeled FAIL) indicates a fault condition. When a fault occurs, the red LED illuminates, a descriptive error message is displayed, and the action of the output(s) will function as described in Section 3.2 (fault value - e.g. 22 mA).



FIGURE 2-1. Model 54 Front Panel with Operating Display

SECTION 3.0
PROGRAMING THE ANALYZER

The analyzer arrives from the factory configured and ready to operate **for use with inductive (toroidal) conductivity sensors.** If Series 100 contacting conductivity sensor is used the analyzer must be configured as "contacting" under sensor type as in Section 3.3.2.

This section provides detailed procedures for changing operational values for specific applications. Refer to Section 3.3 if a contacting conductivity sensor is used.

Before attempting any changes refer to the parameter setup list shown in Table 3-1. This table presents a brief description and the possible options.The factory setting is also given with a space for the user setting. It is recommended that the list be carefully reviewed before any changes are made.

On initial configuration, it is recommended that the parameters be entered in the order shown on the worksheet. This will reduce the chance of accidentally omitting a needed variable.

Table 3-1. Conductivity Settings List

ITEM	RANGES	FACTORY SETTINGS	USER SETTINGS
PROGRAM LEVEL (Sections 3.1 - 3.2)			
A. Alarm Setpoints (Section 3.1)			
1. Alarm 1 (low action)	0 - 2,000 mS/cm	20 µS/cm	_____
2. Alarm 2 (high action)	0 - 2,000 mS/cm	1,000 mS/cm	_____
3. Alarm 3 (high action)	0 - 2,000 mS/cm	1,000 mS/cm	_____
B. Output Setpoints (Section 3.2)			
1. Output 1: 4 mA (min value)	0 - 2,000 mS/cm	0 µS/cm	_____
2. Output 1: 20 mA (max value)	0 - 2,000 mS/cm	1,000 mS/cm	_____
3. Output 2: 4 mA (min value)	–15 - 200 °C	0.0 °C	_____
4. Output 2: 20 mA (max value)	–15 - 200 °C	100.0 °C	_____
CONFIGURE LEVEL (Sections 3.3 - 3.10)			
A. Display (Section 3.3)			
1. Sensor type	Inductive/Contacting	Inductive	_____
2. Reference temperature	0 to 200°C	25°C	
3. Temperature Units	°C/°F	°C	_____
4. Output 1 Units	mA/% of full scale	mA	_____
5. Output 2 Units	mA/% of full scale	mA	_____
6. Language	English/Français/Español/Deutsch/Italiano	English	_____
7. Operating display lower left	See section 3.3	Alarm 1 Setpoint	_____
8. Operating display lower right	See section 3.3	Alarm 2 Setpoint	_____
9. Display contrast	0-9 (9 darkest)	4	_____
B. Outputs (Section 3.4)			
1. Hold (Outputs and Relays)	Disable/Enable/ 20 min timeout	Disable feature	_____
2. Output 1			
(a) Current Range	4-20 mA/0-20 mA	4-20 mA	_____
(b) Dampening	0-299 Sec	0 Sec	_____
(c) Hold Mode Value	Last value/Fixed value	Last value	_____
(value if (c) Fixed)	0-22 mA	21 mA	_____
(d) Fault value	0-22 mA	22 mA	_____

Continued

Table 3-1. Conductivity Settings List *(Continued)*

ITEM	RANGES	FACTORY SETTINGS	USER SETTINGS
B. Outputs (Section 3.4) *Continued*			
3. Output 2			
(a) Measurement Selection	Temperature/Conductivity	Temperature	_____
(b) Current Range	4-20 mA/0-20 mA	4-20 mA	_____
(c) Dampening	0-299 Sec	0 Sec	_____
(d) Hold Mode Value	Last value/Fixed value	Last value	_____
(value if (d) Fixed)	0-22 mA	21 mA	_____
(e) Fault value	0-22 mA	22 mA	_____
C. Alarms (Section 3.5)			
1. Alarm 1 (Process Alarm)			
(a) Configuration	Low alarm/High alarm/Off	Low alarm	_____
(b) Hysteresis (deadband)	0-25% of setpoint	0%	_____
(c) Delay Time	0-99 sec	0 sec	_____
2. Alarm 2 (Process Alarm)			
(a) Configuration	Low alarm/High alarm/Off	High alarm	_____
(b) Hysteresis (deadband)	0-25% of setpoint	0%	_____
(c) Delay Time	0-99 sec	0 sec	_____
3. Relay Action in Fault Mode (Alarms 1 - 3)	Open/Closed/None	Open	_____
4. Alarm 3			
(a) Type	Process alarm/Timer	Process alarm	_____
(b) Settings if (a) is Process alarm			
• Configuration	High alarm/Low alarm/off	High alarm	_____
• Hysteresis (deadband)	0-25% of setpoint	0%	_____
• Delay Time	0-99 sec	0 sec	_____
(c) Settings if (a) is Timer			
• Interval between timer cycles	0-999.9 hr	24 hr	_____
• Number of relay activations per cycle	1-60	1	_____
• Relay on time per activation	0-999 sec	120 sec	_____
• Relay off time between activations	0-999 sec	1 sec	_____
• Recovery time after last activation	0-999 sec	600 sec	_____
5. Alarm 4 (configuration)			
(a) Type	Fault/Off	Fault	_____
D. Security (Section 3.6)			
1. Level 1 (Lock all)	000-999	000 (no security)	_____
2. Level 2 (Lock all except Calibrate)	000-999	000 (no security)	_____
3. Level 3 (Lock all except Calibrate, Alarm Setpoints and Rerange Outputs)	000-999	000 (no security)	_____
E. Temperature Sensor (Section 3.7)			
RTD Type	Pt100/Pt1000	Pt100	_____

Accessing Calibrate, Program and Configure Menus Operating configuration changes are made at the levels shown in Figure 3-1. Press any key from the operating display to access the main menu.

Level 1 Calibrate. To access calibration selections from the main menu, press Enter (F4) with the cursor on "Calibrate". Standardize conductivity, Initial setup, and temperature adjustments are made at this level (refer to Section 4.0 for these procedures).

Level 2 Program. To access the program level from the main menu, place the cursor over "Program" using the down arrow key, and press Enter (F4). From the program level menu, changes can be made to the alarm setpoints and the output setpoints.

Level 3 Configure. To access the configure level from the main menu place cursor over "Program", press Enter (F4), then place cursor over "Configure" and again press Enter (F4). This level contains more advanced options.

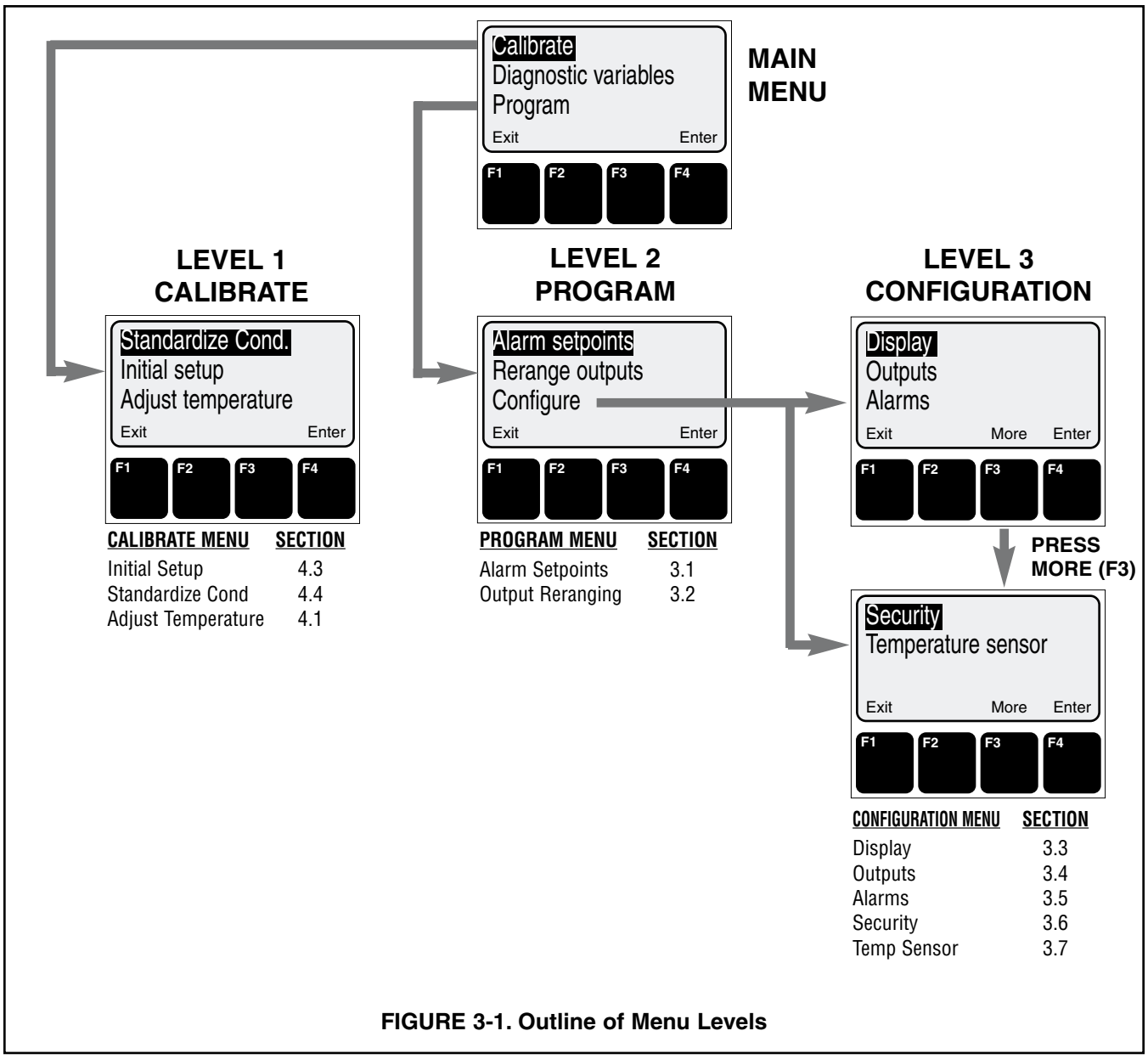
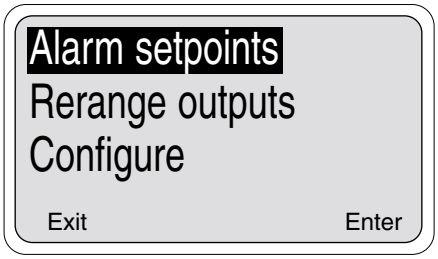


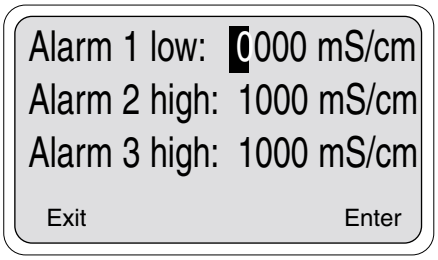
FIGURE 3-1. Outline of Menu Levels

3.1 CHANGING ALARM SETPOINTS



This section describes how the three alarm setpoints can be changed.

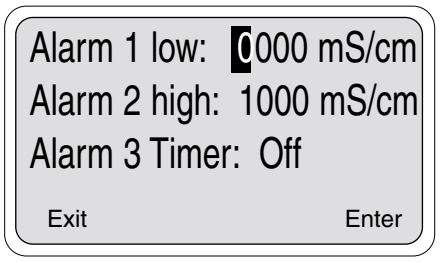
1. From the operating display, press any key to obtain the main menu. With the down arrow key, move the cursor to “Program” and press Enter (F4). With the cursor on “Alarm Setpoints”, press Enter (F4).



