Serial Number _____

CHECKMATE® PLUS REFERENCE MANUAL

CHECKMATE® PLUS CORRDATA®
Portable Instrument

Rohrback Cosasco Systems, Inc.
11841 East Smith Avenue
Santa Fe Springs, CA 90670
Tel: +1 (562) 949-0123
Fax: +1 (562) 949-3065
Email: rcs@rohrbackcosasco.com
Web: http://www.rohrbackcosasco.com

P/N 723600 -1 Manual Rev NC
13-January-2006

CHECKMATE™ PLUS is a trademark of Rohrback Cosasco Systems, Inc.
CORROSOMETER®, **CORRDATA®, and CORRDATA® PLUS** are registered trademarks of Rohrback Cosasco Systems, Inc.

Windows® is a registered trademark of Microsoft Corporation.

CONTENTS

Page

Figures and Tables

Figure

Table

Chapter 1
Introduction

The CheckMate™ Plus is the next evolution in handheld corrosion monitoring instruments. It is capable of reading all Corrosometer® (electrical resistance) corrosion probes with an enhanced resolution of 0.1 probe divisions (0.01% probe span) and all RDC units including RDC – COT, RDC – CAT and 4-Channel RDC – COT. The CheckMate™ Plus also features a reduced measurement cycle while still maintaining high accuracy. As with its predecessors, this portable unit has built-in memory that stores readings for later retrieval, however the CheckMate™ Plus can store readings for up to 204 individual probes, with 80 readings per probe (that's over 16,000 readings!). Furthermore, the CheckMate™ Plus makes transferring stored data to a PC a much simpler process than before, using the Corrdata Plus® Corrosion Management Software program (included).

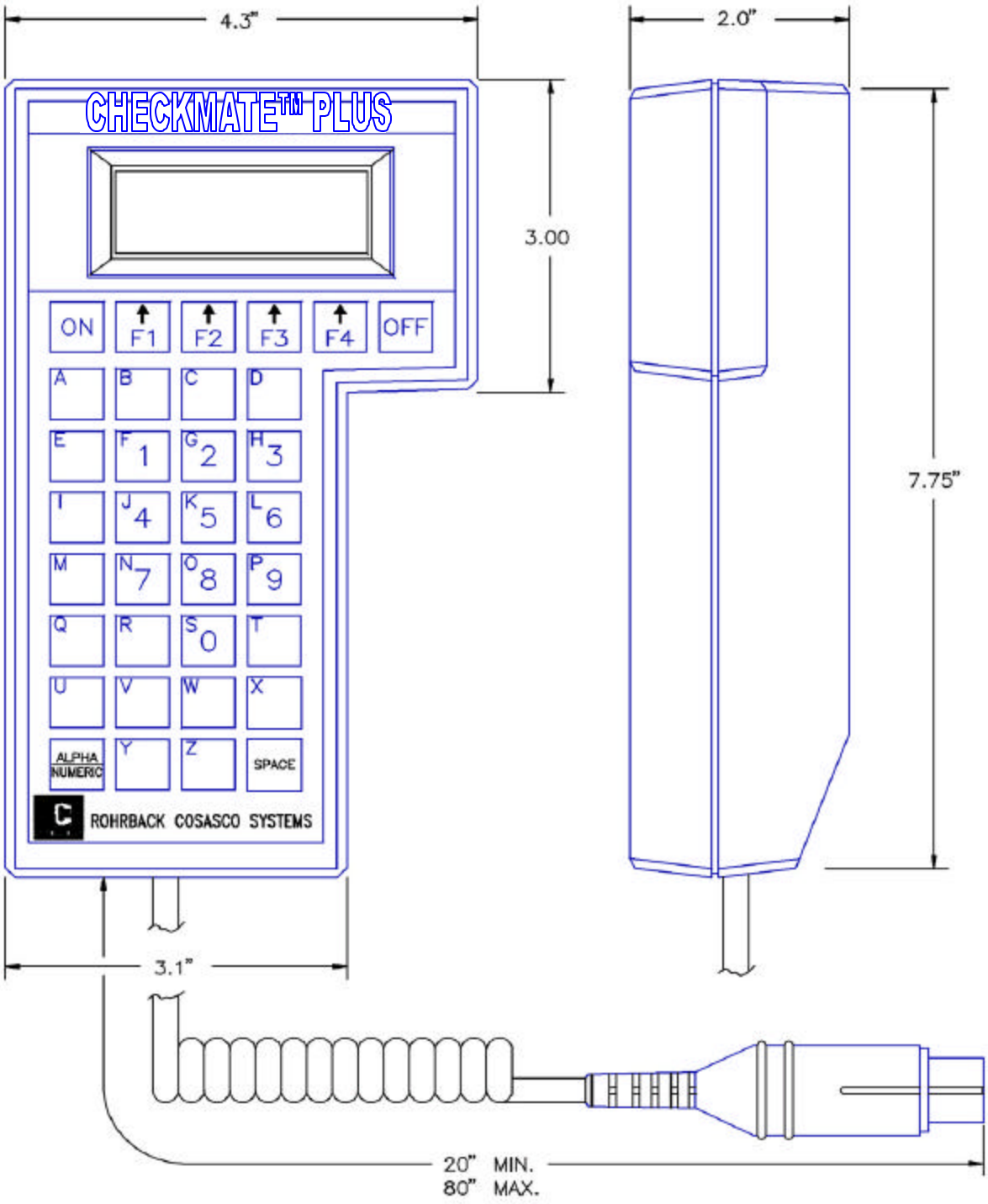


Figure 1.1 CheckMate™ Plus Instrument

Chapter 2
Specifications

CheckMate™ Plus Instrument

Physical

- ✓ Dimensions: 7.75"H x 4.30"W x 2"D (196.8 mm x 109.2 mm x 50.8 mm)
- ✓ Weight: 1.5 lb. (0.68 kg)
- ✓ Temperature range:

  Operating - $0^{o}F$ to $122^{o}F$ ($-18^{o}C$ to $50^{o}C$)

  Storage - $0^{o}F$ to $150^{o}F$ ($-18^{o}C$ to $70^{o}C$)
- ✓ Splash-proof enclosure with sealed membrane keyboard

Electrical

- ✓ Compatible with all Corrosometer® probes
- ✓ Compatible with all Remote Data Collectors
- ✓ Measurement resolution: 0.1 probe divisions (0.01% of probe span)
- ✓ Measurement repeatability: ± 1 division (0.1% of probe span)
- ✓ Rapid measurement cycle of 30 seconds
- ✓ Memory for up to 204 probes (with 80 readings per probe)
- ✓ Reads probes on extension cable of up to 200ft (61m)

- ✓ Power Supply: 6 AA Alkaline cells
- ✓ Battery Life: 900 probe readings (typical)

- ✓ Automatic power shutoff in 2 minutes after reading or non-use
- ✓ Four Line Liquid Crystal Display (LCD)
- ✓ Supplied with:
  - Corrosometer® test probe
  - 6 AA batteries
  - CheckMate™ Plus to computer cable (including DB25 to DB9 adapter)
  - CD-ROM with Corrdata Plus® Corrosion Management Software and Manual
  - CD-ROM with Corrdata® CSV PC software and manual
  - CheckMate™ Plus to RDC cable
  - Carrying Case

Hazardous Area Certification

- ✓ Intrinsically safe
- ✓ North America: UL/ULc (IEC) AEx and Ex ib IIC T4
- ✓ Europe: ATEX EEx ib IIC T4
- ✓ CE compliant (EMC)

Chapter 3
Installation

<u>NOTE:</u> Each CheckMate™ Plus instrument is carefully tested, inspected and packaged prior to shipment. Before unpacking the instrument, please inspect the packaged materials for shipping damage and retain all damaged packaged materials to support any claim against your freight carrier should this become necessary.

Unpacking

Carefully remove the instrument from its package. Included in the package you should find:

CheckMate™ Plus Instrument

- ✓ Handheld CheckMate™ Plus instrument
- ✓ Corrosometer® test probe
- ✓ 6 AA batteries
- ✓ CheckMate™ Plus to computer cable (including DB25 to DB9 adapter)
- ✓ CD-ROM with Corrdata Plus® Software and Manual
- ✓ CD-ROM with Corrdata® CSV PC software and manual
- ✓ CheckMate™ Plus to RDC cable
- ✓ Carrying Case

Intrinsic Safety

The CheckMate™ Plus instrument is designed for safe use in the harshest of field environments. It has undergone a rigorous design phase to obtain certification for Class I, Zone 1 hazardous locations.
The hazardous area certifications for North America are:

UL/ULc (IEC) AEx and Ex ib IIC T4

And for Europe: ATEX EEx ib IIC T4
CE (EMC)

Care must be taken with intrinsically safe systems to maintain their carefully designed integrity. The major features to note:

1. Batteries must be replaced in a safe area even though the unit is intrinsically safe, since standard alkaline batteries are only safe if housed in a suitable enclosure.

2. The instrument is intrinsically safe when used with six 1.5V, size AA alkaline batteries: Duracell MN1500, Energizer E91 or EN91, or Ray-O-Vac 815. Batteries must be changed only in non-hazardous area. Do not mix batteries of different age or part number.

3. Absolutely no substitution of parts or unauthorized repairs may be undertaken or the certifications are rendered invalid.

4. Reference EC-Type examination certificate for conditions of safe use (See Appendix A).

Battery Installation

The CheckMate™ Plus is supplied with a set of six 1.5 Volt AA alkaline batteries. To install these batteries, remove the access panel on the back of the unit (see Figure 3.1) with the provided Allen Key and install the batteries with the polarities as indicated on the unit.

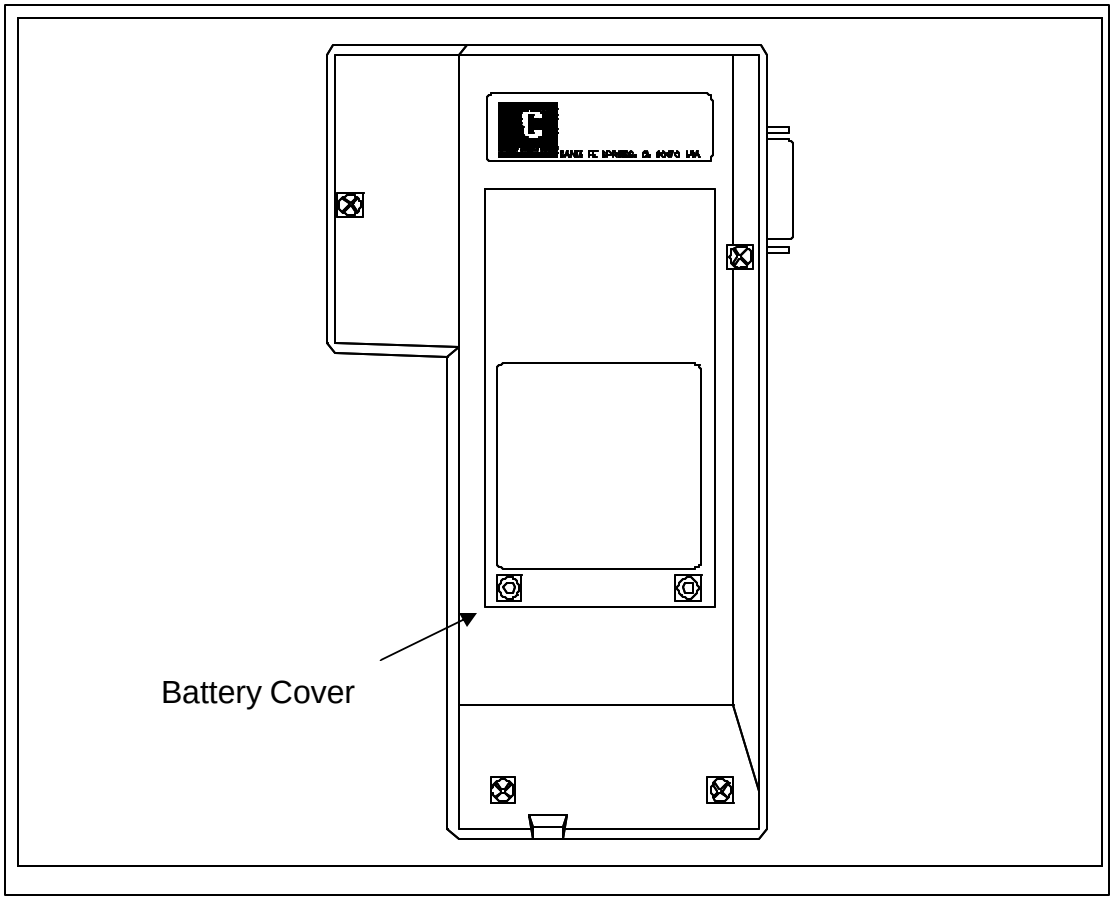
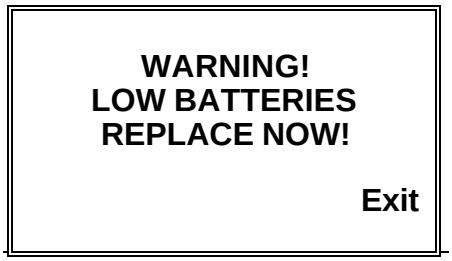


Figure 3.1 Battery Cover of CheckMate™ Plus Instrument

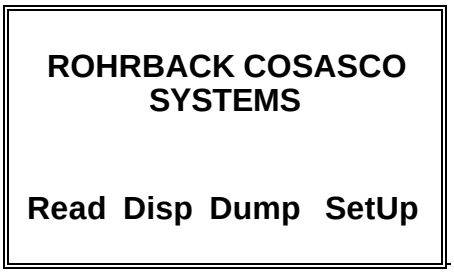
A secondary, back up battery for stored readings in the CheckMate™ Plus is provided by lithium batteries mounted internally within the unit. These batteries should provide 7-10 years of back up capacity. Replacement of these batteries requires the unit to be returned to Rohrback Cosasco Systems or an authorized dealer.

To check that the unit is operational, press the **ON** button. The screen should appear as shown below:

If the batteries are low or in need of replacement, a warning screen will appear as follows:



If the batteries are good, the instrument will sequence directly to the **Standby** display as shown below:



The battery is tested both at initial switch on, and during probe measurement.

Chapter 4
System Configuration and Setup

CheckMate™ Plus Keypad

The CheckMate™ Plus features a 34-key keypad, with keys for the alphabet A through Z and numerals 0 through 9. The numerals are shared with letters F through P and S. Switch between these letters and numbers using the "Alpha/Numeric" key. There are also four soft keys, F1 through F4 (as shown below). The soft keys are multi-function keys used to make on-screen selections.

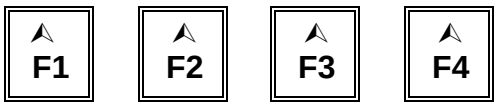


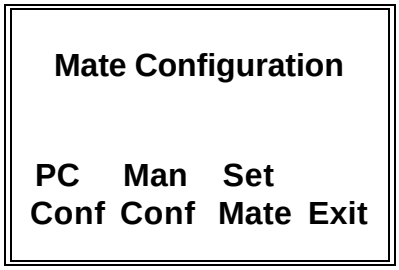
Figure 4.1 CheckMate™ Plus Function Keys

Setting the Time and Date on the CheckMate™ Plus

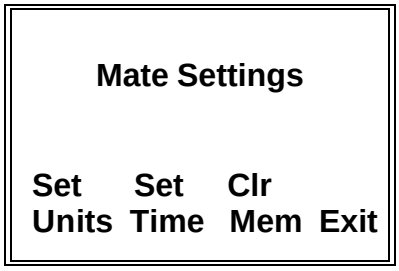
The CheckMate™ Plus has its own internal clock so that individual probe readings are automatically time and date stamped.