2. Alarms 1 and 2 will display the relay configuration as high, low or off depending upon setting determined in Section 3.5. After each setpoint is keyed in, press Enter (F4) and the cursor will immediately move to the next line.

Conductivity Units

1 mho/cm = Siemen/cm = 1000 mS/cm = 1,000,000 µS/cm
1mS/cm = 1000 µS/cm



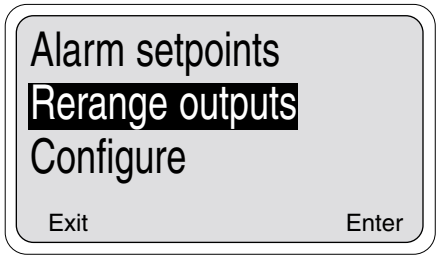
3. Alarm 3 will display the relay configuration as high, low or off if configured as a process alarm. If configured as a timer, the selections are on or off.

“On” - Initiates the timer sequence
“Off” - Deactivates the timer sequence

NOTE

Enter (F4) must be pressed after a cursor value is changed for the analyzer to update. If “on”, is entered, see Section 3.5 for timer settings.

3.2 RERANGING AND TESTING OUTPUTS



This section describes how the outputs (4-20 or 0-20 mA) can be reranged.

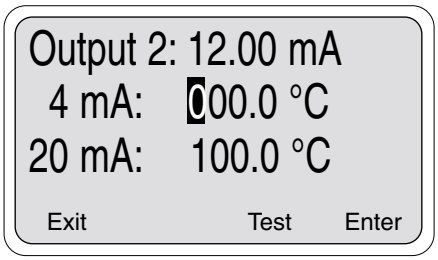
1. From the main menu, move the cursor down to “Program” and press Enter (F4). On this display, move the cursor to “Rerange outputs” and press Enter (F4).



2. The top line of this display reads the live output 1 process value in mA or %. The next two lines allow reranging of the conductivity values corresponding to 4 mA and 20 mA. Pressing More (F3) allows reranging of output 2 setpoints.

NOTE

If the analyzer has been configured for 0-20 mA output (Section 3.4) the 4 mA label will be replaced by 0 mA.



3. The top line of this display reads the live output 2 value. The next two lines allow reranging of the 4 and 20 mA values for output 2. Pressing Test (F3) allows testing (or simulation) of outputs 1 and 2.

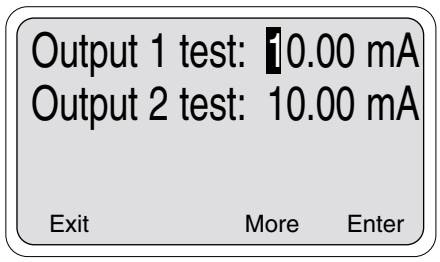
   Pressing Exit (F1) returns the cursor to the program menu.

NOTE

Output 2 can be configured to temperature or conductivity, see Section 3.4. If the analyzer has been configured for 0-20 mA output (Section 3.4), the 4 mA label will be replaced by 0 mA.

Testing The Outputs

The outputs can be simulated between 0-20 mA for the purpose of testing devices such as valves, pumps or recorders.



4. This display allows simulation of both output 1 and output 2. Enter the value(s) to be simulated and press Enter (F4). The analyzer simulates output 1 when Enter is pressed and displays the simulate output message. Pressing More (F3) returns the cursor to the output 1 setpoints display. Pressing Exit (F1) returns the output to normal operation and the cursor to the program menu. Each output is simulated independently. A message will display at the bottom of the screen:

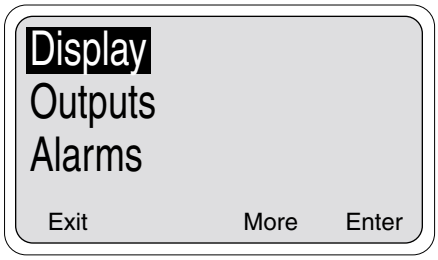
   “Simulating output 1 or 2”

   The simulating display will default back to the operating display if no key is pressed for 20 minutes.

NOTE

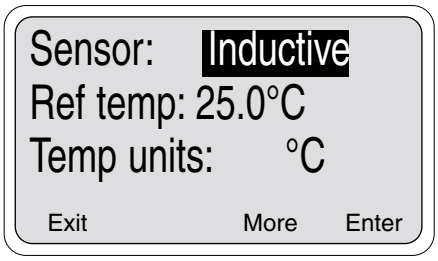
Enter (F4) must be pressed after a cursor value is changed for the analyzer to update.

3.3 CONFIGURATION OF DISPLAY OPTIONS



This section describes the procedure for changing what is shown on the operating display.

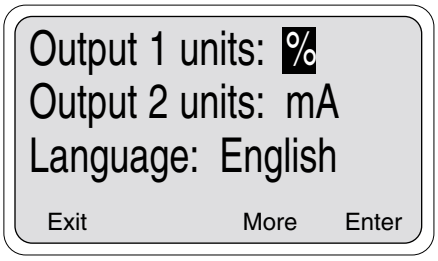
1. From the program menu, move the cursor to "Configure" and press Enter (F4). The first configuration menu is displayed. With the cursor on "Display" press Enter (F4). Pressing More (F3) allows the configuration of other display options.



2.

Menu Item	Options
Sensor type	Inductive/Contacting
Reference temperature	0-200°C
Temperature units	°C/°F

Press Enter (F4) to accept the value shown in reverse video and move the cursor to the next selection. Press More (F3) to show other display options.



3.

Menu Item	Options
Output 1 units	mA/percent
Output 2 units	mA/percent
Language	English/Français/Español/Deutsch/Italiano

Press Enter(F4) to accept the option displayed and move the cursor to the next option. Press More (F3) to select other menu items.

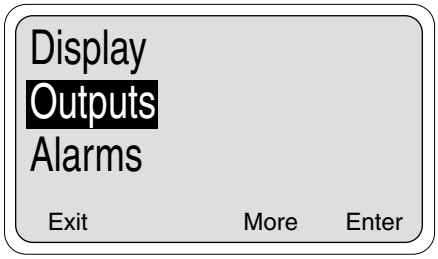


4. This screen allows you to choose the items displayed on the third line right and left of the operating display screen. The process temperature and output 1 value are always shown on line 2 of the operating display. This screen allows you to make the following choices: The "Display contrast" selection makes the display become lighter or

Lower Left of Operating Display	Lower Right of Operating Display
• AL 1 (alarm 1 setpoint) • AL 3 (alarm 3 setpoint) • ABS (absolute conductivity) • CF (cell factor) • Blank (nothing displayed on lower left of operating display)	• AL 2 (alarm 2 setpoint) • AL 3 (alarm 3 setpoint) • ABS (absolute conductivity) • Slp (temperature slope) • Out 2 (Output 2 value in mA or %) • Blank (nothing displayed on lower right of operating display)

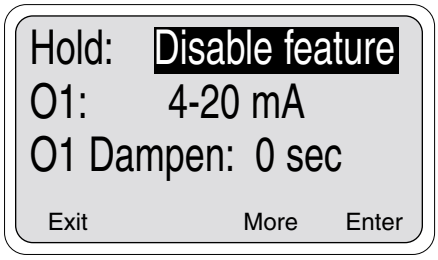
darker. 0 is the lightest display and 9 is the darkest. The display is immediately updated. Press Exit (F1) to return to the first configuration menu.

3.4 CONFIGURATION OF OUTPUT PARAMETERS



This section describes the options available for configuration of the outputs. The designation "O1" refers to output 1. The designation "O2" refers to output 2.

1. From the program menu . . . with the cursor on "Outputs" press Enter (F4).



2.

Menu Item	Options
Hold*	Disable feature/Enable feature/ 20 min timeout
O1 Output 1 current range**	4-20mA/0-20 mA
O1 Output 1 dampen***	0-255 sec

* Enabling the hold feature will give the user the option of activating the hold function during the calibration sequence. The 20-min timeout selection also offers this option, but removes the hold function automatically after 20 minutes.

**If the output 1 range is changed, be sure to rerange output 1 as described in Section 3.2.

*** Dampens the response of the signal output. This option is useful to minimize the effect of a noisy reading. The number entered is the sampling time (in seconds) for an averaged output.

NOTE

Enter (F4) must be pressed after a cursor value is changed for the analyzer to update.

Pressing More (F3) allows the configuration of hold and fault function.

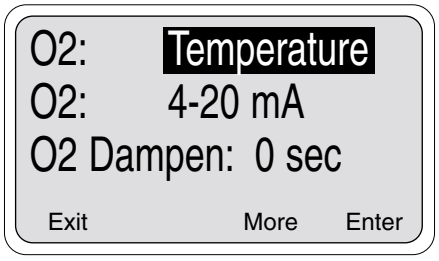


3.

Menu Item	Options
O1 Hold (output 1 action in hold mode)	Last value/ fixed value
O1 Fixed Hold (if Output 1 hold is "fixed value")	0-22.00 mA
O1 Fault (output 1 fixed value in a fault condition)	0-22.00 mA

If fixed hold selected, then output 1 fixed hold must be set at desired held output between 0-22 mA. Fixed hold is factory set at 21.00 mA and fault conditions are factory set at 22.00 mA.

Pressing More (F3) allows the selection of output 2 options.



4.

Menu Item	Options
O2 Output 2 Measurement	Temp/Conductivity
O2 Current range*	4-20 mA/0-20mA
O2 Output 2 Dampen	0-255 sec.

*If this value is changed, be sure to rerange output as described in Section 3.2.

Pressing More (F3) allows configuration of other hold and fault functions.



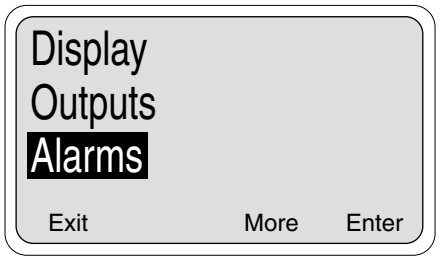
5.

Menu Item	Options
O2 Hold (Output 2 action in hold mode)	Last value/ Fixed value
O2 Fixed Hold (if Output 2 hold is “Fixed value”)	0-22.00 mA
O2 Fault (output 2 action in a fault condition)	0-22.00mA

Pressing Exit (F1) returns screen to the first configuration menu.

3.5 CONFIGURATION OF ALARM PARAMETERS

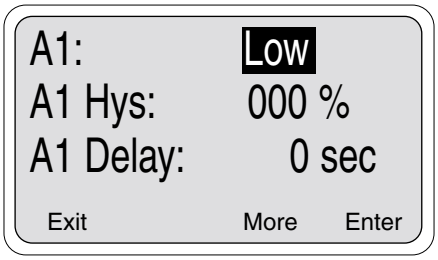
This section explains configuration of the alarms. The designations "A1", "A2", "A3" and "A4" refer to relays 1,2,3 and 4, respectively.



1. From the program menu select configure menu and Enter (F4). With the cursor on "Alarms", press Enter (F4).

NOTE

After completing this section be sure to check the alarm set points with function configuration (see Section 3.1) if necessary.

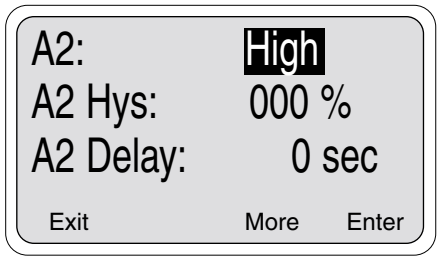


2.