To set the internal clock for Time and Date:

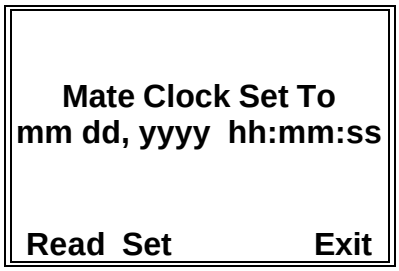
From the **Standby** display, press **SetUp (F4**) then select **Mate (F1)** from the **Configuration Options** display to go to the **Mate Configuration** display:



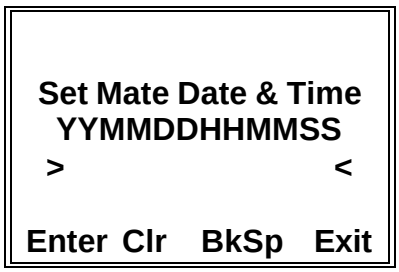
Press **Set Mate (F3)** to go to the **Mate Settings** display:



Press **Set Time (F2)** to go to the **Mate Clock Set To** display:



Press **Set (F2)** to go to the **Set Mate Date & Time** display:



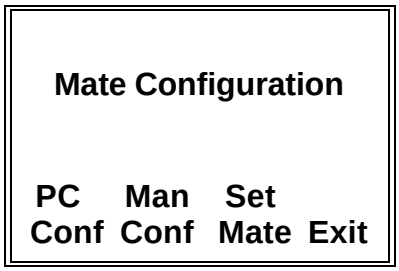
From the keyboard, enter the last two digits of the year followed by the two digit number of the month, date, the time in hours, minutes and seconds (enter 00 for seconds for convenience). When the time is set correctly, press **Enter (F1)** to start the clock. To update the clock on the **Mate Clock Set To** display, press **Read (F1)**. Press **Exit (F4)** to go to the **Mate Settings** screen. Press **Exit (F4)** again to return to the **Mate Configuration** screen. Press **Exit (F4)** twice to return to the **Standby** screen.

<u>NOTE:</u> ***The hour is set on the military 24 hour clock, where 00:00 hours depict midnight at the start of the day, and 12:00 is mid-day.***

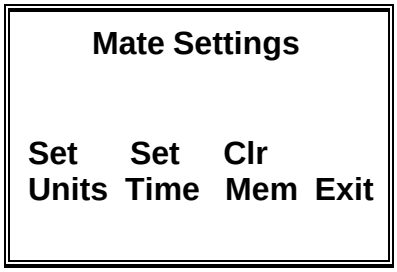
Setting the Engineering Units

To set the Engineering Units:

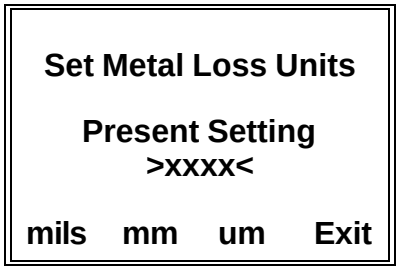
From the **Standby** display, press **SetUp (F4**) then select **Mate (F1)** from the **Configuration Options** display to go to the **Mate Configuration** display:



Press **Set Mate (F3)** to go to the **Mate Settings** display:



Press **Set Units (F1)** to go to the **Set Metal Loss Units** display:



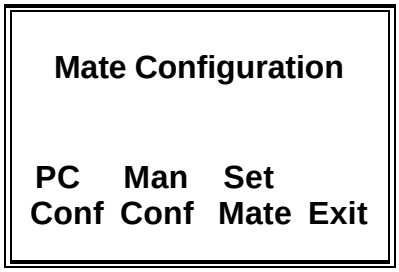
Select and press **mils (F1)** for mils (0.001") and mils/year or press **mm (F2)** for millimeters and mm/year or **um (F3)** for micrometers and um/year.

After the selection is made and correctly displayed on the display, press **Exit (F4)** to set the units and return to the **Mate Settings** display. Press **Exit (F4)** again to return to the **Mate Configuration** display. Press **Exit (F4)** twice to return to the **Standby** display.

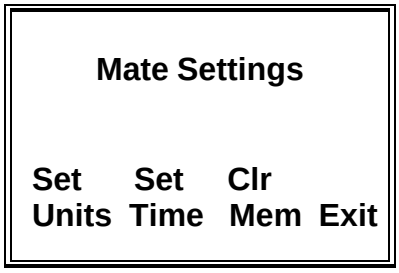
Clearing Memory on CheckMate™ Plus

Normally it will not be necessary to clear the memory on the CheckMate™ Plus unless extraneous entries have been made, for example, when initially experimenting with the system. Alternatively, if the equipment is to be transferred to a new location, then it is recommended to clear the memory to avoid confusion with any previously collected data. To clear the memory, proceed as follows.

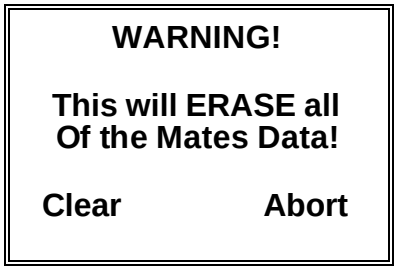
From the **Standby** display, press **SetUp (F4**) then select **Mate (F1)** from the **Configuration Options** display to go to the **Mate Configuration** display:



Press **Set Mate (F3)** to go to the **Mate Settings** display:



Press **Clr Mem (F3)** to go to the clear memory confirmation display:



Press **Clear (F1)** to clear all memory.

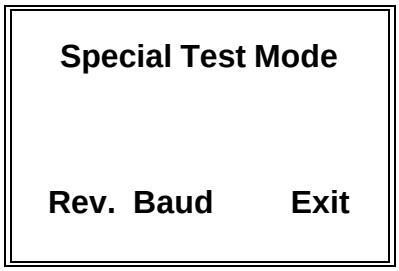
NOTE: This will clear readings stored in internal memory.

NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

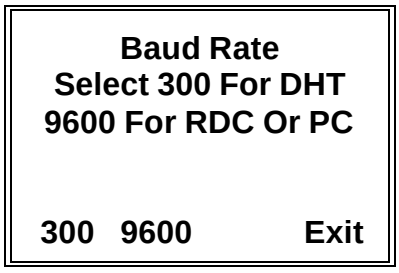
Switching the Baud Rate

Under normal circumstances, the baud rate will not need to be changed from the default setting of 9600. If the Down Hole Tool is used, the baud rate should be switched to 300.

To navigate to the **Baud Rate** display, press **Read (F1**) from the **Standby** display, then select **Mode (F2)** from the **What To Read?** display to go to the **Special Test Mode** display:



Press **Baud (F2)** to modify the baud rate on the following display:

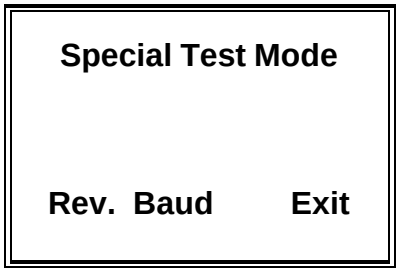


To select 300 press the **300 (F1)** key, to select 9600 press the **9600 (F2)** key. CheckMate™ Plus will set the selected baud rate and return to the **What To Read?** display.

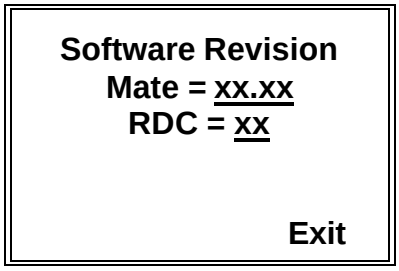
NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

Checking the Firmware Version

To access the CheckMate™ Plus firmware version, press **Read (F1**) from the **Standby** display and select **Mode (F2)** from the **What To Read?** display to go to the **Special Test Mode** display:



Press **Rev. (F1)** for the revision information display:



If the CheckMate™ Plus is connected to a RDC, it will display the version of the RDC.

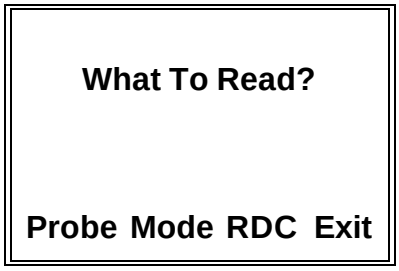
NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

Chapter 5
Reading CORROSOMETER® Probes

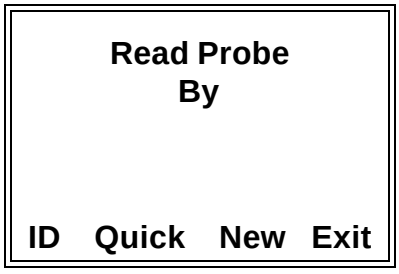
CORROSOMETER® probes can be read using three different procedures: **Quick, ID** and **New**.

In order to choose the read method, navigate to the **Read Probe By** display as follows;

From the **Standby** display, press **Read (F1)** to go to the **What To Read?** display:



Press **Probe (F1)** to go to the **Read Probe By** display:

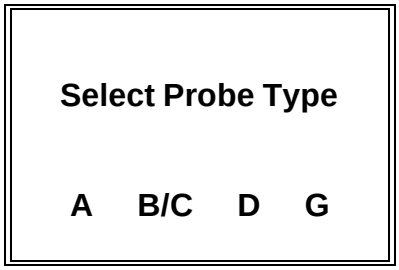


NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

Quick - Read Procedure

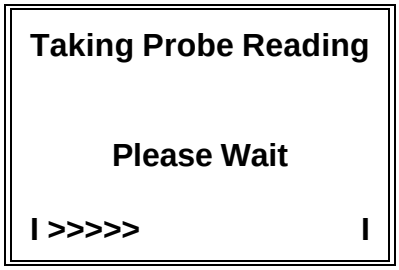
The **Quick** reading allows the user to read a probe and view the result in approximately 30 seconds. The result of a **Quick** read can also be saved for future reference, calculation of corrosion rate and/or downloading to a PC.

Press **Quick (F2)** to go to the **Select Probe Type** display:

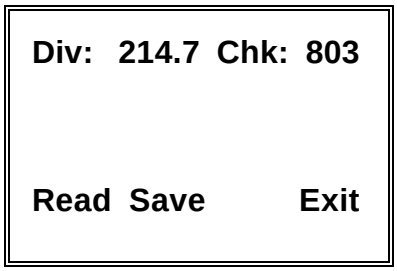


Press **A (F1)** for Wire Loop type probes or **B/C (F2)** for Tube Loop/Strip Loop type probes or **D (F3)** for Cylindrical type probes or **G (F4)** for Model 610 Atmospheric Probes. If unsure of the element type, this information can be found on the probe packaging, etched on the probe body adjacent to the connector or in Table 5.1 Probe Type Identification.

Once the selection is made, CheckMate™ Plus will immediately proceed to reading the probe. The following display will be shown while the reading is processed:



A series of **>** symbols will accumulate from left to right across the display to indicate the progression of the measurement function. At the conclusion of the measurement function (approximately 30 seconds) the CheckMate™ Plus will display the probe reading and the check reading in divisions. A typical displayed reading is shown below:



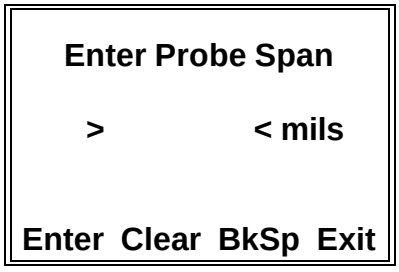
The **Div:** reading is the cumulative metal loss (corrosion) of the probe element on a scale of 1,000 divisions. In the example above 214.7/1000 (two-hundred fourteen point seven one-thousandths of the element has been consumed by corrosion. In engineering units this metal loss would be expressed as 214.7/1000 or 0.2147 times the probe span.

The **Chk:** reading is a measure of probe functionality or integrity. The initial value for CORROSOMETER® probes is 800 ±50 divisions. It is recommended that a **CHECK** reading be taken and recorded immediately after unpacking a probe as it will be the value to which all subsequent **CHECK** readings will be compared. The general rule is that the **CHECK** reading should not vary by more than 1% (±10 divisions) from the initial value. If there is more than a 1% change, it is an indication of a loss in probe integrity and replacement is required.

To reread the probe, press the **Read (F1)** key and another reading will be taken and displayed.

Follow the procedure below if the reading is to be saved in memory for later viewing, corrosion rate calculation, and/or downloading to a PC.

Press the **Save** key to go to the **Enter Probe Span** display:

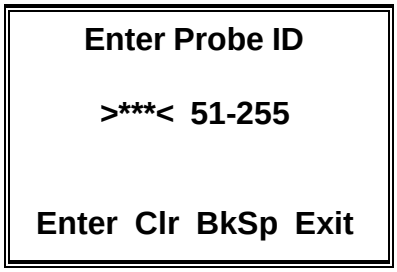


From the keypad, enter the span of the probe element in **mils**. The probe span (in mils) is shown on the probe packaging or it can be found in Table 5.1.

NOTE: If Type G for the Model 610 Atmospheric Probes is selected, the span is entered in Angs (Angstroms).

Pressing **Clear (F2)** will clear the value previously set so that a new span can be entered. Pressing **BkSp (F3)** backs up one space each time it is pressed so that a change can be made. Pressing **Exit (F4)** returns to the **Read Probe By** display.

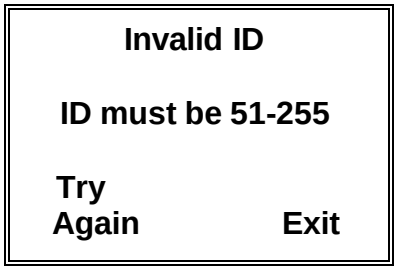
Press **Enter** to go to the **Enter Probe ID** display:



The instrument will automatically assign the next free ID number. If this is not acceptable, you may press **Clr (F2)** and manually assign an ID from the keypad. Pressing **BkSp (F3)** backs up one space for each time it is pressed so that a change can be made. Pressing **Exit (F4)** returns to the **Read Probe By** display.

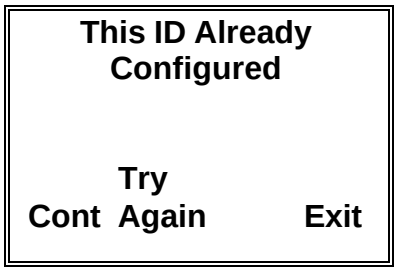
Press **Enter (F1)** to go to the **Enter Probe Tag** display.

NOTE: If an invalid ID has been selected, the **Invalid ID** display appears as shown below:



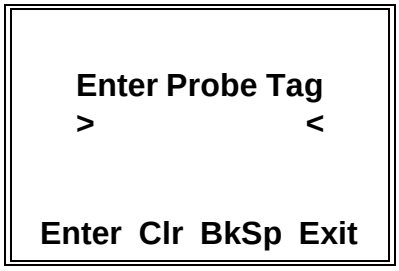
Press **Try Again (F1)** to return to the **Enter Probe ID** display. Pressing **Exit (F4)** returns to the **Read Probe By** display.

NOTE: If the ID selected has already been configured, the **This ID Already Configured** display appears:



Press **Cont (F1)** to continue to the **Enter Probe Tag** display if you want to continue to use this ID number.

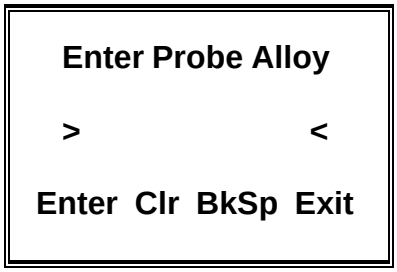
Press **Try Again (F1)** to return to the **Enter Probe ID** display. Pressing **Exit (F4)** returns to the **Read Probe By** display:



The **Enter Probe Tag** display allows the user to enter up to twelve (12) alpha or numeric characters to uniquely identify the monitoring location. This can be a tag number, location or process name.

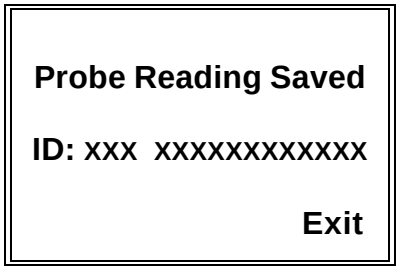
Pressing **Clr (F2)** clears a previously entered ID. Pressing **BkSp (F3)** backs up one space for each time it is pressed so that a change can be made. Pressing **Exit (F4)** returns to the **Read Probe By** display.

Press **Enter (F1)** to go to the **Enter Probe Alloy** display:



The **Enter Probe Alloy** display allows the user to enter up to eight (8) alpha or numeric characters to identify the alloy of the probe element for reference purposes only. It does not affect the calculation of corrosion rates.

Press **Enter** to go to the **Probe Reading Saved** display:

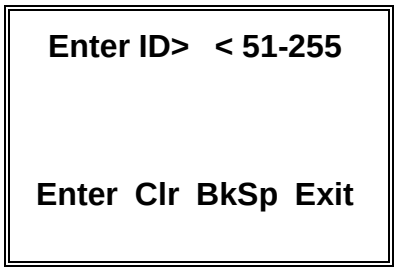


NOTE: XXX is to denote the ID of the location and XXXXXXXXXXXXX denotes the Probe Tag.

Press **Exit** to return to the **Read Probe By** display.

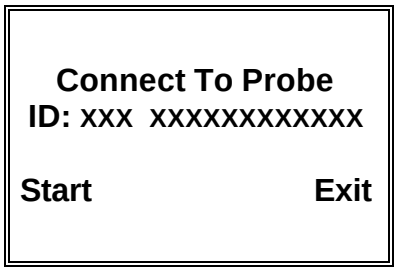
ID - Read Procedure

Press **ID (F1)** to go to the **Enter ID> < 51-255** display:

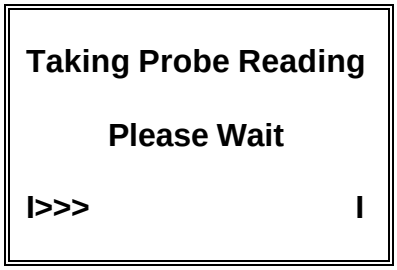


Enter the ID number of the probe and press **Enter (F1)**. Refer to Probe Configuration chapter for setting up probes.

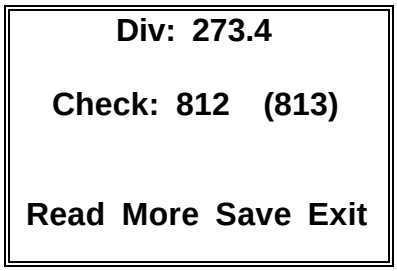
The CheckMate™ Plus will check the ID number to determine its validity. If the ID is found to be invalid, the **ID Not Found** message will appear and the **Exit (F4)** key should be pressed to return to the **Read Probe By** display. If the ID is valid, the **Connect To Probe** display will appear:



After connecting the CheckMate™ Plus to the probe, press the **Start (F1)** key to begin the probe reading. The **Taking Probe Reading** screen will appear:

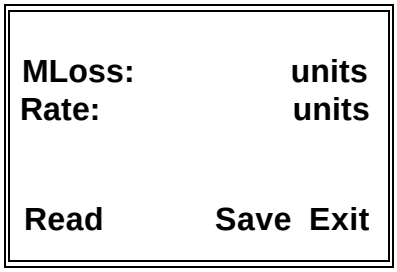


A series of **>** symbols will accumulate from left to right across the screen to indicate the progression of the measurement function. At the conclusion of the measurement function (approximately 30 seconds) the CheckMate™ Plus will display the probe reading, the current check reading, and the initial check reading in divisions. The initial reading in divisions will be shown in parenthesis (). A typical display is shown below:



Metal Loss in divisions is represented by the 273.4, 812 is the present **Check** reading in divisions and (813) is the initial **Check** reading in divisions.

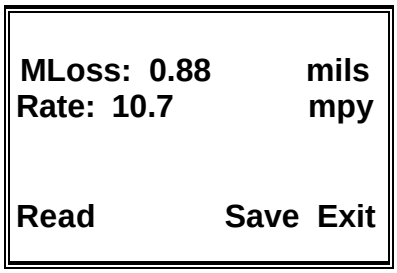
Pressing the **Read (F1)** key will return to the **Taking Probe Reading** display and automatically start a new measurement cycle. Press the **Save (F3)** to save the reading, the **Probe Reading Saved** display will appear, at this point choose the **Exit (F4)** key to return to the **Read Probe By** display. If the **More (F2)** key is pressed, **MLoss** and **Rate** display will appear:



The cumulative metal loss, **MLoss**, in the engineering units originally selected will be displayed and the corrosion rate between the previous probe reading and the present probe reading will be automatically calculated. The corrosion rate, **Rate**, will be displayed in the engineering units originally selected per year.

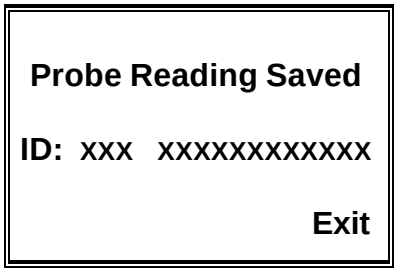
Example: A T10 CORROSOMETER® probe (span 5 mils) was installed in a refinery overhead system on March 1, 2004. The initial probe reading of 97.3 divisions and check reading of 813 was made on March 1, 2004. On March 30, 2004, the probe was again read and the results were as shown in the typical display above, i.e. Div: 273.4 and Check: 812. The corrosion rate calculated between these two measurements would be equal to 10.7 mpy (mils per year).

The display for the example above would show:



To exit without saving, press the **Exit (F4)** key, the **Do You Wish To Save Before Exiting** display will appear with options **Yes (F1)** and **No (F4)**. Choose **Yes** and the reading will be saved and **Probe Reading Saved** screen will display. Choosing **No** will return to the **Read Probe By** display for reading of other probes.

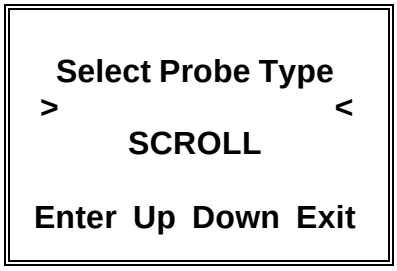
Pressing the **Sav (F3)** key without the above process will advance to the **Probe Reading Saved** display:



The present probe reading will be saved with the ID number and Tag Number as displayed. Pressing the **Exit (F4)** key will return to the **Read Probe By** display for reading of other probes.

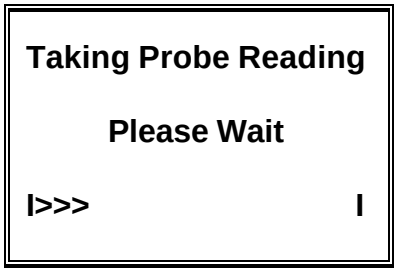
New – Read Procedure

Press **New** to go to the **Select Probe Type** display:

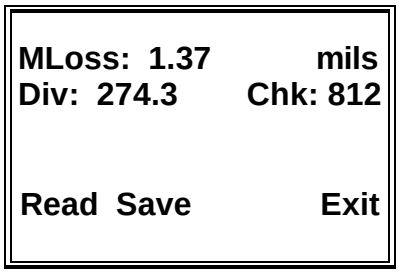


The probe type selections are **W80 WIRE**, **W65 WIRE**, **W45 WIRE**, **W40 WIRE**, **TF50**, **TF5**, **T50 CYLINDRICAL**, **T20 CYLINDRICAL**, **T10 CYLINDRICAL**, **T8 TUBE LOOP**, **T4 TUBE LOOP**, **S50 FLUSH**, **S40 FLUSH**, **S20 FLUSH**, **S10 FLUSH**, **S8 STRIP LOOP**, **S8 FLUSH**, **S4 STRIP LOOP**, **S4 FLUSH**, **S4 ATMOSPHERIC**, **OTHER** and **TEST PROBE CO**. You may scroll up through the list by repeatedly pressing the **Up (F2)** key or down through the list by repeatedly pressing the **Down (F3)** key. When the desired probe element is displayed, press the **Enter (F1)** key to accept the selection. The CheckMate™ Plus will automatically proceed to the next display based on the selection.

If a standard CORROSOMETER® probe (element) is selected, the CheckMate™ Plus will automatically go to the measure mode and the **Taking Probe Reading – Please Wait** display will appear:

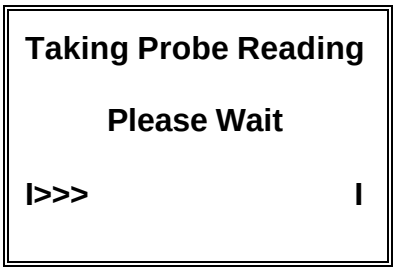


A series of **>** symbols will accumulate from left to right across the screen to indicate the progression of the measurement function. At the conclusion of the measurement function (approximately 30 seconds) the CheckMate™ Plus will display the probe Metal Loss (**MLoss:**) in the engineering units originally selected, the probe reading in divisions (**Div:**) and the current check reading (**Chk:**) in divisions. A typical display is shown below:

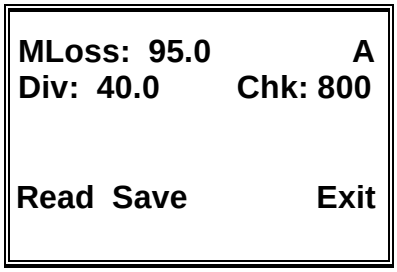


If a TF5 or TF50 high sensitivity atmospheric CORROSOMETER® probe has been selected, the CheckMate™ Plus will go to a special **Enter Probe Span** display:

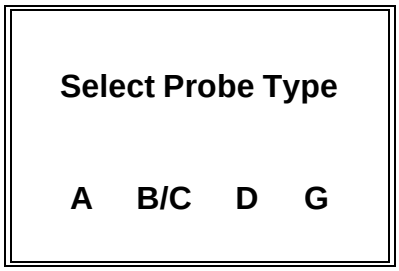
Using the numeric portion of the keypad, enter the probe span in Angstroms (?). The packaging for the TF5 and TF50 CORROSOMETER® provides the specific span for the probe. Alternatively, the nominal span can be used without appreciable error. Pressing **Enter (F1)** will cause the CheckMate™ Plus to automatically go to the measure mode and the **Taking Probe Reading – Please Wait** display will appear:



A series of **>** symbols will accumulate from left to right across the screen to indicate the progression of the measurement function. At the conclusion of the measurement function (approximately 30 seconds) the CheckMate™ Plus will display the probe Metal Loss (**MLoss:**) in angstroms, the reading in divisions (**Div:**) and the simulated check reading (**Chk:**) of 800 divisions (TF5 and TF50 high-sensitivity probes do not provide a check reading). A typical display is shown below:

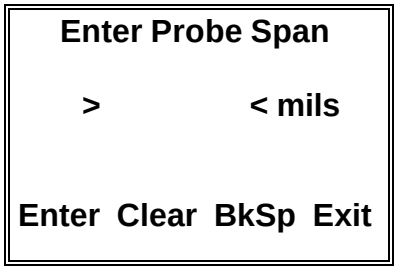


If **OTHER** is selected from the **Select Probe Type** display, the CheckMate™ Plus will go to a second **Select Probe Type** display that requires the selections of the Probe Type (**A**, **B/C**, **D** or **G**). The display is shown below:



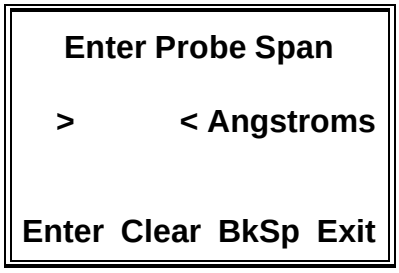
Select and press **A (F1)** for Wire Loop type probes or press **B/C (F2)** for Tube Loop/Strip Loop type probes or **D (F3)** for Cylindrical type probes or **G (F4)** for High Sensitive probes. If you are unsure of the element type, this information can be found on the probe packaging, etched on the probe body adjacent to the connector or in Table 5.1 Probe Type Identification.

Once the selection is made, CheckMate™ Plus will advance to the following **Enter Probe Span** display:



From the keypad, enter the span of the probe element in **mils**.

If Type **G** for the Model 610 Atmospheric Probes is selected, the span is entered in Angstroms as shown in the following **Enter Probe Span** display:



Once probe span is selected in mils or angstroms, the CheckMate™ Plus will proceed to the **Taking Probe Reading – Please Wait** display. Refer to the "New – Read Procedure" section above for the next steps.

CORROSOMETER or CORROTEMP Probe Element	Type	Span (mils)
Strip Loop S4	C	1
Flush Element S4 Atmospheric Element S4 Strip Loop S8 Tube Loop T4	B D C B	2
Flush Element S8 Atmospheric Element S8 Tube Loop T8	B D B	4
Flush Element S10 Cylindrical Element T10	B D	5
Flush Element S20 Cylindrical Element T20 Wire Loop Element W40	B D A	10
Wire Loop Element W45	A	11.25
Flush Element S20 Wire Loop Element W80	B A	20
Cylindrical Element T50	D	25

Table 5.1 CORROSOMETER and CORROTEMP Probe Types and Spans

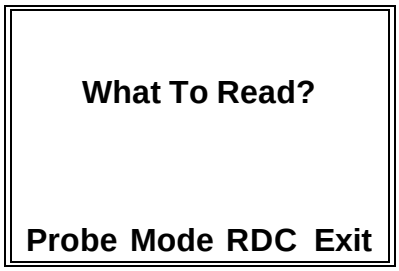
CAUTION: ***CORROSOMETER Model 2500, 3500, or 4500 probes are designated as a "cylindrical" element, not a "tube" element which refers only to "tube loop" elements.***

Chapter 6
Reading a Remote Data Collector (RDC)

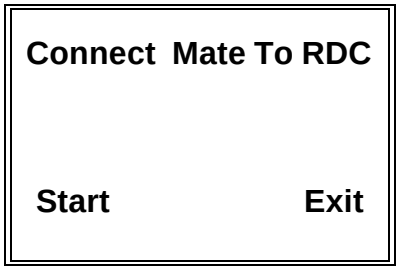
CheckMate™ Plus is designed to configure and gather data from all RDC's. Refer to **Configure a RDC using the CheckMate™ Plus** section for more details on configuring RDC's. The following section will explain the data collection procedure from a RDC.