Menu Item	Options
A1 alarm 1: Logic	Low alarm/High alarm/ Off (not used)
A1 alarm 1: Hysteresis (deadband)*	0-25 % of full scale alarm alarm setpoint
A1 alarm 1: Delay time before relay activation and deactivation (can prevent chatter)	0-99 sec

*Delays relay deactivation after reading is no longer in the alarm 1 condition

Pressing More (F3) allows configuration of alarm 2 options.

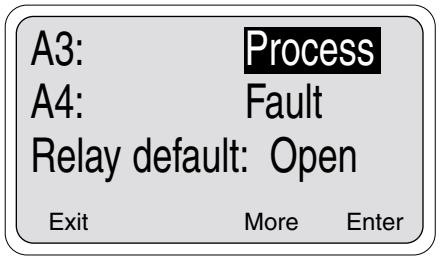


3.

Menu Item	Options
A2 alarm 2: Logic	Low alarm/High alarm/ Off (not used)
A2 alarm 2: Hysteresis (Deadband)*	0-25 %
A2 alarm 2: Delay time before relay activation and deactivation (can prevent chatter)	0-99 sec

*Delays relay deactivation after reading is no longer in the alarm 2 condition

Pressing More (F3) allows configuration of alarm 3 options.

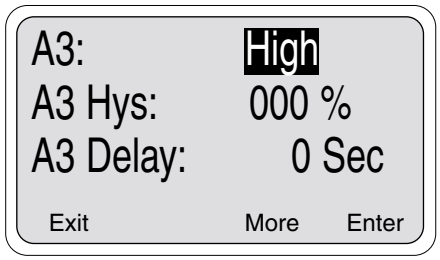


4.

Menu Item	Options
A3 alarm 3: Type	Timer/Process alarm*
A4 alarm 4 Logic	Fault/Off**
Relays 1-3 action in a hold or fault condition	Relays open/closed/none

*Pressing More (F3) proceeds to screen 5 if relay 3 is a process alarm or screen 6 if relay 3 is a timer.

**Note: If A4 configuration is "Fault" the relay will activate in a fault condition. To activate the complete diagnostics refer to Section 5.2.

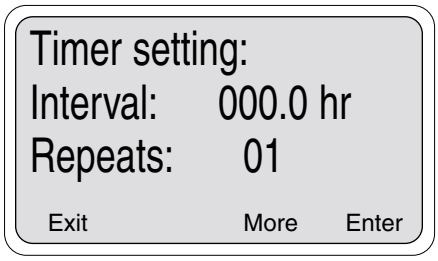


5.

Menu Item	Options
A3 alarm 3: Configuration	Low alarm/High alarm/ Off (not used)
A3 alarm 3: Hysteresis (deadband)*	0-25 %
A3 alarm 3: Delay time before relay activation and deactivation (can prevent chatter)	0-99 sec

Pressing More (F3) allows the configuration of timer setting.

*Delays relay deactivation after reading is no longer in the alarm 3 condition



6.

Menu Item	Options
Interval between cycles	0-999.9 hr.
No. of activation cycles for relay (repeats)	1-60

NOTE

The timer can be used for periodic chemical or mechanical cleaning of a coated sensor. See the examples of the timer cycle below. The timer must be activated separately (see Section 3.1).

Pressing More (F3) allows configuration of more timer parameters.

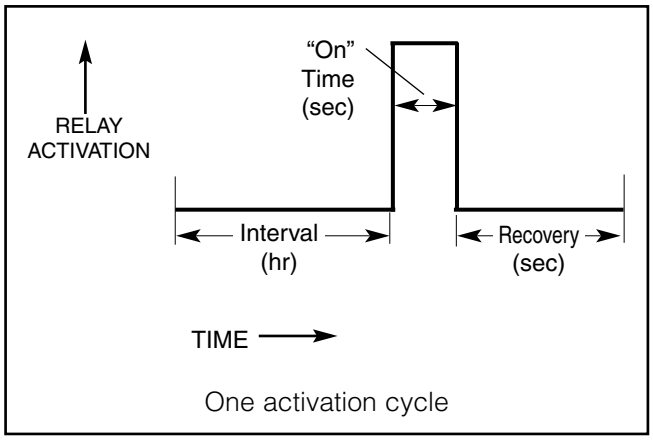


7.

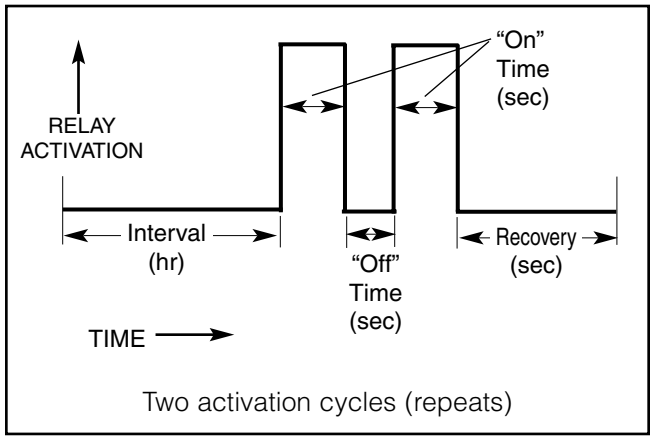
Menu Item	Options
Relay “on” (time per activation)	0-999 sec
Relay “off” (time between activations)	0-999 sec
Recovery time after last activation	0-999 sec

Pressing Exit (F1) returns screen to previous functions.

TIMER EXAMPLES



One activation cycle



Two activation cycles (repeats)

3.6 CONFIGURATION OF SECURITY LEVELS

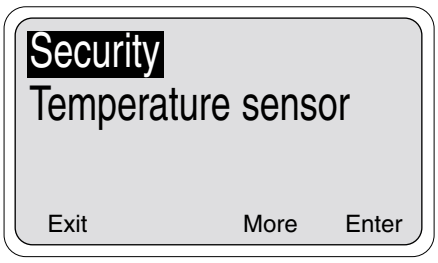
This section describes programming of three levels of security:

I. Lock out all access (read main screen only)

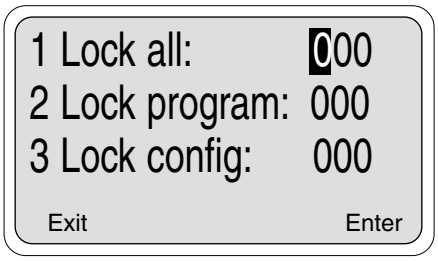
II. Lock out program features (only calibration is allowed)

III. Lock out configuration features (only calibration, alarm setpoint and rerange output setpoints (4 and 20 mA values) are allowed)

For convenience, the level 3 security code will be accepted at levels 1 and 2 and the level 2 security code will be accepted at level 1.



1. From the program menu display configure menu and press Enter (F4) and More (F3). Move the cursor to “Security” and press Enter (F4).



2.

Menu Item	Options
1 Lock all	000-999
2 Lock program	000-999
3 Lock configuration	000-999

Pressing Exit (F1) from this display returns screen to previous functions.

NOTE

A code of 000 disables security for that level.

NOTE

The security feature will not activate until two minutes* after the last keyboard activity. It will activate immediately if power is removed from the analyzer then restored.

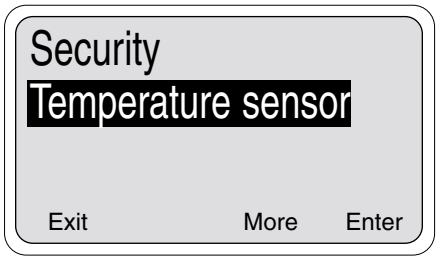
NOTE

To access the code if it is forgotten, press and hold F4 Key for 5 seconds, The security screen appears with the code in the display.

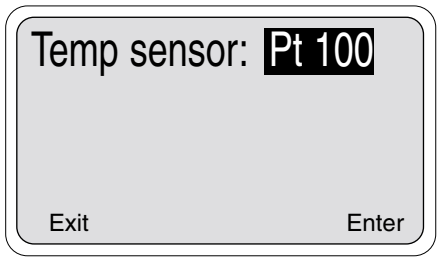
* when simulating outputs, or during a hold condition, the time out period is extended indefinitely.

3.7 CONFIGURATION OF TEMPERATURE SENSOR (RTD) TYPE

This section explains how to change the temperature sensor type.



1. From the program menu, display configure menu, and press Enter (F4) and More (F3). Move the cursor to “Temperature sensor” and press Enter (F4).



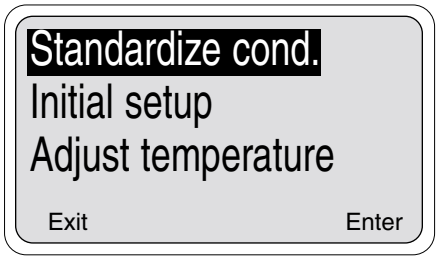
2.

Menu Item	Options
Temperature sensor	PT100/PT1000

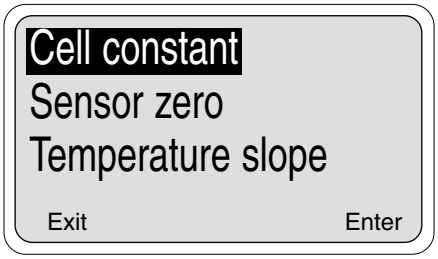
Pressing Exit (F1) several times will return the operating display.

SECTION 4.0
CALIBRATION

4.1 INITIAL SETUP



We recommend complete configuration (Section 3.0) of the Model 54C before calibration. Calibration consists of entering the cell constant, zeroing the sensor in air, and entering the temperature slope of the process. The analyzer can automatically calculate the cell constant, if it is unknown, and a two point calibration can be used if the temperature slope is not known.



1. From the operating display, press any key and press Enter (F4) to access the calibration menu. Select initial setup and press Enter (F4).

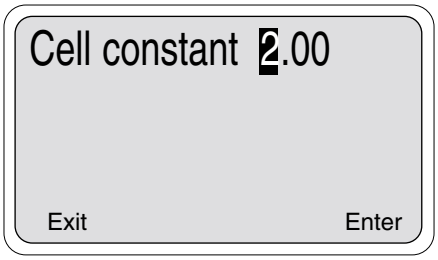
Menu Item	Options
Cell constant	.01-50
Temperature slope	0-5%

NOTE

The hold mode screen will appear if the screen is activated in Section 3.4. Changing the hold mode to ON holds the outputs and relays in a fixed state to avoid process upsets to a control system. Press enter to obtain the calibration menu.

All cell constants can be located on the sensor J-Box or cable label. The cell constant on the label is approximate. If approximate conductivity readings are acceptable input the labels cell constant and temperature slope value (Step 3) no calibration is required, however if a standardization is performed the cell constant will change compensating for the process effects on the sensor.

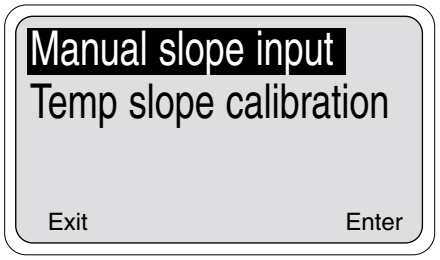
If the cell constant is not entered a standardization or two point calibration will calculate the apparent cell constant and set the cell factor to one. Subsequent standardizations will change the cell factor indicating process effects on the sensor.