Data Collection from a RDC

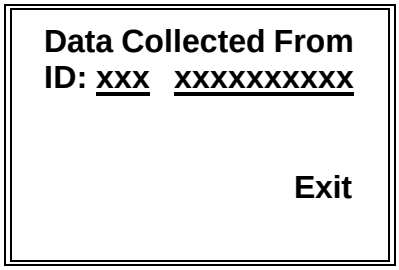
To read a RDC, connect the CheckMate™ Plus to the RDC with the lemo connector. From the **Standby** screen, press **Read (F1)** to go to the **What To Read?** display:



Press **RDC (F3)** to go to the **Connect Mate To RDC** display:

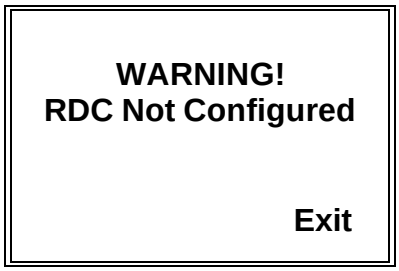


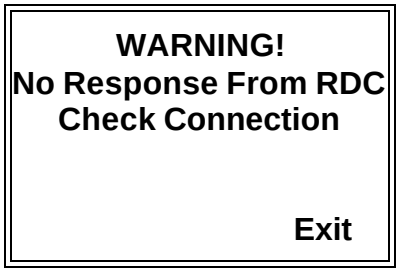
Press **Start (F1)** to begin reading data from the RDC. When the data collection is successfully completed, the CheckMate™ Plus will advance to the display shown below:



NOTE: For Four (4) Channel RDC units, four readings must be taken to collect the data from the four attached probes. From the **Connect Mate To RDC** display press the **Start (F1)** key to take the first probe reading, once that is successfully completed, press the **Exit (F4)** button from the **Data Collected From** display to advance to the **Connect Mate To RDC.** Press **Start (F1)** and repeat to collect data from the remaining 3 probes.

Unsuccessful data read attempts will display any of the following error messages:



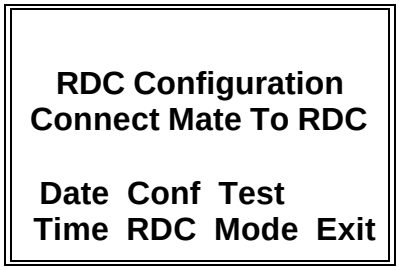


Ensure the RDC is properly configured. Inspect the data cable for proper connection to the RDC and the CheckMate™ Plus. Replace the RDC battery if required. Try again.

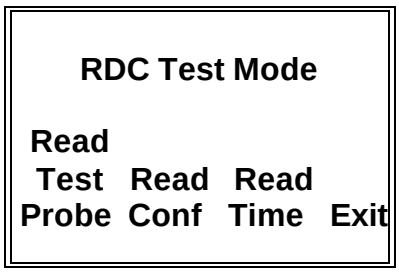
NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

Reading the RDC Configuration Details

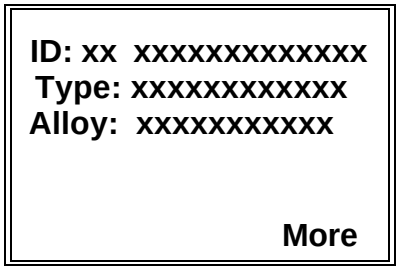
From the **Standby** display of the CheckMate™ Plus, press **SetUp (F4**) then select **RDC (F2)** from the **Configuration Options** display to go to the **RDC Configuration** display:



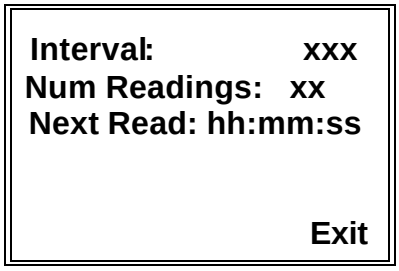
Press **Test Mode (F3)** to enter the following **RDC Test Mode** display:



Press **Read Conf (F2)** key to enter the following display with the configuration details:



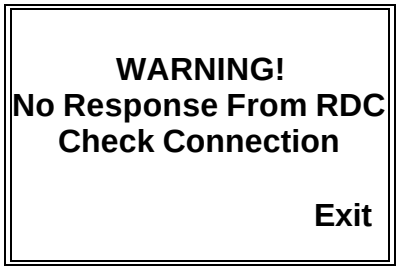
The **ID:** line displays the ID number assigned to the RDC and the Probe Tag. The **Type:** line displays the Probe Type. Press **More (F4)** to advance to the following screen:



The **Interval:** line displays the probe read time interval in minutes or hours as configured. The **Num Readings:** line displays the number of readings taken thus far by the RDC with the current configuration. The **Next Read:** line displays the time at which the next data collection will be performed.

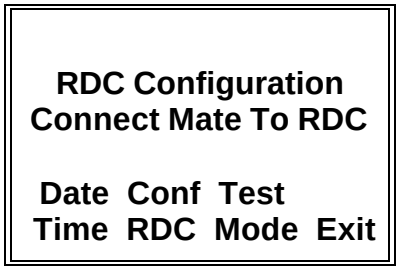
Press **Exit (F4)** once to return to the **RDC Test Mode** display or continuously to return to the **Standby** display.

NOTE: If the following message appears, check to ensure the validity of the connection. Pressing **Exit (F4)** will return the CheckMate™ Plus to the **Configuration Options** display, select **RDC (F2)** to advance to the next display. Press **Test Mode (F3)** to enter the **RDC Test Mode** display and retry.

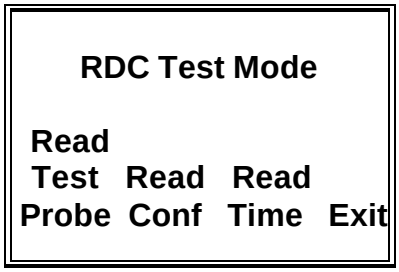


Reading the Programmed Date and Time on the RDC

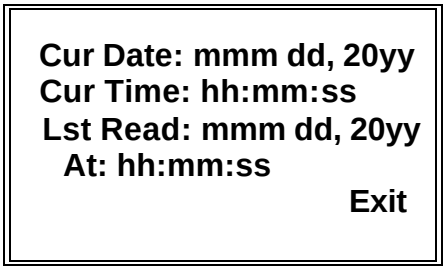
From the **Standby** display of the CheckMate™ Plus, press **SetUp (F4**) then select **RDC (F2)** from the **Configuration Options** display to go to the **RDC Configuration** display:



Press **Test Mode (F3)** to enter the following **RDC Test Mode** display:



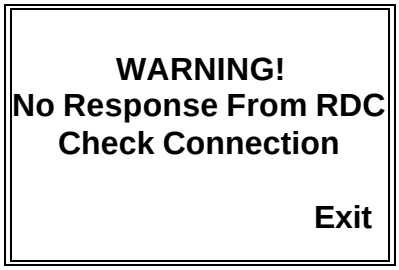
Press **Read Time (F3)** key to enter the following display with the Date and Time details:



The **Cur Date:** line displays the current date while the **Cur Time:** displays the time in military 24 hour clock, where 00:00 hours depict midnight at the start of the day, and 12:00 is mid-day. **Lst Read:** line displays the date of the last reading performed while **At:** displays the time of that reading.

Press **Exit (F4)** once to return to the **RDC Test Mode** display or continuously to return to the **Standby** display.

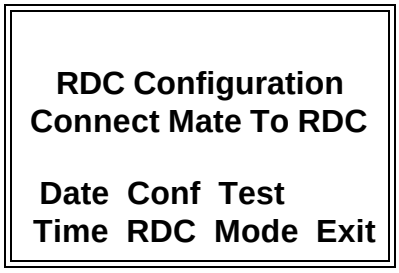
NOTE: If the following message appears, check to ensure the validity of the connection. Pressing **Exit (F4)** will return the CheckMate™ Plus to the **Configuration Options** display, select **RDC (F2)** to advance to the next display. Press **Test Mode (F3)** to enter the **RDC Test Mode** display and retry.



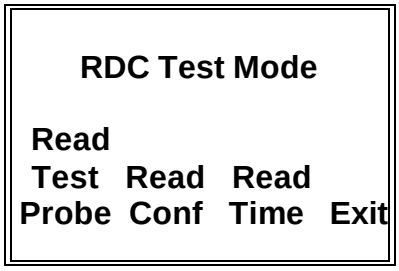
Perform a Test Read on a RDC

It is possible to perform a test reading on a RDC from a CheckMate™ Plus to verify the proper setup of the RDC and the validity of the cable connectivity in the field. In order for this test reading, a test probe or special probe is required.

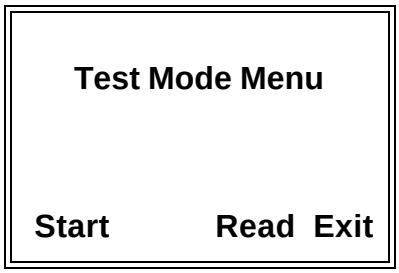
From the **Standby** display of the CheckMate™ Plus, press **SetUp (F4**) then select **RDC (F2)** from the **Configuration Options** display to go to the **RDC Configuration** display:



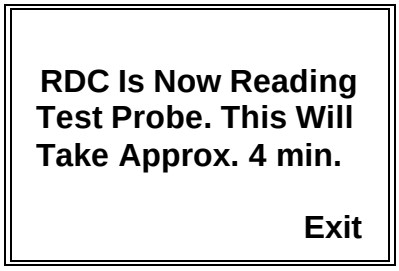
Press **Test Mode (F3)** to enter the following **RDC Test Mode** display:



Press **Read Test Probe (F1)** key to enter the following display:



A test probe must be attached to the RDC before pressing the **Start (F1)** key. Pressing the **Start (F1)** key will advance the CheckMate™ Plus to the following display:



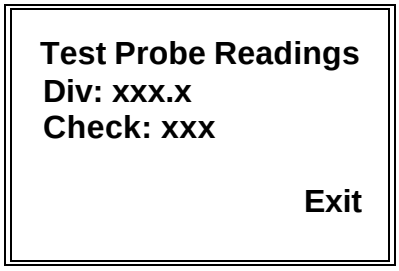
Press the **Exit (F4)** to return to the **Test Mode Menu**.

NOTE: The reading is being performed. Do not press the **Start (F1)** key again before the reading is complete or a **No Response From RDC - Check Connection** warning message will display. The same warning message will display if the **Read (F3)** key is pressed before the reading is completed. See below for details on navigating back to the **Test Mode Menu** after getting the warning message display.

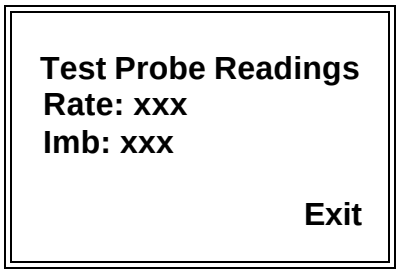
NOTE: It will take up to 4 minutes to successfully complete the reading. The CheckMate™ Plus will power off after 2 minutes if left idle. This is normal behavior of the equipment. The reading will still commence on the RDC.

When adequate time has passed, the test reading can be viewed. From the **Test Mode Menu**, press the **Read (F4)** key to advance to one of the following displays.

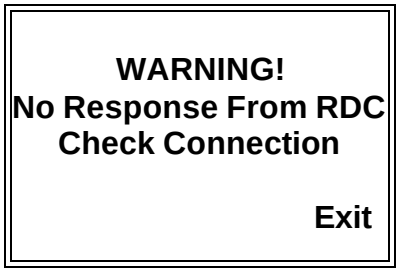
If the unit is a RDC – COT or a 4 Channel RDC – COT, the following display will appear:



If the unit is a RDC – CAT, the following display will appear:



NOTE: If the following warning message appears, check to ensure the validity of the connection. Pressing **Exit (F4)** will return the CheckMate™ Plus to the **Configuration Options** display, select **RDC (F2)** to advance to the next display. Press **Test Mode (F3)** to enter the **RDC Test Mode** display and press **Read Test Probe (F1)** to return to the **Test Mode Menu**.



Chapter 7
Probe Configuration

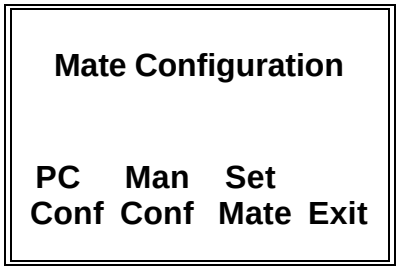
Probes may be configured using a PC or manually on the CheckMate™ Plus.

Probe Configuration using a PC and Corrdata® Plus Software

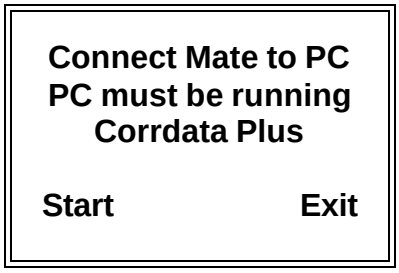
Create the desired **Site**, **Group**, and **Probe** list running the Corrdata Plus software program on the PC. To configure the CheckMate™ Plus with the above created probe list; click the **Device Configuration** command button on the Corrdata Plus software program. Choose the **Mate** radio button on the **Select Device** area and select **CheckMate** from the **Select Method** drop down menu. Now, select a complete group or an individual probe from the list to configure the CheckMate™ Plus.

Connect the CheckMate™ Plus to the PC (ensure the correct **port** number is selected).

Power on the CheckMate™ Plus. From the **Standby** display of the CheckMate™ Plus, press **SetUp (F4**) then select **Mate (F1)** from the **Configuration Options** display to go to the **Mate Configuration** display:

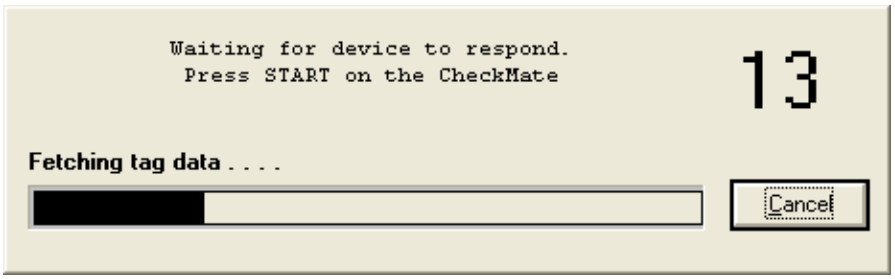


Press **PC Conf (F1)**, following screen will appear:

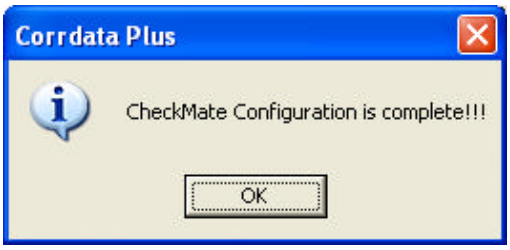


Click the **Configure Device** command button on the Corrdata Plus software program. Following dialogue box may appear:

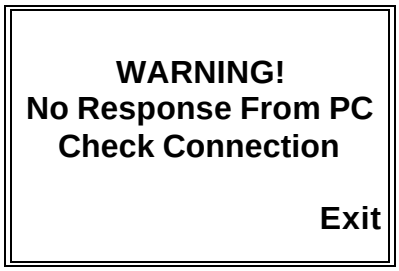
Select **OK**. Following dialogue box will appear:



Press the **Start (F1)** on the CheckMate™ Plus. Successful configuration will yield "**CheckMate Configuration is complete!!!**" message on the PC as shown below and the CheckMate will automatically advance to the **Mate Configuration** display:



If following error messages appear on the CheckMate™ Plus, ensure the CheckMate™ Plus is properly connected to the PC and verify the **port** number.

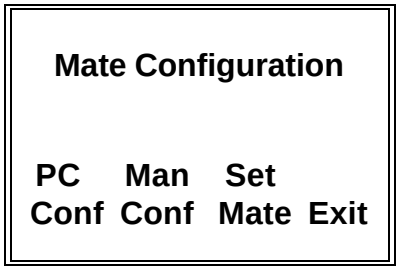


NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

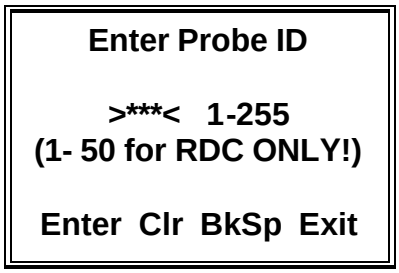
Manually Configuring a Corrosometer or Corrater Probe attached to a RDC

Following section will explain the probe configuration process of the CheckMate™ Plus. Once the probes are configured for the use with RDC's, RDC units will need to be programmed. Refer to the **Configuring a RDC** chapter for more information.

From the **Standby** display, press **SetUp (F4**) then select **Mate (F1)** from the **Configuration Options** display to go to the **Mate Configuration** display:



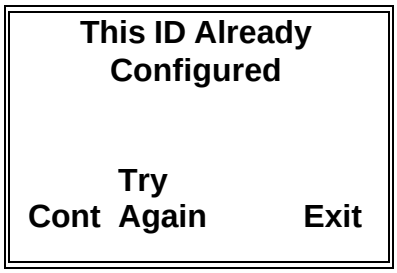
Press **Man Conf (F2)** to go to the **Enter Probe ID** display:



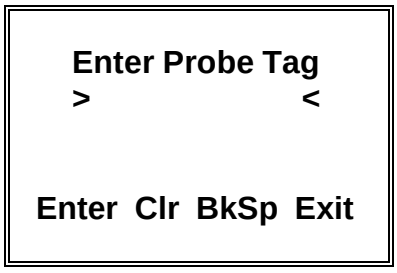
Enter a number from 1 to 50 and press **Enter (F1)** to go to the **Enter Probe Tag** display.

NOTE: If an invalid ID is entered, it is automatically cleared upon pressing **Enter (F1)**.

NOTE: If the **I**D selected has already been configured, the **This ID Already Configured** display appears:



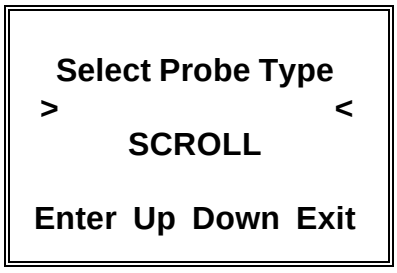
Pressing **Exit (F4)** returns to the **Configuration Options** display. Press **Try Again (F2)** to return to the **Enter Probe ID** display or **Cont (F1)** to continue to the **Enter Probe Tag** display and reconfigure the ID:



Enter Clr BkSp Exit

In the **Enter Probe Tag** display, enter up to twelve (12) alpha or numeric characters to uniquely identify the monitoring location. This can be a tag number, location or process name. Pressing **Clr (F2)** clears a previously entered ID. Pressing **BkSp (F3)** backs up one space for each time it is pressed so that a change can be made. Pressing **Exit (F4)** returns to the **Configuration Options** display.

Press **Enter (F1)** to go to the **Select Probe Type** display:



SCROLL

Enter Up Down Exit

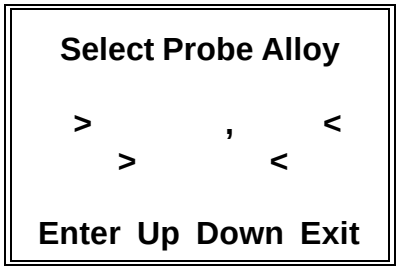
The probe type selections are **W80 WIRE**, **W65 WIRE**, **W45 WIRE**, **W40 WIRE**, **TF50**, **TF5**, **T50 CYLINDRICAL**, **T20 CYLINDRICAL**, **T10 CYLINDRICAL**, **T8 TUBE LOOP**, **T4 TUBE LOOP**, **S50 FLUSH**, **S40 FLUSH**, **S20 FLUSH**, **S10 FLUSH**, **S8 STRIP LOOP**, **S8 FLUSH**, **S4 STRIP LOOP**, **S4 FLUSH**, **S4 ATMOSPHERIC**, **CORRATER, CORRATER FLUSH, OTHER** and **TEST PROBE CO**.

You may scroll up through the list by repeatedly pressing the **Up (F2)** key or down through the list by repeatedly pressing the **Down (F3)** key. When the desired probe element is displayed, press the **Enter (F1)** key to accept the selection.

If a TF5 or TF50 high sensitivity atmospheric CORROSOMETER® probe has been selected, the CheckMate™ Plus will go to a special **Enter Probe Span** display:

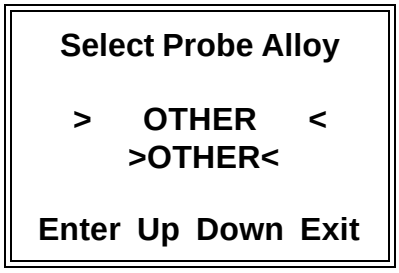
Using the numeric portion of the keypad, enter the probe span in Angstroms (?). The packaging for the TF5 and TF50 CORROSOMETER® provides the specific span for the probe. Alternatively, the nominal span can be used without appreciable error.

If a Corrater or Corrater Flush probe has been selected, the CheckMate will go to a special **Select Probe Alloy** display:

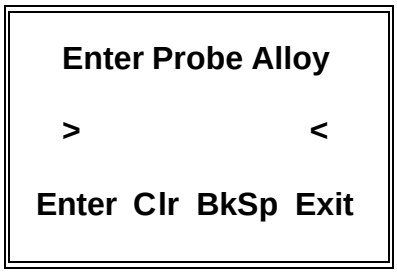


You may scroll up through the list by repeatedly pressing the **Up (F2)** key or down through the list by repeatedly pressing the **Down (F3)** key. When the desired probe element is displayed, press the **Enter (F1)** key to accept the selection.

Select **OTHER** (as shown below), if the default selection does not accommodate the probe being used.



Pressing the **Enter (F1)** key will advance the display to the **Enter Probe Alloy** display:

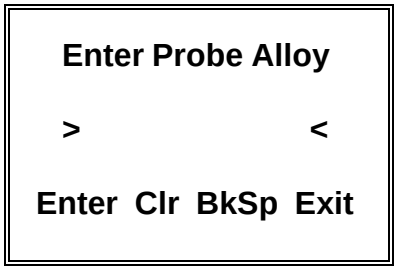


The **Enter Probe Alloy** display allows the user to enter up to eight (8) alpha or numeric characters to identify the alloy of the probe element for reference purposes only. It does not affect the calculation of corrosion rates.

Press **Enter (F1)** again to go to the **Enter Alloy Mult** display:

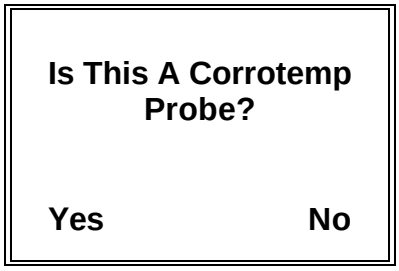
Enter the Alloy Multiplier for the probe. Refer to Table 7.1 Alloy Multipliers for more details.

If a CORROSOMETER® probe (element) is selected, the above steps are bypassed and the CheckMate™ Plus will automatically proceed to the **Enter Probe Alloy** display:

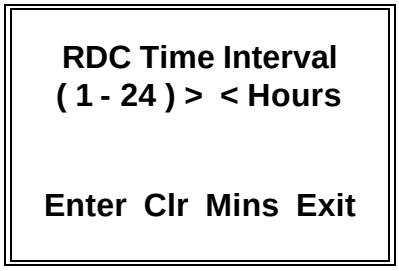


The **Enter Probe Alloy** display allows the user to enter up to eight (8) alpha or numeric characters to identify the alloy of the probe element for reference purposes only. It does not affect the calculation of corrosion rates.

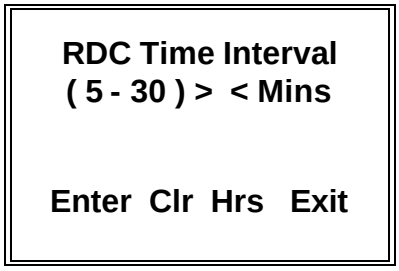
Press the **Enter (F1)** key to advance to the next display shown below:



Make the appropriate selection, CheckMate™ Plus will automatically proceed to the next display:



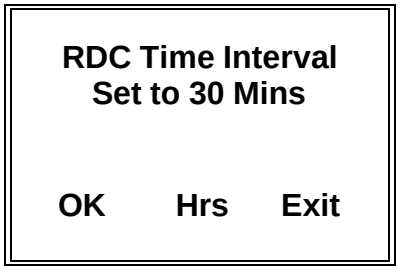
Key in the desired read time interval for RDC readings (default selection is presented in hours) and press **Enter (F1)**. Pressing the **Enter (F1)** without specifying a value will default the read interval to One (1) hour. Press the **Mins (F3)** key to change the time interval selection to minutes (shown below):



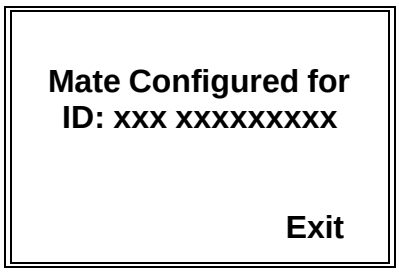
Key in the desired minute read interval and press the **Enter (F1)** key to advance to the next display. Pressing the **Enter (F1)** without specifying a value will default the read interval to five (5) minutes.

NOTE: The minimum read time interval for a Four (4) Channel RDC is 15 minutes. Although Corrosometer probes attached to RDC – COT may be set up to have a 5 minute read time interval, 4 Channel RDC will change the read time to 15 minutes (RDC – COT (one channel) will retain the 5 minute read interval).

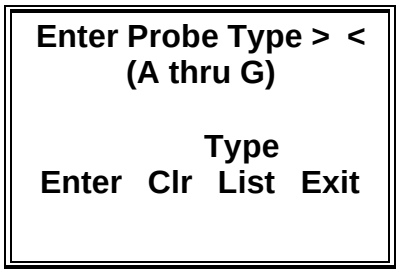
> ***NOTE:*** The minimum read time interval offered for Corrater and Corrater Flush probe is 30 minutes. In this case, choosing **Mins (F3)** will show the following display. Press **OK (F1)** to accept, **Hrs (F3)** to return to hourly **RDC Time Interval** display, or **Exit (F4)** to exit to **Configuration Options** screen:



Once the appropriate selections are made, the following display will appear indicating the CheckMate™ Plus was successfully configured. Press the **Exit (F4)** key to return to the **Standby** screen:

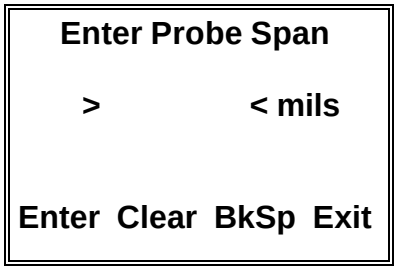


If **OTHER** is selected from the probe type selections on the **Select Probe Type** display the CheckMate™ Plus will go to the **Enter Probe Type** display. The display is shown below:



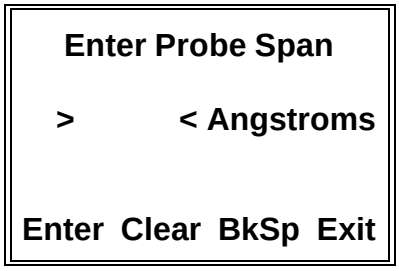
Enter **A** for Wire Loop type probes or enter **B** or **C** for Tube Loop/Strip Loop type probes or enter **D** for Cylindrical type probes or **E** for Corrater probes or **F** for Corrater Flush probes or **G** for High Sensitive Probes (probe types E and F are only read using RDC units. CheckMate™ Plus will not directly read these probes). If you are unsure of the element type, this information can be found on the probe packaging, etched on the probe body adjacent to the connector or in Table 5.1 Probe Type Identification.

Make the Probe Type selection and press **Enter (F1)**. Following **Enter Probe Span** display will appear if type **A**, **B**, **C**, or **D** is selected:

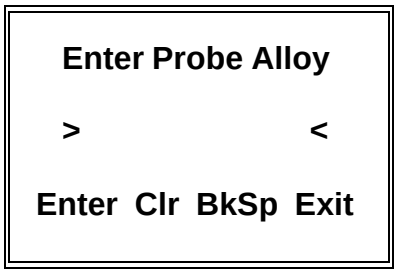


From the keypad, enter the span of the probe element in **mils**. The span in mils is shown on the probe packaging or it can be found in Table 5.1.

If Type **G** for the Model 610 Atmospheric Probes is selected, the span is entered in Angstroms, see the following **Enter Probe Span** display:

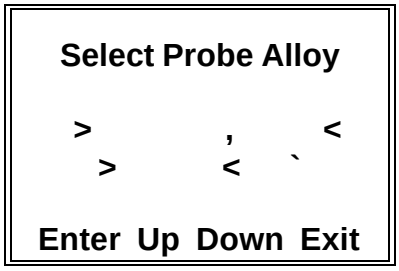


Once the span is entered, press the **Enter (F1)** key to proceed to the **Enter Probe Alloy** display:



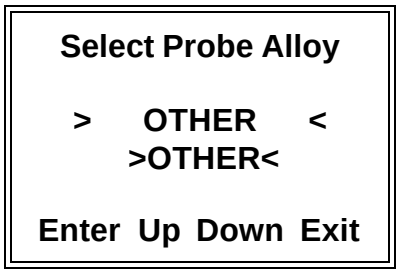
The **Enter Probe Alloy** display allows the user to enter up to eight (8) alpha or numeric characters to identify the alloy of the probe element for reference purposes only. It does not affect the calculation of corrosion rates. At this point, the CheckMate™ Plus will proceed to the **Is This A Corrotemp Probe?** display. Make the appropriate selection, **Yes (F1)** or **No (F4)**. CheckMate will proceed to the **RDC Time Interval** display, make the appropriate selection to advance to the next screen. CheckMate™ Plus will automatically proceed to conclude the configuration process. Scroll up in this section (**Manually Configuring a Corrosometer or Corrater Probe attached to a RDC**) for step by step illustrated descriptions.

If type **E** or **F** is selected, following **Select Probe Alloy** display will appear:

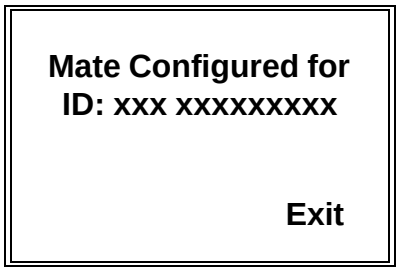


Scroll up or down through the list by repeatedly pressing the **Up (F2)** key or the **Down (F3)** key. When the desired probe element selection is displayed, press the **Enter (F1)** key to accept the selection. Next screen (**Is This A Corrotemp Probe?**) will prompt to choose **Yes (F1)** or **No (F4)**. Make the appropriate selection. CheckMate will proceed to the **RDC Time Interval** display, make the appropriate selection to advance to the next screen. CheckMate™ Plus will automatically proceed to conclude the configuration process. Scroll up in this section (**Manually Configuring a Corrosometer or Corrater Probe attached to a RDC**) for step by step illustrated descriptions.