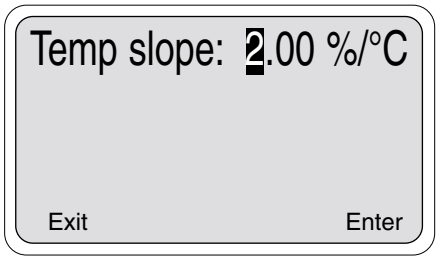


2. Entering a new cell constant will reset the cell factor to 1.0. The cell factor indicates the nonideality of the conductivity measurement due to installation geometry, sensor scaling, and normal manufacturing tolerances. Track changes in this value to determine when to remove the sensor for cleaning. After the cell constant is entered, place the sensor in air and select sensor zero to zero the analyzer/sensor loop.

NOTE

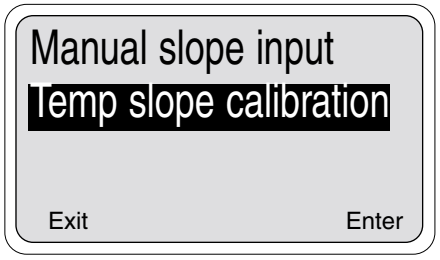
See page 8-3 for typical cell constants found in Rosemount Analytical sensors

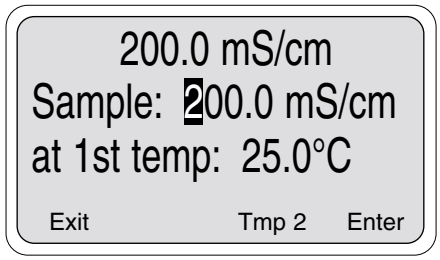


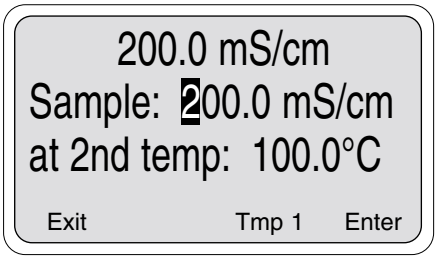


3. Manual temperature slope: If the temperature slope of the process is known, use the cursor keys to display the temperature slope value and press Enter(F4). If you do not know the exact temperature slope value, but wish to approximate it, refer to the following guide.

Acids:	1.0 to 1.6% per °C
Bases:	1.8 to 2.2% per °C
Salts:	2.2 to 3.0% per °C
Water:	2.0% per °C







4. Two point temperature slope calibration: This procedure is used to calculate the cell constant and temperature slope simultaneously. This is the recommended procedure for initial calibration if the process temperature slope is unknown.

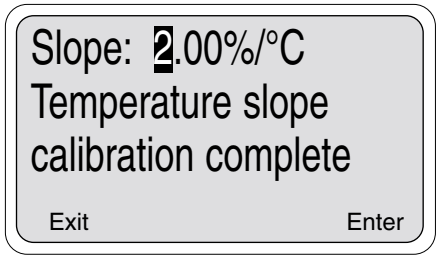
A. Obtain a grab sample of the process to be measured. Select temperature slope calibration and press Enter (F4).

B. Determine the sample's conductivity using a calibrated bench instrument or portable analyzer. The instrument must be able to reference the conductivity to 25°C, or the solution must be measured at 25°C. Write down the reading.

C. Immerse the sensor into the process solution. The sensor body must be held away from the bottom and sides of the sample's container at a distance at least equal to the diameter of the sensor, and the sensor cable must not be allowed to contact the solution. Shake the sensor to ensure that no air bubbles are present.

D. Adjust the sample's temperature to either the normal high or normal low temperature of the process. To raise the sample's temperature, a hot plate with stirrer is recommended. To lower the process temperature, place the grab sample container in an ice bath or let it slowly cool down.

E. Allow the sensor to acclimate to the solution. (The temperature reading should be stable.)

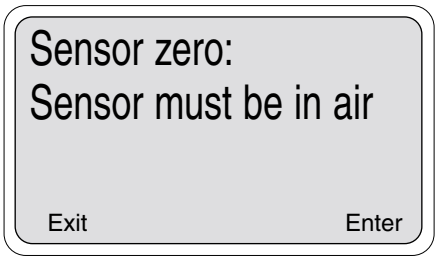


F. When the temperature and sensor have stabilized at the first temperature enter the conductivity reading from B above and press Enter (F4).

G. Adjust the sample's temperature to the other normal temperature extreme of the process.

H. Enter the conductivity reading from B above at the second temperature and press Enter (F4).

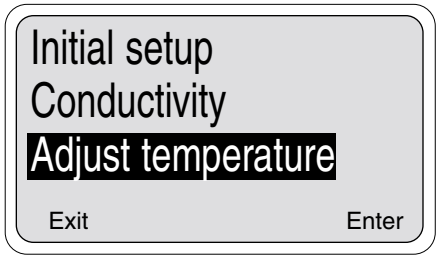
I. The temperature slope will display. Press Enter (F4) and standardize sensor.



5. The analyzer compensates for differences in cable resistance by measuring a reading while the sensor is in air (which has zero conductivity).

4.2 TEMPERATURE ADJUSTMENT

For accurate temperature correction, the temperature reading may need adjustment. The following steps should be performed with the sensor on line or in a grab sample near the operating temperature.

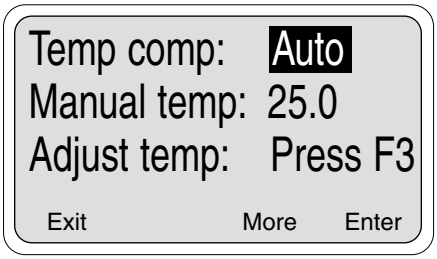


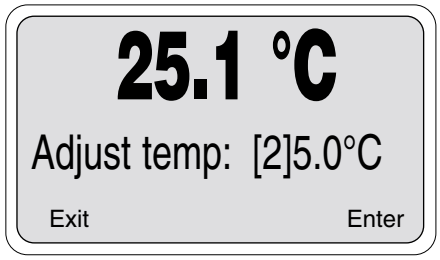
Observe the analyzer temperature reading. Make sure the sensor has acclimated to the process temperature. Compare the analyzer temperature to a calibrated temperature reading device. Proceed to the next step if the reading requires adjustment.

1. From the operating display, press any key and press Enter (F4) to access calibration menu. With the cursor on "Adjust temperature" press Enter (F4).

NOTE

The hold mode screen will appear if the output hold function is activated in Section 3.4. Changing the hold mode to ON holds the outputs and relays in a fixed state to avoid process upsets to a control system.





2. Press enter to obtain the calibration menu. Press More (F3) on this display to adjust the temperature. Then using the cursor keys, input the correct temperature value and press Enter (F4). The analyzer will enter the value into memory. Press Exit (F1) to return to the temperature menu.

NOTE

The temperature compensation can be changed to either automatic or manual.

The manual temperature value need only be entered if the temperature compensation setting is manual. In this case, a value may be entered between –15 and 200°C (5 and 392°F). Pressing the back arrow key will display the +/- segment.

Pressing Exit (F1) returns the cursor to the calibration menu.

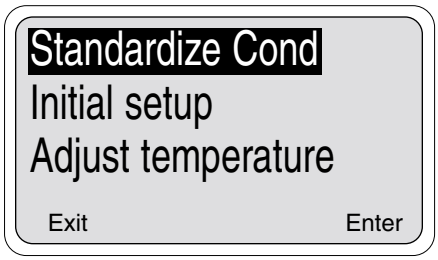
NOTE

When the temperature compensation setting is manual, all temperature specific faults are disabled.

NOTE

Before exiting the calibration mode, if hold mode is ON, be certain to install the sensor back in the process and change the setting to OFF to resume normal operation. To access the hold menu, press any key to display the main menu, then, with the cursor on calibrate press Enter (F4). Hold Mode will be shown with the present hold status displayed. Adjust display then press Enter (F4) to change hold status. Exit (F1) to return to main menu.

4.3 CONDUCTIVITY STANDARDIZATION



For maximum accuracy, standardize the sensor in the process or a process grab sample.

1. From the operating display, press any key to obtain the main menu. With the cursor on “Calibrate”, press Enter (F4).

NOTE

The hold mode screen will appear if the screen is activated in Section 3.4. Changing the hold mode to ON holds the outputs and relays in a fixed state to avoid process upsets to a control system. Press enter to obtain the calibration menu.

   A. Take a grab sample which is as close to the sensor as possible. Write down the value the analyzer is reading at this time.
   B. Using a calibrated conductivity instrument with automatic temperature compensation, determine the conductivity of the process or grab sample. The calibration is best performed at the process temperature.
   C. Before entering the standardized value, compare the value the analyzer is reading now to the value in Step A. Add this difference to the reference value obtained in Step B. This accounts for the conductivity change while the grab sample is being measured.

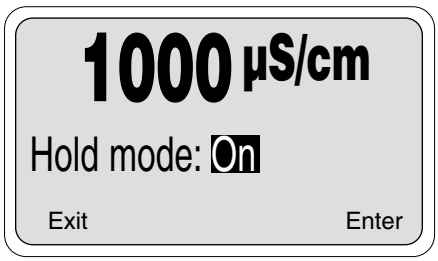


2. The conductivity reading in large numbers is the live process conductivity reading. The next line displays the conductivity reading when the display was accessed. Pressing the arrow keys to change the reading and pressing enter (F4) standardizes the conductivity reading. The analyzer will continue to read this value until another key is pressed.

NOTE

Before exiting the calibration mode reinstall the sensor in the process and change the hold mode setting to OFF.

4.4 HOLD OUTPUTS



Before removing the sensor from process the analyzer outputs can be held to prevent process upsets. Refer to Section 3.4 to enable this feature. If hold function is enabled the hold mode screen will appear when calibrate is selected.

The relays will act as selected in relay default, see Section 3.5.

4.5 INSTRUMENT MAINTENANCE

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

SECTION 5.0
DIAGNOSTICS AND TROUBLESHOOTING

The MODEL 54 Conductivity Analyzer automatically searches for fault conditions that would cause an error in the measured reading. If such a condition occurs, the current outputs and relays will act as configured in Section 3.4 and Section 3.5, the red "FAIL" LED on the front will illuminate and the display will flash a diagnostic message.If more than one fault exists, the display will sequence through the diagnostic messages. This will continue until the cause of the fault has been corrected.

Troubleshooting is easy as 1, 2, 3 . . .

Step 1 Look for a diagnostic fault message, on the display, to help pinpoint the problem. Refer to Table 5-1 for an explanation of the message and a list of the possible problems that triggered it.

Step 2 Refer to the Quick Troubleshooting Guide, Table 5-2, for common conductivity loop problems and the recommended actions to resolve them.

Step 3 Follow the step by step troubleshooting approach, offered in Section 5.3 and Section 5.4, to diagnose less common or more complex problems.

5.1 DIAGNOSTIC MESSAGES.

The Model 54 C software diagnostics constantly monitor the loop for possible problems. If you encounter an operational problem check the display for a fault or error message (displayed in reverse video).

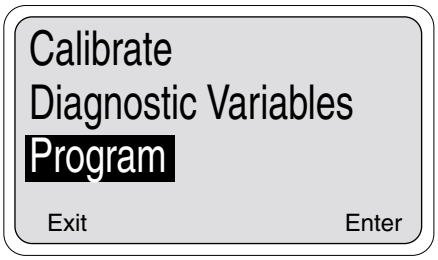
Note the message and refer to Table 5-1 for an explanation of the message and a list of the possible problems that triggered it.