> ***NOTE:*** If **OTHER** is selected in the **Select Probe Alloy** display, as shown below, pressing the **Enter (F1)** key will advance the display to the **Enter Probe Alloy** screen. The **Enter Probe Alloy** display allows the user to enter up to eight (8) alpha or numeric characters to identify the alloy of the probe element for reference purposes only. It does not affect the calculation of corrosion rates. Press **Enter (F1)** again and follow the prompts and enter the necessary values to conclude the configuration process. Scroll up in this section (**Manually Configuring a Corrosometer or Corrater Probe attached to a RDC**) for step by step illustrated descriptions.

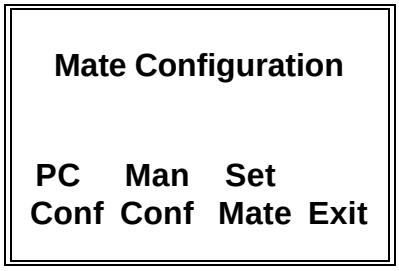


CheckMate™ Plus is successfully configured when the following display appears. Press the **Exit (F4)** to return to the **Standby** screen from the following display:

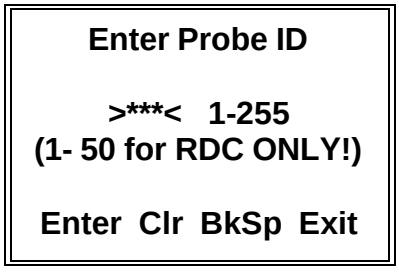


Manually Configuring a Corrosometer Probe

From the **Standby** display, press **SetUp (F4**) then select **Mate (F1)** from the **Configuration Options** to go to the **Mate Configuration** display:



Press **Man Conf (F2)** to go to the **Enter Probe ID** display:

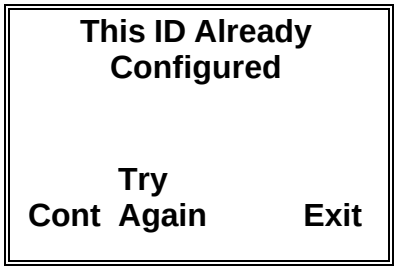


Enter a number between 51 and 255 and press **Enter (F1)** to go to the **Enter Probe Tag** display.

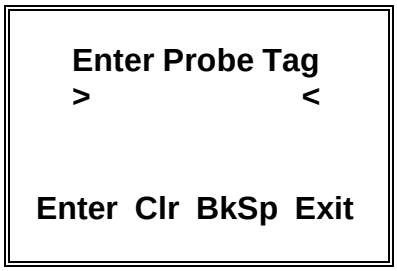
NOTE: Probe ID's 51–255 are reserved for Corrosometer probes (type **A**, **B**, **C**, **D**, and **G**).

NOTE: If an invalid ID is entered, it is automatically cleared upon pressing **Enter (F1)**.

NOTE: If the ID selected has already been configured, the **This ID Already Configured** display appears:

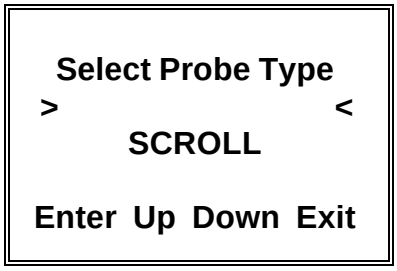


Press **Try Again (F2)** to return to the **Enter Probe ID** display or **Cont (F1)** to continue to the **Enter Probe Tag** display and reconfigure the ID. Pressing **Exit (F4)** returns to the **Configuration Options** display:



In the **Enter Probe Tag** display, enter up to twelve (12) alpha or numeric characters to uniquely identify the monitoring location. This can be a Tag No., location or process name. Pressing **Clr (F2)** clears a previously entered ID. Pressing **BkSp (F3)** backs up one space for each time it is pressed so that a change can be made. Pressing **Exit (F4)** returns to the **Configuration Options** display.

Press **Enter (F1)** to go to the **Select Probe Type** display:



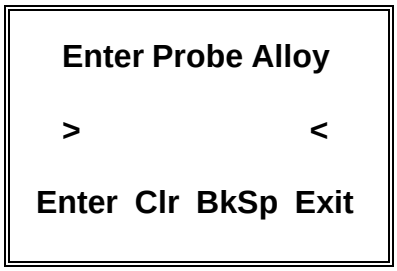
The probe type selections are **W80 WIRE**, **W65 WIRE**, **W45 WIRE**, **W40 WIRE**, **TF50**, **TF5**, **T50 CYLINDRICAL**, **T20 CYLINDRICAL**, **T10 CYLINDRICAL**, **T8 TUBE LOOP**, **T4 TUBE LOOP**, **S50 FLUSH**, **S40 FLUSH**, **S20 FLUSH**, **S10 FLUSH**, **S8 STRIP LOOP**, **S8 FLUSH**, **S4 STRIP LOOP**, **S4 FLUSH**, **S4 ATMOSPHERIC**, **OTHER** and **TEST PROBE CO**.

You may scroll up through the list by repeatedly pressing the **Up (F2)** key or down through the list by repeatedly pressing the **Down (F3)** key. When the probe element selection is displayed, press the **Enter (F1)** key to accept the selection

If a TF5 or TF50 high sensitivity atmospheric CORROSOMETER® probe has been selected, the CheckMate™ Plus will go to a special **Enter Probe Span** display:

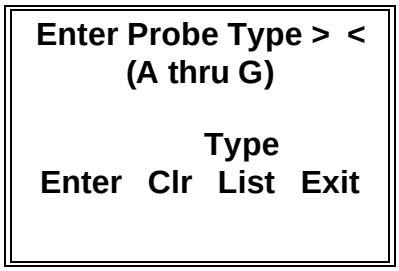
Using the numeric portion of the keypad, enter the probe span in Angstroms (?). The packaging for the TF5 and TF50 CORROSOMETER® provides the specific span for the probe. Alternatively, the nominal span can be used without appreciable error.

If a CORROSOMETER® probe (element) is selected, the above step is bypassed and the CheckMate™ Plus will automatically proceed to the **Enter Probe Alloy** display:



The **Enter Probe Alloy** display allows the user to enter up to eight (8) alpha or numeric characters to identify the alloy of the probe element for reference purposes only. It does not affect the calculation of corrosion rates.

If **OTHER** is selected from the probe type selections on the **Select Probe Type** display the CheckMate™ Plus will go to the **Enter Probe Type** display. The display is shown below:

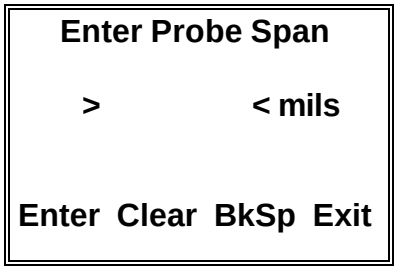


Enter **A** for Wire Loop type probes or enter **B** or **C** for Tube Loop/Strip Loop type probes or enter **D** for Cylindrical type probes or **G** for High Sensitive Probes. If you are unsure of the element type, this information can be found on the probe packaging, etched on the probe body adjacent to the connector or in Table 5.1 Probe Type Identification.

NOTE: Probe Type **E** and **F** cannot be configured to read directly from the CheckMate™ Plus. These probes need to be connected to a RDC to collect data.

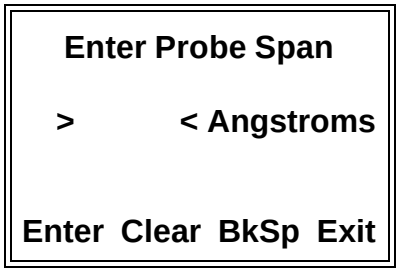
Make the Probe Type selection and press **Enter (F1)**.

Following **Enter Probe Span** display will appear if type **A**, **B**, **C**, or **D** is selected:

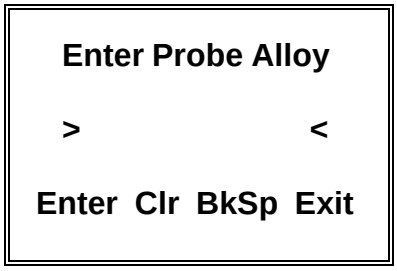


From the keypad, enter the span of the probe element in **mils**. The span in mils is shown on the probe packaging or it can be found in Table 5.1.

If Type **G** for the Model 610 Atmospheric Probes is selected, the span is entered in Angstroms in the following **Enter Probe Span** display:

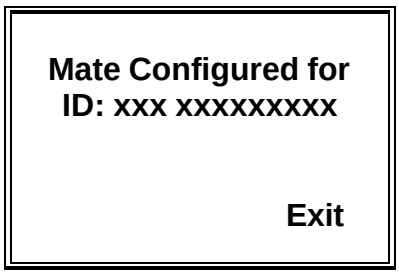


Once the span is entered, press the **Enter (F1)** key to proceed to the **Enter Probe Alloy** display:



The **Enter Probe Alloy** display allows the user to enter up to eight (8) alpha or numeric characters to identify the alloy of the probe element for reference purposes only. It does not affect the calculation of corrosion rates.

Press the **Exit (F4)** to return to the **Standby** display:



UNS Code	Material	Multiplier
K03005	Pipe Grade Carbon Steel	1.00
A91100	Aluminum 1100-0	0.94
A92024	Aluminum 2024	0.88
C11000	Copper 110 ETP Comm. Pure	2.00
C44300	CDA 443 Arsenical Admiralty	1.67
C44500	CDA 445 Phosphorized Adm.	1.68
C64200	CDA 642 A1 Silicon Bronze	1.48
C68700	CDA 687 Alum. Brass Arsenical	1.62
C70610	CDA 706 90/10 Copper/Nickel	1.80
C71500	CDA 715 70/30 Copper/Nickel	1.50
G41300	AISI 4130 Alloy Steel	1.00
L50045	Lead	2.57
N04400	Monel 400 Nickel	1.13
N05500	Monel K-500 Nickel	1.04
N06022	Hastelloy C22	0.85
N06600	Inconel 600 Nickel	0.95
N08020	Carpenter 20 CB3 SST	0.98
N08800	Incolloy 800	0.89
N08825	Incolloy 825	0.88
N10276	Hastelloy C276	0.86
R50400	ASTM B-348 Grades 2-4 Titanium	0.75
S30400	AISI 304 Stainless Steel	0.89
S31600	AISI 316 Stainless Steel	0.90
S31603	AISI 316L Stainless Steel	0.90
S31803	2205 Duplex Stainless Steel	0.89
S32750	2507 Duplex Stainless Steel	0.88
Z17001	Grades 1A, 1, 2, 3, or 5 Zinc	1.29

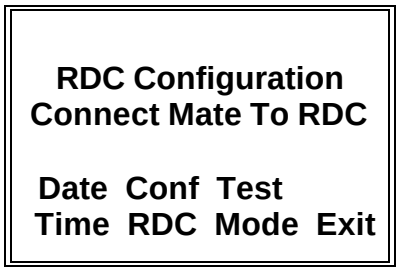
Note: These factors are recommended for the MULTIPLIER values. They are based upon use of CORRATER® electrodes which have surface areas of 5cm^2 for "standard" probes and 0.5 cm^2 for "flush" probes.

Table 7.1 Alloy Multipliers

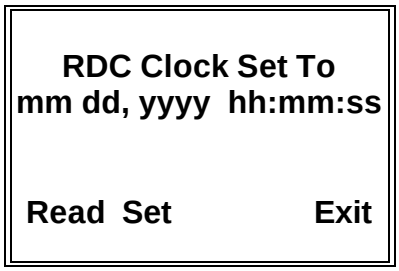
Chapter 8
Configuring a RDC

Setting the Date and Time on the RDC

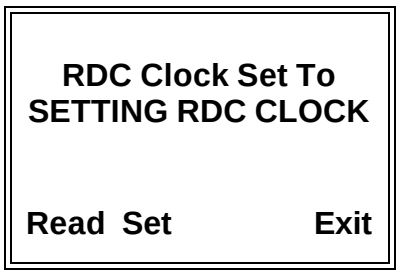
From the **Standby** display of the CheckMate™ Plus, press **SetUp (F4**) then select **RDC (F2)** from the **Configuration Options** display to go to the **RDC Configuration** display:



Press **Date Time (F1)**, following screen will appear:

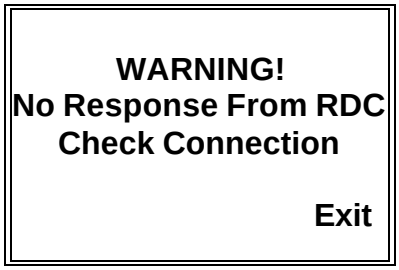


Press **Set (F2)**, the **RDC Clock Set To** display will change to show:



The clock on the CheckMate™ Plus will program the RDC internal clock to match the CheckMate™ Plus. Press the **Read (F1)** to verify the time of the RDC. Press the Exit (F4) to return to the RDC Configuration display.

NOTE: If the following message appears, check to ensure the validity of the connection.

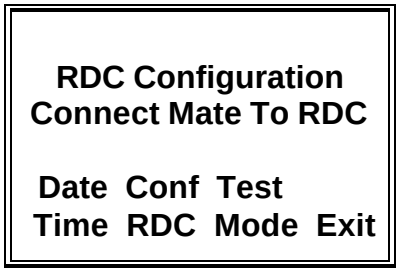


NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

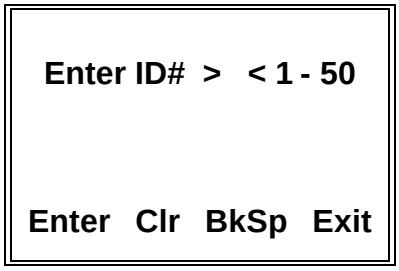
Configure a RDC using the CheckMate™ Plus

CheckMate™ Plus is designed to configure and gather data from all RDC's. Refer to **Reading a Remote Data Collector (RDC)** section for more details on reading RDC's. The following section will explain the configuration procedure of a RDC from a CheckMate™ Plus.

To begin the configuration process, connect the CheckMate™ Plus to the RDC with the provided lemo connector. Power up the CheckMate™ Plus. Press **SetUp (F4)** from the **Standby** display and then select **RDC (F2)** from the **Configuration Options** display to go to the **RDC Configuration** display:



Press the **Conf RDC (F2)**, following screen will appear:

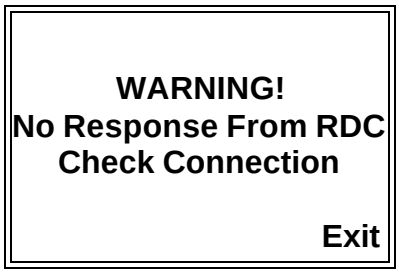


Enter the ID number (1 – 50) using the numeric keys of the CheckMate™ Plus. In order to configure the RDC, the probe must be already programmed in the CheckMate™ Plus. Refer to the **Manually Configuring a Corrosometer or Corrater Probe attached to a RDC** section or **Probe Configuration using a PC and Corrdata Plus Software** section in the **Probe Configuration** chapter for more details.

> If the probe is not properly configured before configuring the RDC, the following error message will display:

Press the **Exit (F4)** key once to enter the **RDC Configuration** display and press the **Conf RDC (F2)** to enter a different ID. If it is desirable to configure the above ID, press the **Exit (F4)** key continuously to return to the **Standby** display and configure the ID by navigating to the appropriate displays and try again.

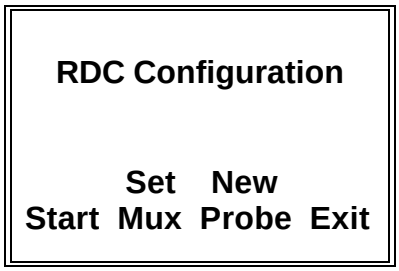
If the connection between the RDC and the CheckMate™ Plus is interrupted or not valid, the following display will appear:



Press the **Exit (F4)** key to return to the **Configuration Options** display. Select **RDC (F2)** to go to the **RDC Configuration** display and repeat the above process with the connection properly established.

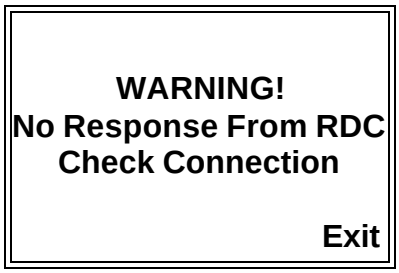
If either of the following error messages appears, verify the **Probe Type** configured for the RDC. RDC – CO (Corrosometer) and RDC – CA (Corrater) technologies require different probe configurations. Refer to the **Manually Configuring a Corrosometer or Corrater Probe attached to a RDC** section or **Probe Configuration using a PC and Corrdata Plus Software** section in the **Probe Configuration** chapter for more details.

Upon successful entry of the ID, the following **RDC Configuration** display will appear:



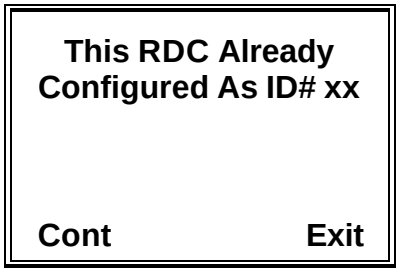
Press **Start (F1)** to configure the RDC.

If the connection between the RDC and the CheckMate™ Plus is interrupted, the following display will appear:

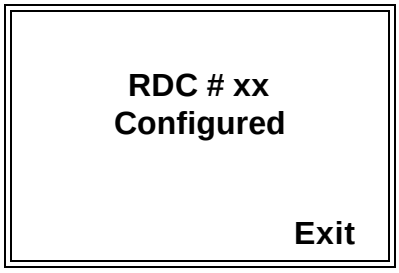


Ensure the integrity of the connection by checking the lemo connector cable between the CheckMate™ Plus and the RDC. Press **Exit (F4)** and retry.

If the RDC was previously programmed, CheckMate™ Plus will proceed to the following display:



If replacing the existing ID with the new configuration is desired, press **Cont (F1)** (see display below), otherwise **Exit (F1)** to return to the **RDC Configuration** display to begin configuration of a different ID:



Press **Exit (F4)** to return to the **Configuration Options** display.

NOTE: For Four (4) Channel RDC units, each probe configuration (channel) must be individually configured. Follow the procedure above to configure the first channel. At the completion of the above procedure, the CheckMate™ Plus should be at the **Configuration Options** display. Now, press **RDC (F2)** to go to the **RDC Configuration** display and repeat the procedure to configure the remaining channels. Also refer to the **Changing or Partial Configuration of 4 Channel RDC** section below**.** The minimum read time interval for a Four (4) Channel RDC is 15 minutes. Although Corrosometer probes attached to RDC – COT may be set up to have a 5 minute read time interval, 4 Channel RDC will change the read time to 15 minutes (RDC – COT (one channel) will retain the 5 minute read interval).

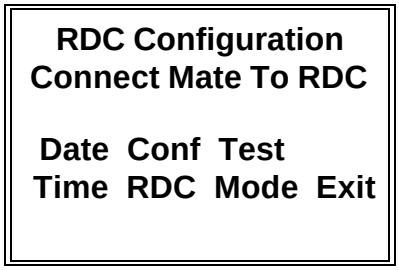
NOTE: RDC units will not collect data if the CheckMate™ Plus is connected. Make sure to unplug the CheckMate™ Plus from the RDC to begin data collection.

NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

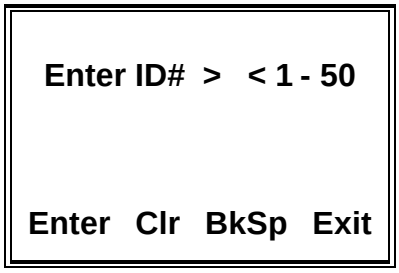
Update RDC Configuration On Probe Replacement

Initial **Check** reading can be reset easily on the RDC when a probe is replaced. The **Check** reading is a measure of probe functionality or integrity. The initial value for CORROSOMETER® probes is 800 ±50 divisions. It is recommended that a **Check** reading be taken and recorded immediately after unpacking a probe as it will be the value to which all subsequent **Check** readings will be compared. The general rule is that the **Check** reading should not vary by more than 1% (±10 divisions) from the initial value. If there is more than a 1% change, it is an indication of a loss in probe integrity and replacement is required.

To reset the **Initial Check** reading, connect the CheckMate™ Plus to the RDC with the provided lemo connector and power up the CheckMate™ Plus. Press **SetUp (F4)** from the **Standby** display and then select **RDC (F2)** from the **Configuration Options** display to go to the **RDC Configuration** display:



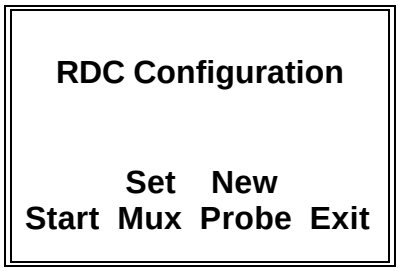
Press the **Conf RDC (F2)**, following screen will appear:



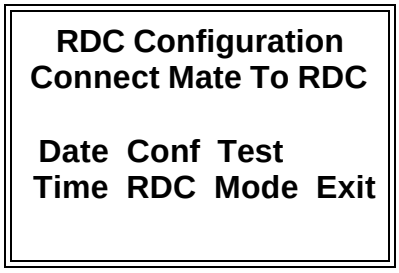
Enter the ID number (1 – 50) using the numeric keys of the CheckMate™ Plus. Press the **Enter (F1)** key.

NOTE: Refer to the **Configure a RDC using the CheckMate™ Plus** section above for any Warning and/or Error messages displayed.

Press **New Probe (F3)** to reset the Initial Check reading on the following display:



CheckMate™ Plus will return to the following display:



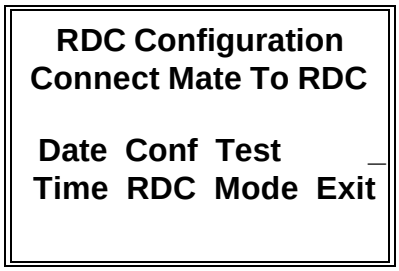
NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

Changing or Partial Configuration of 4 Channel RDC

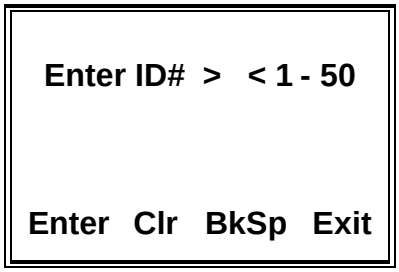
When initially configuring the 4 Channel RDC, it will begin at channel 1 and proceed through to channel 4, and then wrap around to channel 1 again. This may not be suitable when less than four channels are to be configured, or when one or more channels are to be reconfigured. CheckMate™ Plus allows users to select any one of the channels on the 4 Channel RDC. This same screen also allows switching **ON** and **OFF** of any of the channels without losing the configuration information.

NOTE: When re-configuring any channel, previous data on the other channels will be erased and a new data collection run commenced. Therefore all the data from the other channels MUST be collected BEFORE any channel is reconfigured to AVOID LOSS OF DATA.

To select, deselect or set as active a channel, connect the CheckMate™ Plus to the RDC with the provided lemo connector and power up the CheckMate™ Plus. Press **SetUp (F4)** from the **Standby** display and then select **RDC (F2)** from the **Configuration Options** display to go to the **RDC Configuration** display:

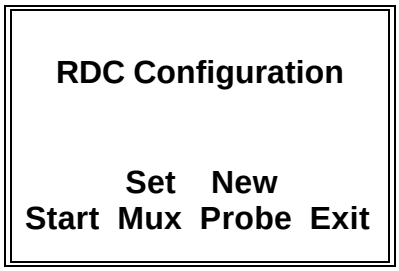


Press the **Conf RDC (F2)**, following screen will appear:

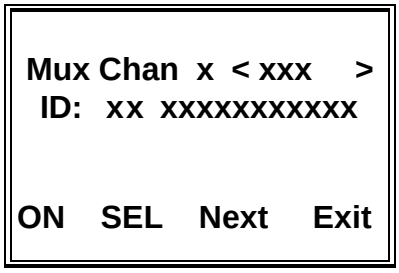


Enter the ID number (1 – 50) using the numeric keys of the CheckMate™ Plus. Press the **Enter (F1)** key.

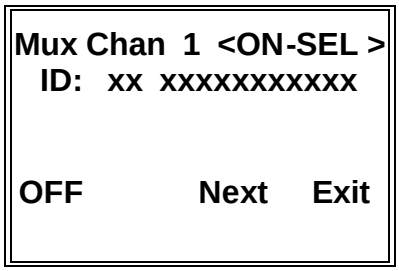
NOTE: Refer to the **Configure a RDC using the CheckMate™ Plus** section above for any Warning and/or Error messages displayed.
Press **Set MUX (F3)** on the following display:



This will advance the CheckMate™ Plus to the following display:



The first line shows the selected channel and its status inside the **<** **>** symbols. The **ON (F1)** key is a multifunctional key that alternates back and forth with **OFF (F1)**. Selecting **ON (F1)** on channel 1 and pressing the **SEL (F2)** will depict the following display:



Channel 1 is switched **ON** and is currently **SELECTED** to transmit data or receive any instructions from the CheckMate™ Plus. Press **OFF (F1)** to suspend the data collection from this channel if desired. If this channel is not currently **SELECTED**, only **"ON"** will appear in the status area (channel is active, but not selected to receive instructions or transmit data). Pressing the **Next (F3)** key will advance the CheckMate™ Plus to the next channel. It is possible now to make changes to this channel using the **F1** and/or **F2** keys. **Next (F3)** key will proceed through to the next channel and wrap around to the first channel.

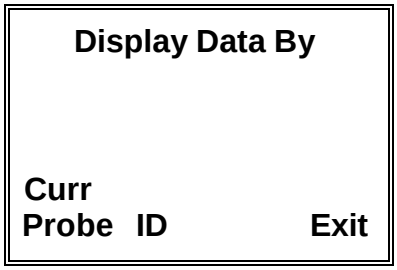
Press the **Exit (F4)** button to return to the **RDC Configuration** display.

NOTE: Pressing the **Exit (F4)** button repeatedly will return the CheckMate™ Plus to the **Standby** display.

Chapter 9
Displaying Data on the CheckMate™ Plus

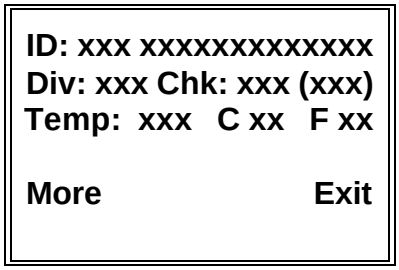
Probe reading data can be displayed on the CheckMate™ Plus either by the probe currently attached or by ID. Probe ID numbers 1 – 50 corresponds to probes attached to RDC's while 51 – 255 are probes that are directly connected to CheckMate. The data includes the Tag ID, Metal Loss, Corrosion Rate, Divisions and Check Readings, Alloy, Span, Temperature (RDC readings only), number of Readings, and Interval for Corrosometer probes and Tag ID, Corrosion Rate, Imbalance, Temperature, Alloy, Multiplier, number of Readings, and reading Interval for Corrater probes via RDC's .

From the **Standby** screen, press **Disp (F2)** to go to the **Display Data By** display:

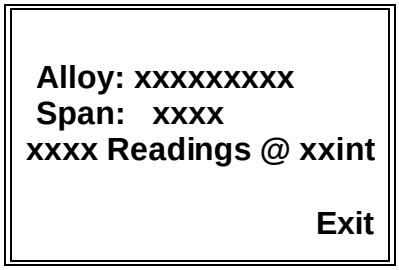


Press **Curr Probe (F1)** to go directly to the current probe display or press **ID (F2)** to select the probe by ID.

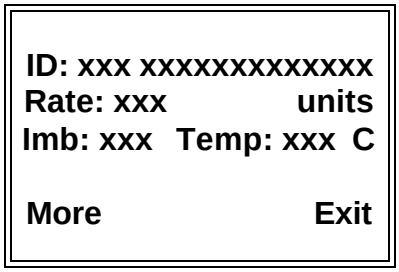
For ID numbers 1 – 50, if a Corrosometer probe is attached to the RDC, following display will appear:



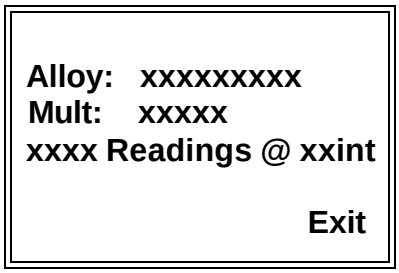
Press **More (F1)** to go to the next display of information:



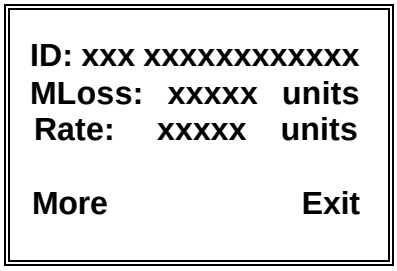
For ID numbers 1 – 50, if a Corrater probe is attached to the RDC, following display will appear:



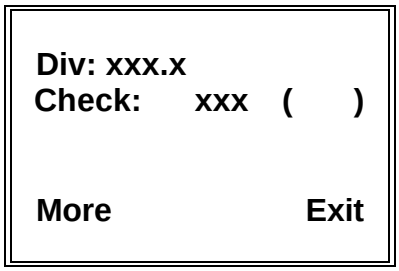
Press **More (F1)** to go to the next display of information:



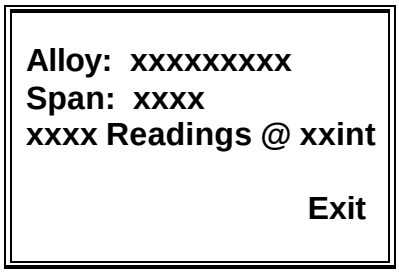
For Corrosometer probes with ID numbers 51 - 255, following screen will display:



Press **More (F1)** to go to the next display of information:



Press **More (F1)** one more time to go to the next display of information:



Chapter 10
Transferring Data to the PC

Probe reading data is downloaded to the PC using the provided Corrdata Plus® Corrosion Management Software program. This is a Windows compatible program that allows fast download of data stored in the CheckMate™ Plus.

Installation

The Corrdata Plus® Corrosion Management Software program can be found on the CD-ROM included with the instrument. Insert the auto run CD-ROM and follow the on screen instructions to install. The default installation directory is C:\Program Files\RCS\Corrdata Plus.

Configuring Corrdata Plus

When the installation is complete, launch the Corrdata Plus program from **All Programs → Rohrback Cosasco Systems**. Follow the instructions on the Corrdata Plus User Manual provided on the CD-ROM for site setup and configuration. The manual can be accessed by right-clicking and selecting **open** on the CD-ROM device of the computer.