TABLE 5-1 Diagnostic Messages

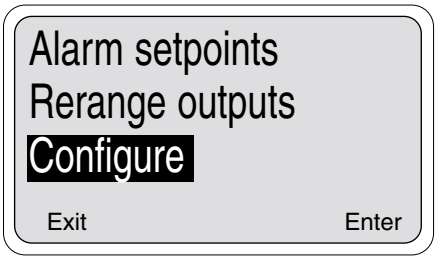
Diagnostic Messages	Description of problem
"Temp error high" "Temp error low"	1. Open or shorted RTD. 2. Temperature out of range.
"Sensor line open"	1. Open wire between sensor and analyzer. 2. Distance between sensor and analyzer > 1000 ft.
"Failure - EEPROM" "Failure - CPU" "Failure - Factory"	1. Defective CPU board. Notify Rosemount Response Center. if cycling power does not clear the fault.
"Failure - ROM"	Bad "ROM" chip on CPU board.
"Field cal needed"	Outputs 1 and 2 need trimming.
"Hold mode activated" (off line only)*	All relays are set open and outputs are set to default values.
"Excess Input"	High input from sensor.
"Reverse Input"	Faulty calibration of sensor zero.
"Overange"	Conductivity out of range.
"Hi reference drive"	High electronics range error
"Lo reference drive"	Low electronics range error
"Check Sensor Zero"	Sensor zero needs adjustment
"Zero Offset Error"	Sensor zero was unsuccessful

* Off line error messages. These displayed error messages will not initiate a fault condition, and will display on one screen only. The message will clear from the screen when a key is pressed.

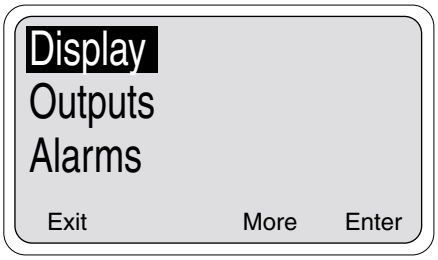
KEYSTROKE GUIDE FOR CHANGING LANGUAGES



1. From the operating display*, press any key to obtain the main menu. Display text will be in English, French, Spanish, German or Italian. With the down arrow key, move the cursor to “Program/Programme/-Programm/Programmazione” and press F4.

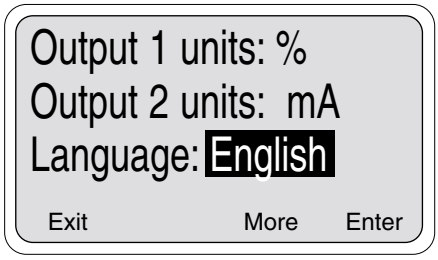


2. Move the cursor to “Configure/Configuration/Configurar/Konfiguration/-Configurazione” and press F4.



3. With the cursor on “Display/Affichage/Indición/Bildshirm/Impostazioni visore”, press F4.

4. Press F3 (More/Plus/Más/Weit/Cont) to display the second set of menu items.



5. Press F4 move cursor to “Language:/Langue:/Idioma:/Sprache:/-Lingua:” option.

6. With the down arrow key, display the desired display language: “English/Françias/Español/Deutsch/Italiano” and press F4.

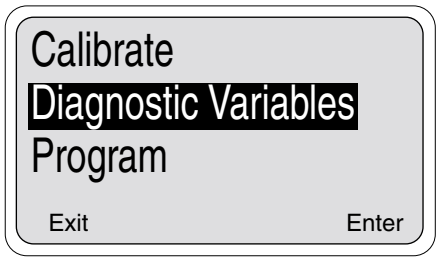
* Screens shown are “English” display.

5.2 DISPLAYING DIAGNOSTIC VARIABLES

This section explains how the following diagnostic information can be displayed at a glance.

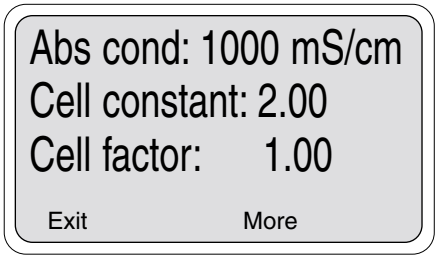
1. Absolute conductivity
2. Cell constant
3. Cell factor
4. Temperature slope
5. Software version

Use the following procedure to display the diagnostic variables:



1. From the operating display, press any key.

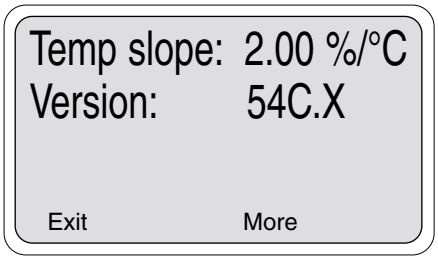
2. With the down arrow key move the cursor down to “Diagnostic Variables” then press Enter (F4).



3. The first diagnostic variable screen displays absolute conductivity, cell constant and cell factor. To display the second screen, press More (F3).

The absolute conductivity is affected by the cell constant, the cell factor and the conductance signal from the sensor but is not temperature compensated.

The cell constant is a property of any specific sensor and does not change. The cell factor indicates nonidealety due to various factors.



4. The second diagnostic variable screen displays temperature, slope, and software version. To redisplay the first screen, press More (F3). To return to the main screen, press Exit (F4) until the main screen is reached.

NOTE

“X” in example will be a numerical value. Software versions will also be printed on serial tag.

5.3 QUICK TROUBLESHOOTING GUIDE

Table 5-2 (below) identifies some of the more common symptoms and suggests actions to help resolve the problem. Refer to Table 5-1 for a complete list of diagnostic messages.

TABLE 5-2 Quick Troubleshooting Guide

SYMPTOM	ACTION
Wrong temperature reading. Suspected temp. compensation problem. "Temp. error high" "Temp. error low"	Perform a temperature standardization. Verify sensor's RTD resistance vs. temp.; see Section 5.5. Temperature is out of range of sensor. Check wiring.
Display segments missing. Display not operable.	Replace Display board.
Analyzer locks up; won't respond. Erratic display and relays chattering.	Replace CPU board. Check alarm set points.
Analyzer not responding to key presses. Key press gives wrong selection.	Verify and clean ribbon cable connection on CPU board. Replace enclosure door/keyboard assy.
Wrong or no current output.	Verify that output is not being overloaded; remove load: Replace Power board. If still malfunctioning; replace the CPU board.
No display or indicators. Alarm relay closure problems. Blows fuses.	Verify that the removable fuse module is securely seated. Check fuse on Power board. Replace the Power board.
"Excess Input" "Reverse Input"	Check for sensor miswiring. Perform sensor zero.
"Hi reference drive" "Lo reference drive"	Return instrument to authorized Rosemount service center.
"Check sensor zero"	Analyzer will not zero. Place sensor in air and access zero routine.

5.3.1 FIELD TROUBLESHOOTING. When it is apparent by grab sample analysis that the model 54C analyzer is giving inaccurate readings, the following procedure should be followed.

A. A quick visual inspection of the installation may expose the problem. Check to be sure that the analyzer is mounted securely and that its internal parts are properly held. Next check all input and output wiring.

B. The sensor should be checked to be certain that the electrode surfaces are totally wetted by the process and that air bubbles have not been trapped in the vicinity of the electrodes. If air bubbles are found, the installation technique should be altered to eliminate this source of error.

C. If the previous two steps did not indicate the source of the problem, the next step is to isolate the problem to either the sensor or the Model 54C analyzer.

NOTE

See flow chart on the following page for further reference (Figure 5-1).

D. The first step in troubleshooting the sensor is to disconnect the sensor wires at the conductivity monitor, remove the sensor from the process and thoroughly dry the sensor electrodes. Refer to sensor manual for additional troubleshooting checks.

NOTE

The most frequent source of problems is wiring.

5.4 SYSTEMATIC TROUBLESHOOTING

Not all problems that you encounter will be typical. If you are unable to resolve your problem using the Quick Troubleshooting Guide, Table 5-2, then try the step by step approach offered in this section.

Step 1 Follow the applicable troubleshooting flow chart:

Step 2 Refer to the tests and instructions indicated by the flow chart to diagnose the problem.

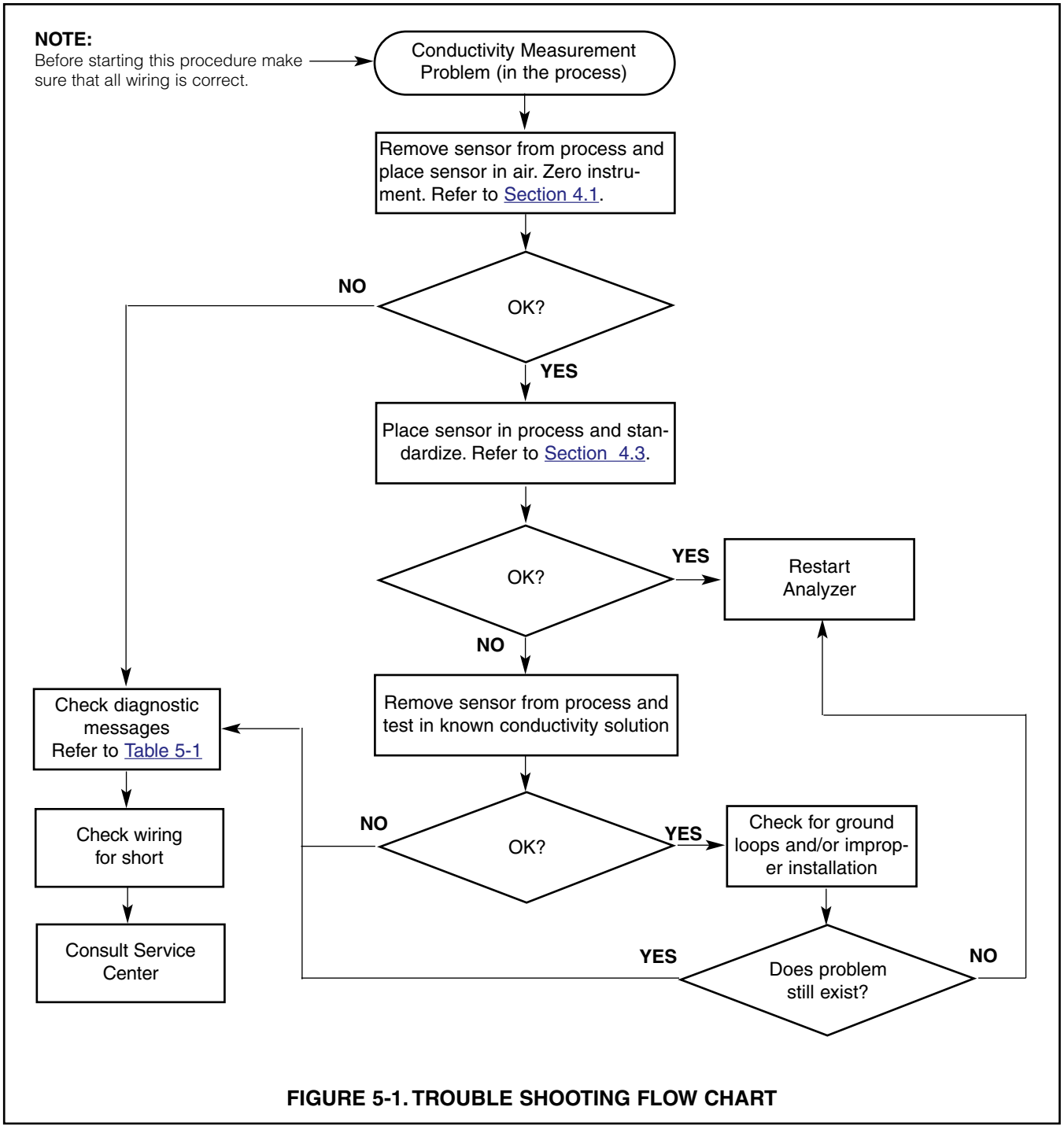


FIGURE 5-1. TROUBLE SHOOTING FLOW CHART

5.5 RTD RESISTANCE VALUES

Table 5-3 (below) 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 of (±1%). Allow enough time for the RTD element in the sensor to stabilize to the surrounding temperature.

Table 5-3. RTD Resistance Values

Temperature	Pt-100 Resistance	Pt-1000 Resistance
0°C	100.00 ohms	1000 ohms
10°C	103.90 ohms	1039 ohms
20°C	107.79 ohms	1078 ohms
25°C	109.62 ohms	1096 ohms
30°C	111.67 ohms	1117 ohms
40°C	115.54 ohms	1155 ohms
50°C	119.40 ohms	1194 ohms
60°C	123.24 ohms	1232 ohms
70°C	127.07 ohms	1271 ohms
80°C	130.89 ohms	1309 ohms
90°C	134.70 ohms	1347 ohms
100°C	138.50 ohms	1385 ohms

5.6 CIRCUIT BOARD REPLACEMENT

If it is necessary to replace the CPU Circuit Board or Power Supply Circuit Board, specific procedures for calibration (included with the new circuit board) must be followed exactly or the microprocessor will be improperly programmed. Should this occur, it will be necessary to return the entire analyzer to the factory for reprogramming.

See Section 6.0 for part numbers of replacement boards and other parts.

SECTION 6.0
REPLACEMENT PARTS AND ACCESSORIES

INDEX NO.	PART NUMBER	DESCRIPTION
1	23548-00	CPU Circuit Board
2	23710-00	Power Supply Circuit Board (115/230Vac) -Code -08
3	23537-00	LCD Display Circuit Board
4	23540-00	Front Panel Assembly
	33281-00	Hinge Pin
	33286-00	Front Panel Gasket
5	33542-00	Power Supply Circuit Board Shield- Code 08
6	33543-00	Half Shield
7	33293-00	Enclosure, Rear
8	33326-00	CPU Circuit Board Cover
	9100173	Fuse
9	33328-00	Display Insulator

Type of fuse: Time-lag type fuse (slo-blo)
Voltage Rating: 250 Volt
Current Rating: 100 milli Amp

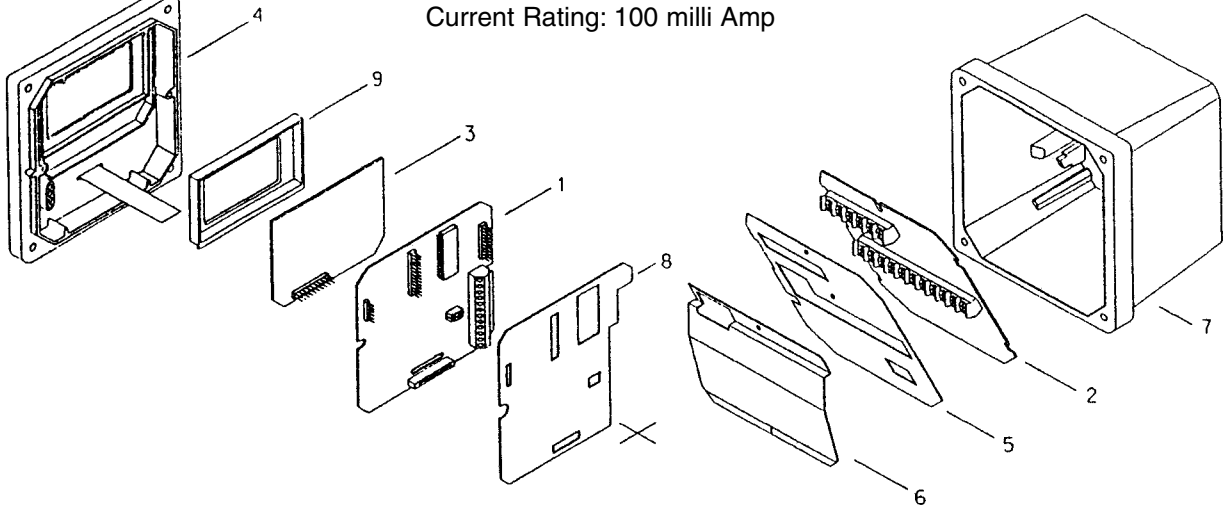


FIGURE 6-1. MODEL 54 C Analyzer, Exploded View.

ACCESSORIES	
PART NO.	**DESCRIPTION**
2002577	Mounting Bracket, 2 in. Pipe or Wall
23545-00	Panel Mounting Kit
23554-00	Gland Fitting Kit
9510048-00	Conduit Plug

SECTION 7.0
THEORY OF OPERATION

This section is a general description of how the analyzer operates. This section is for those users who desire a greater understanding of the analyzer's operation.

CONTACTING CONDUCTIVITY

The conductivity sensor produces a "conductance signal" that is proportional to the conductivity of the process solution. The 54C Analyzer subtracts a baseline zero conductivity signal from the sensor signal and multiplies the result by the cell constant and the cell factor. This absolute conductivity is then corrected to the reference temperature (usually 25°C). by accurately measuring the process temperature by means of a RTD located in the conductivity sensor. The microprocessor also adjusts the amount of correction required for temperature compensation by means of a temperature slope adjustment. This slope may be adjusted between 0 to 5%/°C either manually via the keyboard or automatically during bench or process calibration. This slope controls the amount of correction required in the temperature compensation circuit, and is specific to the process, giving you the most accurate conductivity reading possible.

INDUCTIVE (TOROIDAL) CONDUCTIVITY

The basic conductivity measurement is made using two toroids. The drive toroid induces a current in the liquid loop. The second toroid (receiver) computes the liquid current loop. By keeping the number of turns (windings around each toroid) and the drive voltage across the transmitter toroid constant the current in the liquid loop is directly proportional to the conductivity of the loop.

The actual value of the drive voltage generated by the Model 54C (either 1 volt peak-to-peak or 0.1 volt peak-to-peak) is determined by the conductivity being measured. The current sensed by the receiver toroid is converted at the analyzer to an AC voltage through a high performance amplifier. This voltage is further converted to a DC time-proportional signal which is used by the microprocessor to measure and compute absolute conductivity. The microprocessor also measures the raw DC voltage used to generate the drive voltage and the zero input at the time-proportional converter. These measurements are used to correct for ambient temperature and line voltage variations.

Rosemount Analytical also offers a booklet titled "Conductance Data for Commonly Used Chemicals." This booklet includes conductance information for over 100 industrial chemicals commonly used.

INTERVAL TIMER. The interval timer may be used for periodic sensor cleaning, or process adjustment.

The interval timer settings are:

1. Switch - Enables or disables the interval timer.
2. Interval - the time period between cycles.
3. Repeats - the number of relay activations per cycle.
4. On time - the time period of one relay activation.
5. Off time - the time period between two or more relay activations.
6. Recovery - the time period following the final relay activation.

The cycle begins at the Interval time when the Switch is turned on. When the Interval time has expired the analyzer activates Hold mode and relay 3 is activated for the On time period. If the number of Repeats is greater than one, the relay is deactivated for the Off time period and reactivated for the On time period until the number of relay activations equals the number of Repeats selected. When the final relay activation is complete the relay is deactivated for the Recovery time period. Note that no Off time period follows this last relay activation. When the Recovery time period expires the Hold mode deactivates and the cycle repeats, beginning with the Interval time.

Typically, the interval timer is configured with a long Interval, several Repeats of fairly short On times, fairly short Off times and a Recovery time which allows the process to stabilize. Setting Interval to zero results in continuous pulsing and setting Off time to zero will cause a single pulse equal to [On time x Repeats].

Note that the hold mode supercedes the Timer State. If the hold mode is on, the present interval time continues to expire and once expired the interval timer is suspended until hold state is removed.

OUTPUT LOGIC. The behavior of the Model 54 analyzer's outputs and relays are determined by various states called 'modes'.

The modes are:

1. Fault mode - fault conditions cause this mode to turn on.
2. Timer mode - the interval timer causes this mode to turn on.
3. Hold mode - user switches this mode on and off.
4. Simulation - user switches this mode on by simulating output(s).

Normally the analyzer's relays and outputs track the process.

The fault mode sets the outputs and relays to their preset programed fault values (Section 3.4 & 3.5).

Hold mode overrides timer state. If hold is activated, timer continues count to time out, but does not change state until hold is removed. The relays always open in hold mode (Note that Relay 4 may be wired normally closed as the relay is open when the LED is on). The timer mode initiates the hold mode for all relays except the timer relay. The simulation mode affects only the output(s) being simulated. (one at a time).

Fault mode overrides normal operation.

Timer mode overrides fault mode.

Hold mode overrides Timer and Fault modes.

Simulation mode overrides hold mode for the output(s) simulated.

If the hold “Enable feature” is selected then Hold mode can be accessed via the calibration menu. When hold mode is on, the display timeout is disabled until hold mode has been turned off. If the Hold “20 min timeout” is selected and hold is on then display timeout and security lockout are disabled for 20 minutes after the last keypress. At the end of this 20 minute period Hold mode automatically turns off and the display times out.

Normally the display defaults to the operating display after two minutes of no keypresses. If output is being simulated, 2-pt buffer calibration is performed or if “20 min timeout” and Hold mode is on, then the display times out after 20 minutes.

If a security code is entered, the security will lock when the display times out.

SECTION 8.0
DESCRIPTION AND ORDERING INFORMATION

- USES EITHER CONTACTING OR INDUCTIVE CONDUCTIVITY SENSORS to meet most application requirements.
- EASY-TO-USE INTERFACE spells out each operation.
- HEAVY DUTY NEMA 4X (IP65) enclosure of epoxy-painted cast aluminum.
- FULLY DESCRIPTIVE DIAGNOSTIC MESSAGES.
- TWO INDEPENDENT OUTPUTS for conductivity and temperature.
- THREE ALARMS WITH PROGRAMMABLE LOGIC plus one dedicated fault alarm.

8.1 FEATURES AND APPLICATIONS

The Model 54 C Conductivity Analyzer, with the appropriate sensor, monitors and controls conductivity in a variety of industrial processes using the most advanced technology available.

The analyzer can use either contacting or inductive (Toroidal) conductivity sensors. The sensor type is selected by keyboard entry. This feature allows the user to stock one instrument for most conductivity applications.

The analyzer is housed in a rugged NEMA 4X (IP65) weatherproof, corrosion resistant enclosure of epoxy-painted cast aluminum. It is suitable for panel, pipe or wall mounting. All functions are accessible through the front panel membrane keyboard which features tactile feedback. The large dot-matrix liquid crystal display continuously indicates conductivity, temperature, current output and alarm setpoints. Three levels of security are available: 1) calibration, 2) output range and alarm setpoint adjustment, and 3) advanced configuration. A hinged front panel provides convenient wiring access.

The two independent, isolated outputs provide 4-20 or 0-20 mA signals for conductivity and temperature. Both output ranges are programmable within the measurement ranges of conductivity and temperature. A hold output mode allows manual control during routine sensor maintenance. During hold mode the current outputs will be held at a preset or last process value.

In the event of a fault, the analyzer will display a descriptive diagnostic message, illuminate a red LED on the front panel and drive the outputs to preselectable fault mode values. A dedicated fault relay may be used to provide a visual or audible alarm to an operator.

Three process alarms are a standard feature. All alarms have programmable high or low activation, independent setpoints, adjustable hysteresis (deadband) and time delay. One relay may be configured as a timer for automatic chemical cleaning of the sensor. Green LED's on the front panel indicate the status of each of the three alarm relays.

Standardization is easily accomplished by simply immersing the sensor in a known solution and entering the value. With a two point calibration, the analyzer will automatically calculate the temperature slope of the solution.

The Model 54C utilizes either a PT-100 or a PT-1000 RTD located in the sensor to display temperature and compensate the conductivity reading for changes in process temperature. Manual temperature compensation is also keyboard selectable.

The Model 54C is compatible with both contacting and inductive (toroidal) conductivity sensors and measures over the range of 0-1 µS/cm to 0-2,000 mS/cm. Inductive conductivity sensors have no electrodes exposed to the measured solution, which practically eliminates routine sensor maintenance. The analyzer features a 0-5%/°C temperature slope adjustment. Temperature slope may be adjusted to provide greater accuracy in chemical concentration control. The temperature slope is factory set at 2% as a representative value, but each conductive solution has its own set of temperature vs. concentration curves. The Model 54C will automatically calculate the temperature slope for any given solution, or permit manual adjustment of the temperature slope if already known. The analyzer will also automatically correct for cell constant variations for better measurement accuracy.

8.2 PHYSICAL SPECIFICATIONS - GENERAL

Enclosure: Epoxy-painted cast aluminum
NEMA 4X (IP65)
144 X 144 X 132mm, DIN size
(5.7 X 5.7 X 5.2 in.)

Front Panel: Membrane keyboard with tactile feed back and user selectable security. Light gray, blue and white overlay. Light gray enclosure, dark gray bezel.

Display: Dot matrix LCD (7.0 x 3.5 cm), blue on gray-green. The display contrast is compensated for ambient temperature.

Process Variable Character Height: 16mm (0.6 inch)

Electrical Classification:
Group I Panel Mount Enclosure:
FM Class I, Div. 2, Group A thru D.
Relays: 28 Vdc - 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
6.0 Amps resistive only

Power: 100 - 127 VAC, 50/60 Hz ± 6%, 6.0 W
200 - 253 VAC, 50/60 Hz ± 6%, 6.0 W

Current Outputs: Output 1: Conductivity
Output 2: Conductivity or temperature
Each output is galvanically 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

EMI/RFI : EN50081-2
EN50082-2 CE
LVD : EN61010-1

Ambient Temperature: 0 to 50°C (32 to 122°F)
NOTE: The analyzer is operable from -20 to 60°C (-4 to 140°F) with some degradation in display performance.

Relative Humidity: 95%, non-condensing

Alarms: Relay 1 - Process alarm
Relay 2 - Process alarm
Relay 3 - Process alarm or timer
Relay 4 - Fault alarm
Each relay has a dedicated LED on the front panel.

Relay Contacts: Relays 1-3: Epoxy sealed form A contacts, SPST, normally open.
Relay 4: Epoxy sealed form C, SPDT.

	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)

INSTRUMENT SPECIFICATIONS @ 25°C

Measurement Range: (See table on page 8-3), –15 to 200°C (5 to 392°F)

Accuracy: ±0.5% of reading

Repeatability: ±0.25% of reading

Stability: ±0.25% of output range/month, noncumulative

Ambient Temperature Coefficient: ±0.01% of reading/°C

Temperature Compensation: -15 to 200°C (5 to 392°F) (automatic or manual)

Temperature Slope Adjustment: 0-5%/°C

RECOMMENDED SENSORS:

Model 140 Retractable Conductivity
Model 141 Insertion Conductivity
Model 142 Insertion Conductivity
Model 150 Insertion/Submersion Conductivity
Model 222 Toroidal Conductivity
Model 225 Toroidal Conductivity
Model 226 Toroidal Conductivity
Model 228 Toroidal Conductivity
Model 400 Screw-in Conductivity
Model 401-14 Screw-in Conductivity
Mode 402 Retractable Conductivity
Model 403 Conductivity with Sanitary Fitting

CONTACTING SENSORS						
Conductivity Sensor Model Number	142 400 402/403	142 150 400/402/403	140 141	150	140, 141 150 400/402/403	401-14 402/403
Cell Constant	0.01	0.1	0.2	0.5	1.0	10.0
Minimum Range Maximum Range	1 200	2 2,000	4 4,000	100 10,000	200 20,000	2000 200,000
	FULL SCALE MICROSIEMENS/cm					

INDUCTIVE SENSORS					
Conductivity Sensor Model Number	226	228	225	222 (1in.)	222 (2 in.)
Cell Constant*	1.0	3.0	3.0	6.0	4.0
Minimum Range	50	250	250	500	500
Maximum Range	1,000,000	2,000,000	2,000,000	2,000,000	2,000,000
* Typical	FULL SCALE MICROSIEMENS/cm				

8.3 ORDERING INFORMATION

The **Model 54 Conductivity Microprocessor Analyzer** is housed in a rugged, NEMA 4X (IP65) epoxy painted cast aluminum enclosure and is compatible with both contacting and inductive conductivity sensors. Standard features include a dot-matrix liquid crystal display, dual isolated outputs, three process alarms with independent setpoints and a fault alarm.

MODEL 54 C	MICROPROCESSOR ANALYZER
CODE	OPTIONS
08	115/230Vac, 50/60Hz power, CE
54 C — 08	**EXAMPLE**

ACCESSORIES

PART NO.	DESCRIPTION
23554-00	Cable glands, kit (Qty 5 of PG 13.5)
2002577	Mounting bracket, 2 in., pipe or wall
23545-00	Panel mounting kit
9240048-00	S.S. Tag (specify marking)

SECTION 9.0
RETURN OF MATERIAL

9.1 GENERAL.

To expedite the repair and return of instruments, proper communication between the customer and the factory is important. Before returning a product for repair, call 1-949-863-1181 for a Return Materials Authorization (RMA) number.

9.2 WARRANTY REPAIR.

The following is the procedure for returning instruments still under warranty:

1. Call Rosemount Analytical for authorization.
2. 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 unit must be supplied.
3. Carefully package the materials and enclose your "Letter of Transmittal" (see Warranty). If possible, pack the materials in the same manner as they were received.
4. Send the package prepaid to:

   Rosemount Analytical Inc., Uniloc Division
   Uniloc Division
   2400 Barranca Parkway
   Irvine, CA 92606

   Attn: Factory Repair

   RMA No. _____

   Mark the package: Returned for Repair

   Model No. ____

9.3 NON-WARRANTY REPAIR.

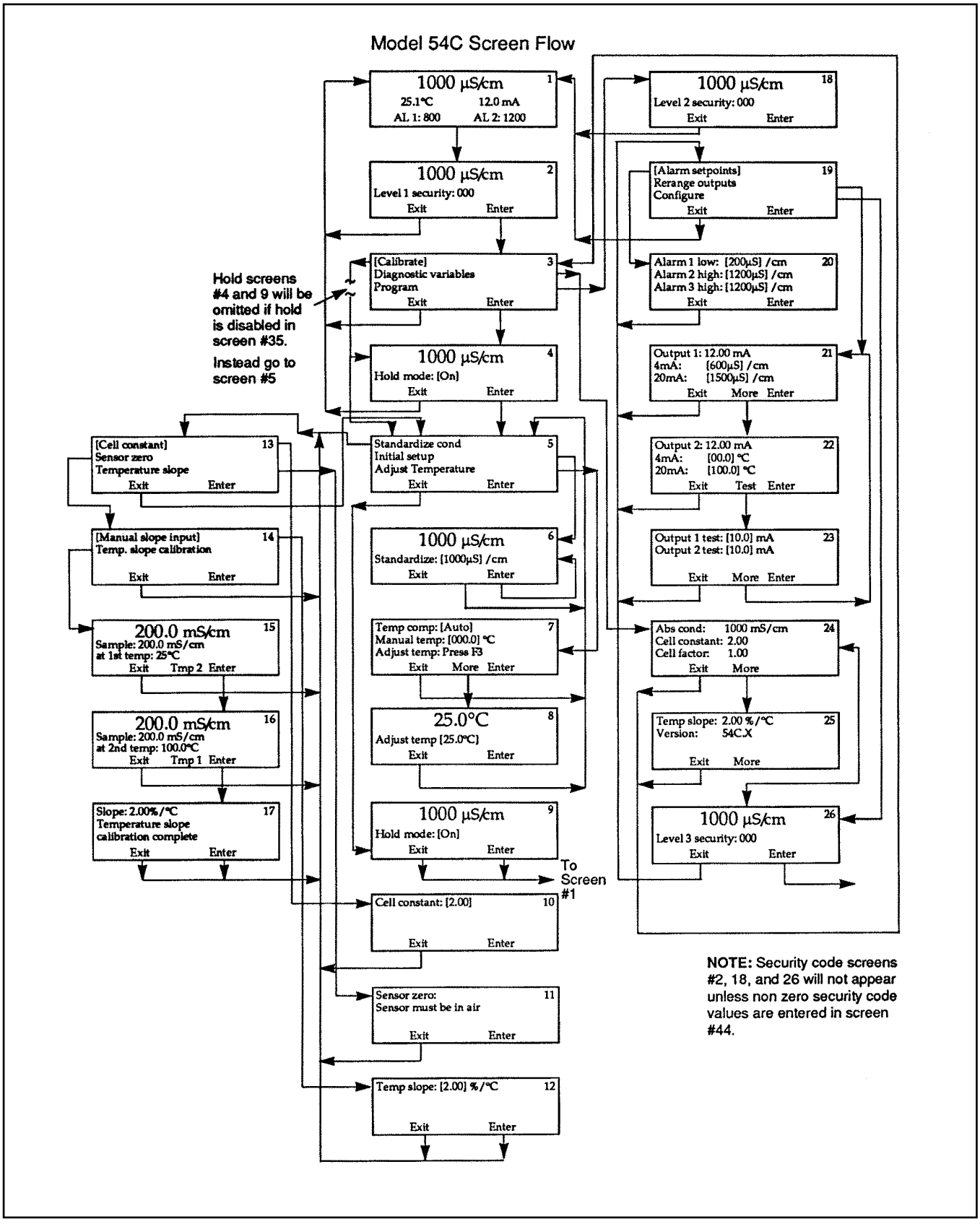
The following is the procedure for returning for repair instruments that are no longer under warranty:

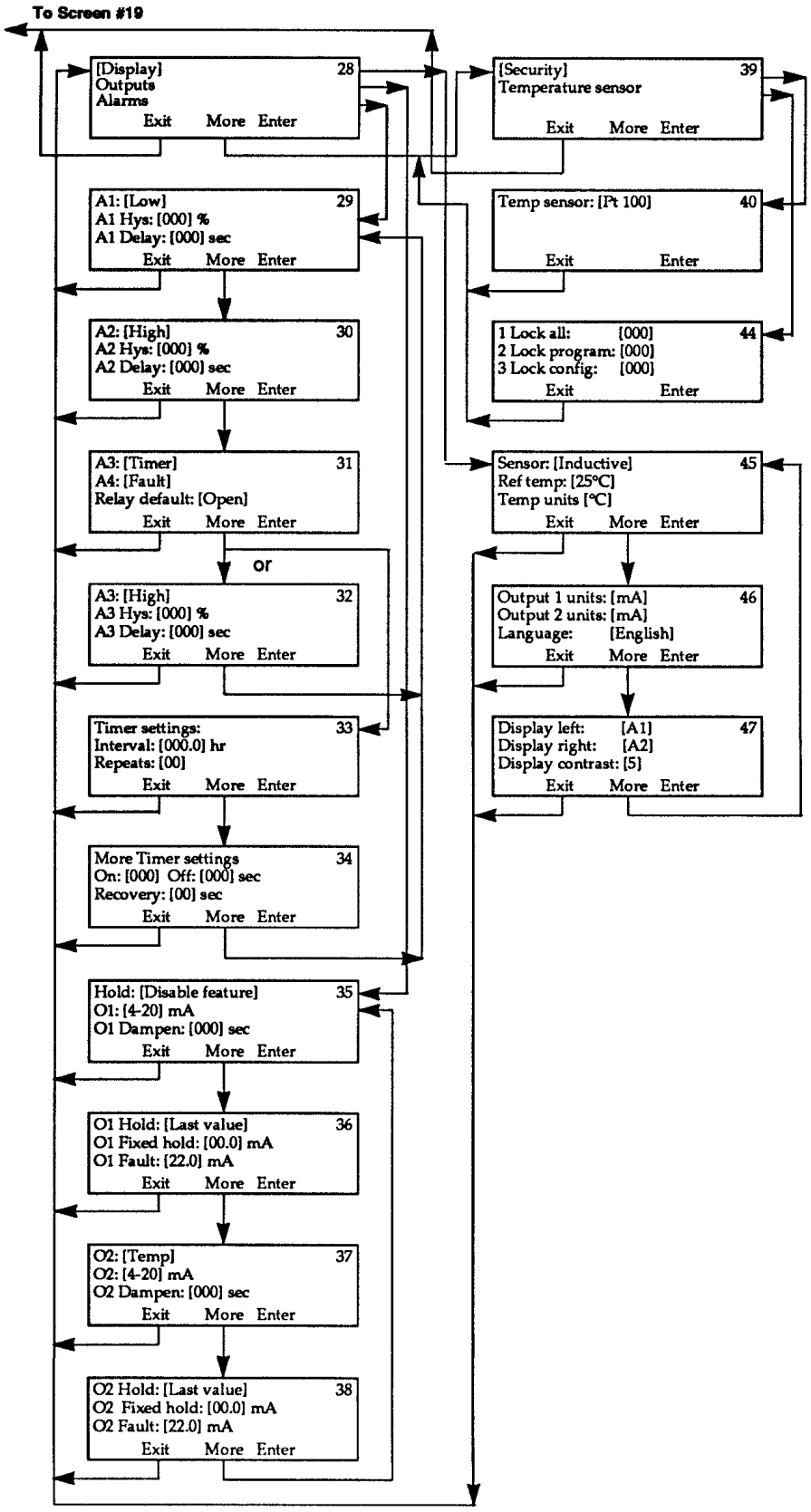
1. Call Rosemount Analytical for authorization.
2. Supply the purchase order number, and make sure to provide the name and telephone number of the individual to be contacted should additional information be needed.
3. Do Steps 3 and 4 of Section 9.2.

NOTE

Consult the factory for additional information regarding service or repair.

APPENDIX


Model 54C Screen Flow
1000 µS/cm 1
25.1°C 12.0 mA
AL 1: 800 AL 2: 1200
1000 µS/cm 2
Level 1 security: 000
Exit Enter
[Calibrate] 3
Diagnostic variables
Program
Exit Enter
1000 µS/cm 4
Hold mode: [On]
Exit Enter
Hold screens #4 and 9 will be omitted if hold is disabled in screen #35.
Instead go to screen #5
[Cell constant] 13
Sensor zero
Temperature slope
Exit Enter
Standardize cond 5
Initial setup
Adjust Temperature
Exit Enter
[Manual slope input] 14
Temp. slope calibration
Exit Enter
1000 µS/cm 6
Standardize: [1000µS] /cm
Exit Enter
200.0 mS/cm 15
Sample: 200.0 mS/cm
at 1st temp: 25°C
Exit Tmp 2 Enter
Temp comp: [Auto] 7
Manual temp: [000.0] °C
Adjust temp: Press F3
Exit More Enter
200.0 mS/cm 16
Sample: 200.0 mS/cm
at 2nd temp: 100.0°C
Exit Tmp 1 Enter
25.0°C 8
Adjust temp [25.0°C]
Exit Enter
Slope: 2.00%/°C 17
Temperature slope
calibration complete
Exit Enter
1000 µS/cm 9
Hold mode: [On]
Exit Enter
To Screen #1
Cell constant: [2.00] 10
Exit Enter
Sensor zero: 11
Sensor must be in air
Exit Enter
Temp slope: [2.00] %/°C 12
Exit Enter
1000 µS/cm 18
Level 2 security: 000
Exit Enter
[Alarm setpoints] 19
Rerange outputs
Configure
Exit Enter
Alarm 1 low: [200µS] /cm 20
Alarm 2 high: [1200µS] /cm
Alarm 3 high: [1200µS] /cm
Exit Enter
Output 1: 12.00 mA 21
4mA: [600µS] /cm
20mA: [1500µS] /cm
Exit More Enter
Output 2: 12.00 mA 22
4mA: [00.0] °C
20mA: [100.0] °C
Exit Test Enter
Output 1 test: [10.0] mA 23
Output 2 test: [10.0] mA
Exit More Enter
Abs cond: 1000 mS/cm 24
Cell constant: 2.00
Cell factor: 1.00
Exit More
Temp slope: 2.00 %/°C 25
Version: 54C.X
Exit More
1000 µS/cm 26
Level 3 security: 000
Exit Enter
NOTE: Security code screens #2, 18, and 26 will not appear unless non zero security code values are entered in screen #44.


To Screen #19
[Display] 28
Outputs
Alarms
Exit More Enter
A1: [Low] 29
A1 Hys: [000] %
A1 Delay: [000] sec
Exit More Enter
A2: [High] 30
A2 Hys: [000] %
A2 Delay: [000] sec
Exit More Enter
A3: [Timer] 31
A4: [Fault]
Relay default: [Open]
Exit More Enter
or
A3: [High] 32
A3 Hys: [000] %
A3 Delay: [000] sec
Exit More Enter
Timer settings: 33
Interval: [000.0] hr
Repeats: [00]
Exit More Enter
More Timer settings 34
On: [000] Off: [000] sec
Recovery: [00] sec
Exit More Enter
Hold: [Disable feature] 35
O1: [4-20] mA
O1 Dampen: [000] sec
Exit More Enter
O1 Hold: [Last value] 36
O1 Fixed hold: [00.0] mA
O1 Fault: [22.0] mA
Exit More Enter
O2: [Temp] 37
O2: [4-20] mA
O2 Dampen: [000] sec
Exit More Enter
O2 Hold: [Last value] 38
O2 Fixed hold: [00.0] mA
O2 Fault: [22.0] mA
Exit More Enter
[Security] 39
Temperature sensor
Exit More Enter
Temp sensor: [Pt 100] 40
Exit Enter
1 Lock all: [000] 44
2 Lock program: [000]
3 Lock config: [000]
Exit Enter
Sensor: [Inductive] 45
Ref temp: [25°C]
Temp units [°C]
Exit More Enter
Output 1 units: [mA] 46
Output 2 units: [mA]
Language: [English]
Exit More Enter
Display left: [A1] 47
Display right: [A2]
Display contrast: [5]
Exit More Enter

The right people, the right answers, right now.

Immediate, Reliable Analytical Support

Now there's a way to quickly get the right answers for your liquid analytical instrumentation questions: the Analytical Customer Support Center.

Our staff of trained professionals are ready to provide the information you need. If you are placing an order, verifying delivery, requesting application information, or just want to contact a Rosemount Analytical representative, a toll-free call to 1-800-854-8257 will provide you with the right people, the right answers, right now.

A Worldwide Network of Sales and Service

The Rosemount customer sales and service organization comprises a network of fully equipped support centers strategically located throughout the world. From many of these locations, the Rosemount Group provides support, distribution of finished products, repair facilities, and training for our customers.

U.S. Field Service

Field Watch Response Center
1-800-654-7768

International

CANADA
Rosemount Instruments Ltd.
1-800-268-1151

AUSTRALIA
Melbourne
Fisher-Rosemount

AUSTRIA
Vienna
Fisher-Rosemount

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Brussels
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São Paulo
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de Brasil

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Uniloc Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: (949) 863-1181
1-800-854-8257
www.RAuniloc.com

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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

Rosemount Analytical Inc.
Uniloc Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: 1-800-854-8257
Fax: (949)-474-7250

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DOUBLE WARRANTY REGISTRATION

Date of Purchase (of instrument) _____
Company Name _____
Address _____
City _____
State/Country _____ Zip _____
Mail Drop _____

Your Name _____
Title _____
Phone Number _____
E-Mail Address _____
Fax Number _____

Model number of instrument (e.g., 3081pH) _____
***Serial number** (located on nameplate) _____

How many liquid analyzers are purchased at this site per year? (check one)

1 to 5 ___ 6 to 10 ___ 10 to 20 ___ 20 or more ___

What are your principal applications? _____
_____

Through which of the following means do you prefer receiving product updates and application news? (check one)

___ sales representative
___ mail
___ fax (my fax number is _____)
___ E-mail (my e-mail address is _____)
___ phone

CUSTOMER SATISFACTION SURVEY

Please let us know how satisfied you are with your new instrument.

MODEL _____

How easy was it to do the following:	Very Easy	Somewhat Easy	Not Very Easy	Not At All Easy
Unpack	1	2	3	4
Wire	1	2	3	4
Mount	1	2	3	4
Calibrate	1	2	3	4
Program	1	2	3	4
Operate	1	2	3	4

How satisfied were you with the following:	Very Satisfied	Somewhat Satisfied	Not Very Satisfied	Not At All Satisfied
The instrument manual	1	2	3	4
The instrument's performance	1	2	3	4

Please explain any 3's and 4's above:

_____
_____
_____

Thank you,
Mike Stoessl
President, Rosemount Analytical-Uniloc Division

For Customer Support
24 hours a day/365 days a year,
Call 1-800-854-8257

Complete this registration, fold it in thirds so the return address shows, and drop it in any mailbox, or visit our web-site at *www.RAuniloc.com* and register on-line to double your standard warranty from 1 year to 2 years.

***Serial number must be indicated to register for extended warranty.** *Warranty applicable only to instrument accompanying this manual.*

WARRANTY

Goods and part(s) (excluding consumables) manufactured by Seller are warranted to be free from defects in workmanship and material under normal use and service for a period of twelve (12) months from the date of shipment by Seller. Consumables, pH electrodes, membranes, liquid junctions, electrolyte, O-rings, etc. are warranted to be free from defects in workmanship and material under normal use and service for a period of ninety (90) days from date of shipment by Seller. Goods, part(s) and consumables proven by Seller to be defective in workmanship and / or material shall be replaced or repaired, free of charge, F.O.B. Seller's factory provided that the goods, parts(s), or consumables are returned to Seller's designated factory, transportation charges prepaid, within the twelve (12) month period of warranty in the case of goods and part(s), and in the case of consumables, within the ninety (90) day period of warranty. This warranty shall be in effect for replacement or repaired goods, part(s) and consumables for the remaining portion of the period of the twelve (12) month warranty in the case of goods and part(s) and the remaining portion of the ninety (90) day warranty in the case of consumables. A defect in goods, part(s) and consumables of the commercial unit shall not operate to condemn such commercial unit when such goods, parts(s) or consumables are capable of being renewed, repaired or replaced.

The Seller shall not be liable to the Buyer, or to any other person, for the loss or damage, directly or indirectly, arising from the use of the equipment or goods, from breach of any warranty or from any other cause. All other warranties, expressed or implied are hereby excluded.

IN CONSIDERATION OF THE STATED PURCHASE PRICE OF THE GOODS, SELLER GRANTS ONLY THE ABOVE STATED EXPRESS WARRANTY. NO OTHER WARRANTIES ARE GRANTED INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

RETURN OF MATERIAL

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

Rosemount Analytical Inc.
Uniloc 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.

UNILOC DIVISION
CUSTOMER SUPPORT CENTER
1-800-854-8257

Rosemount Analytical Inc.
Uniloc Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: (949) 863-1181
http://www.RAuniloc.com

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