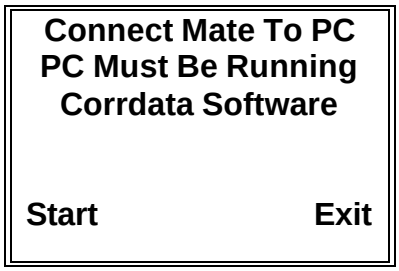
Connect the CheckMate™ Plus to the PC

Connect the CheckMate™ Plus instrument to the 9 pin COM port on the back of the PC using the provided cable. Make sure this is the same COM port as selected previously (in most cases this will be COM 1, however verify this in the device manager).

Launch and **Open an Existing Site** or **Create a New Site** on the Corrdata Plus® Corrosion Management Software program. Ensure the correct port number is selected on **Preferences → Settings → Default Port:** section**.**

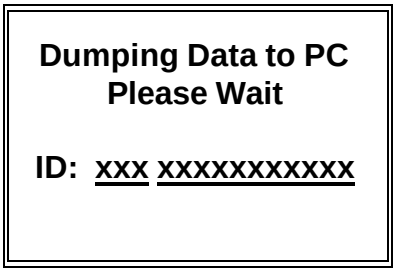
CheckMate™ Plus Procedure

From the **Standby** screen of the CheckMate™ Plus, press **Dump (F3)** to go to the following display:

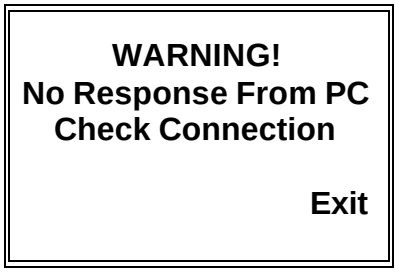


On the Corrdata Plus® Corrosion Management Software program, click the **Receive Data** command button, select **Mate** as the **Select Device**, and **CheckMate** as the **Select Method**. Choose the appropriate **To Group** selection. Click the **Read from Device** command button.

Press **Start (F1)** on the CheckMate™ Plus to begin downloading data to the PC.



If the CheckMate™ Plus is not connected to the PC properly, or the PC is not running Corrdata Plus® Corrosion Management Software program, one of the following screens may be displayed.



If the above screens appear, make sure that Corrdata Plus® Corrosion Management Software is running, that the correct COM port is checked, and that the CheckMate™ Plus is connected to that COM port using the supplied cable.

If data is still not transferred after checking the connection between the PC and CheckMate™, please see the Troubleshooting section (Chapter 9) for further help.

Chapter 11
Troubleshooting Guide

Symptom	Problem	Solution
CheckMate™ Plus will not turn on.	Batteries not installed.	Install batteries (see Chapter 3)
	Battery voltage low.	Install new batteries.
	Batteries installed incorrectly.	Check the polarities as indicated on the unit.
CheckMate™ Plus turns off before 2 minutes auto shutdown.	Battery voltage low.	Install new batteries.
CheckMate™ Plus will not transfer data to the computer.	Corrdata Plus® Corrosion Management Software is not running.	Launch Corrdata Plus® Corrosion Management Software from the Start Menu.
	Cable is not connected properly.	Check that the cable is fully plugged into CheckMate™ Plus and that the other end is fully plugged into the 9 pin serial port on the back of the PC.
		Check that the COM port selected in Corrdata Plus® Corrosion Management Software is the actual COM port to which the CheckMate™ Plus is connected.
CheckMate™ Plus not reading probe.	No probe connected to CheckMate™ Plus	Connect probe to CheckMate™ Plus
	Cable is not connected properly.	Connect CheckMate™ Plus to RDC
RDC will not transfer data to the CheckMate™ Plus.	Battery voltage low on RDC.	Install new batteries.

Appendix A
EC-Type Examination Certificate

[1]
[2]

EC-TYPE EXAMINATION CERTIFICATE

Equipment or Protective System intended for use in Potentially explosive atmospheres Directive 94/9/EC

[3] EC-Type Examination Certificate Number: **DEMKO 05 ATEX 0417899X**

[4] Equipment or Protective System: **Portable Corrosometer Data Terminal, Models CheckMate, Part No. 723601 and CheckMate Plus, Part No. 723601-1**

[5] Manufacturer: **Rohrback Cosasco Systems Inc**

[6] Address: **11841 E Smith Ave, Santa Fe Springs CA 90670 USA**

[7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no: **0417899**

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 E incl. A1 + A2 EN 50020:2002 E

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of this Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment or protective system shall include the following:

Ex II 2G EEx ib IIC T4

On behalf of UL International Demko A/S Herlev, 2005-04-19

Karina Christiansen
Certification Manager

UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730, Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

[13]

Schedule

[14]

EC-TYPE EXAMINATION CERTIFICATE No.

DEMKO 05 ATEX 0417899X

[15] Description of Equipment or protective system:
The CheckMate/CheckMate Plus is a handheld corrosometer and data recorder intended for use with Rohrback Cosasco Systems Inc. remote data collectors (RDC's) and corrosion probes in a Hazardous Location, and also with a computer in a Non-Hazardous Location via the PC Isolator Cable. It is intended to provide transfer of stored corrosion data from the RDC's (DEMKO 04 ATEX 0307914X) and also to program the RDC's. It may be connected directly to a corrosion probe for a corrosion measurement or to a test probe of known resistance for system checks and troubleshooting. Software is the only difference between the CheckMate and the CheckMate Plus instruments.

Types comprised by the Certificate
Model CheckMate, Part No. 723601
Model CheckMate Plus, Part No. 723601-1

Electrical Data
9V supply from six size AA 1.5V alkaline batteries:
Duracell MN1500, Energizer E91, EN91 or Rayovac 815 alkaline type.

RS232 Data Port from Pin 2 and Pin 3 to Pin 5:
Uo = 11.1 V, Io = 22.4 mA, Po = 63 mW, Co = 1.9 uF, Lo = 70 mH
Ui = 11.1 V, Ii = 45.9 mA, Pi = 127.4 mW, Ci = 0, Li = 0

Probe Port from Probe A to Probe F:
Uo = 5.88 V, Io = 0.594 A, Po = 0.873 W, Co = 43 uF, Lo = 100 uH
Ui = 5.88 V, Ii = 79.4 mA, Pi = 116.7 mW, Ci = 96 pF, Li = 0.32 uH

Probe Port from Probe B, C, D or E to Probe F:
Uo = 5.88 V, Io = 79.4 mA, Po = 116.7 W, Co = 43 uF, Lo = 5.6 mH
Ui = 5.88 V, Ii = 4.9 mA, Pi = 7.3 mW, Ci = 96 pF, Li = 0.32 uH

Probe Port from Probe A, B, C, D and E to Probe F:
Uo = 5.88 V, Io = 1.07 A, Po = 1.573 W, Co = 43 uF, Lo = 31 uH
Ui = 5.88 V, Ii = 0.667 A, Po = 0.98 W, Co = 96 pF, Li = 0.32 uH

Temperature Data
$-20°C \leq Ta \leq 50°C$

Routine Tests
Tests are performed per 11.1.1 of EN 50020:2002 on the PC Isolator Cable P/N 723240.

UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730, Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

Schedule DEMKO 05 ATEX 0417899X

[16] Report No.:
Project Report No.: 0417899 (Hazardous Locations Testing)

Drawings:

Drawing Number	Sheets	Rev.	Date	Title
006436	1	E	08 Apr 05	Marking Label
723203	8	H	01 Apr 05	Interconnect Control Drawing
723601	1	C	14 Mar 05	Complete Unit Assembly
723215	2	-	30 Sep 03	Enclosure Case Top
723214	2	-	30 Sep 03	Enclosure Case Bottom
723045	1	A	14 Mar 05	Keyboard Static Guard
723629	1	-	18 Feb 05	Battery Access Door
723612	2	G	21 Mar 05	Circuit Board Schematic
723610	1	M	08 Apr 05	Board Assembly and Parts List
723611	11	G	07 Mar 05	Circuit Board Trace Layout
723618	1	C	21 Mar 05	Internal Battery Supply Cable
723616	1	D	21 Mar 05	Internal RS232 Serial Cable
723619	1	D	24 Mar 05	External Probe Cable
723623	1	C	24 Mar 05	External CheckMate/RDC Cable
723235	1	B	21 Mar 05	CheckMate Test Probe Assembly
044054	1	S	24 Oct 03	CheckMate Test Probe Material
006438	1	B	21 Mar 05	CheckMate Test Probe Marking
723240	1	B	24 Mar 05	PC Isolator Cable Assembly
723243	1	A	21 Mar 05	PC Isolator Cable Schematic
723241	1	B	08 Apr 05	PC Isolator PCB Assembly
723242	1	-	14 Mar 05	PC Isolator PCB Specifications
723032	5	G	26 May 94	PC Isolator PCB Artwork
006447	1	A	24 Mar 05	PC Isolator Cable Marking
CheckMate Instrument	7	-	18 Mar 05	Component Safety Assessment
CheckMate Instrument	1	-	07 Apr 05	Aggregate Capacitance Table
PC Isolator Cable PCB	1	-	22 Mar 05	Component Safety Assessment

[17] Special conditions for safe use:
The CheckMate/CheckMate Plus instrument is intrinsically safe when connected in accordance with interconnect control drawing No. 723203 which is supplied with each unit. Downloading of stored data to a computer is performed only in the non-hazardous area and only with PC Isolator Cable Part No. 723240. Alkaline battery replacement is only performed in the non-hazardous area.

[18] Essential Health and Safety Requirements
The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

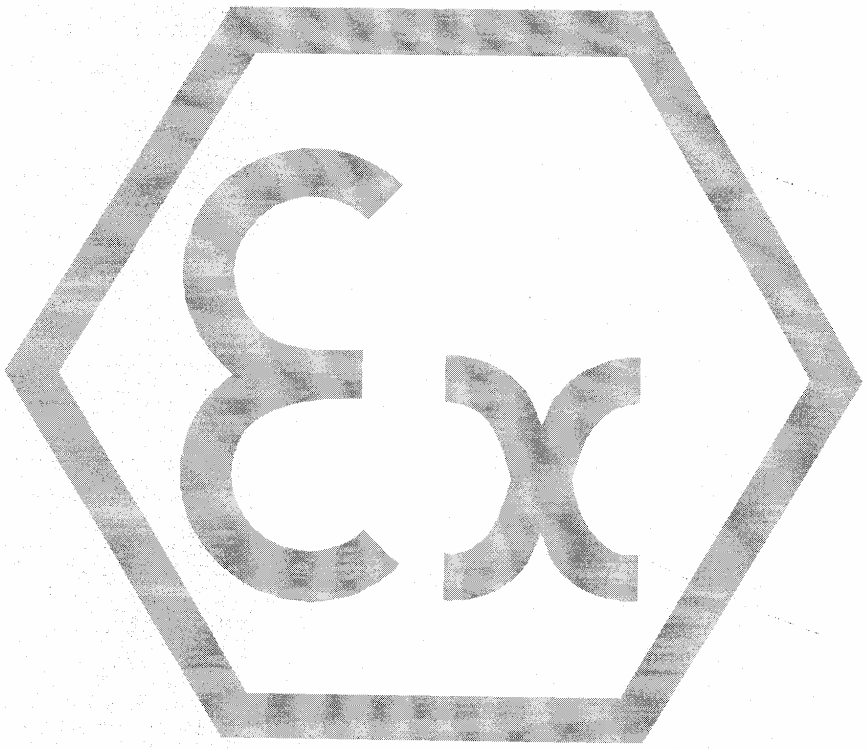
UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730, Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

Schedule DEMKO 05 ATEX 0417899X

On behalf of UL International Demko A/S

Herlev, 2005-04-19

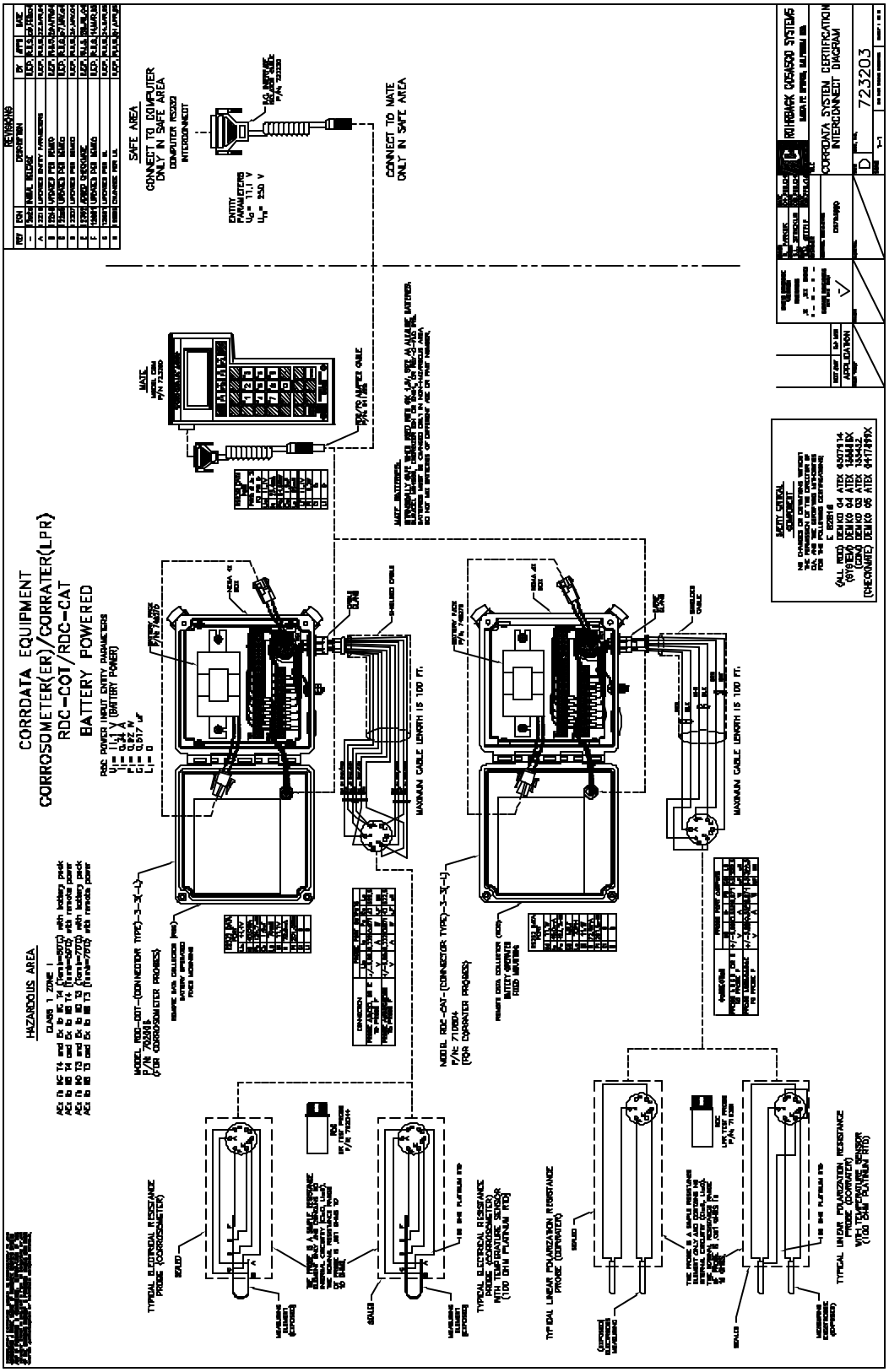
Karina Christiansen
Certification Manager

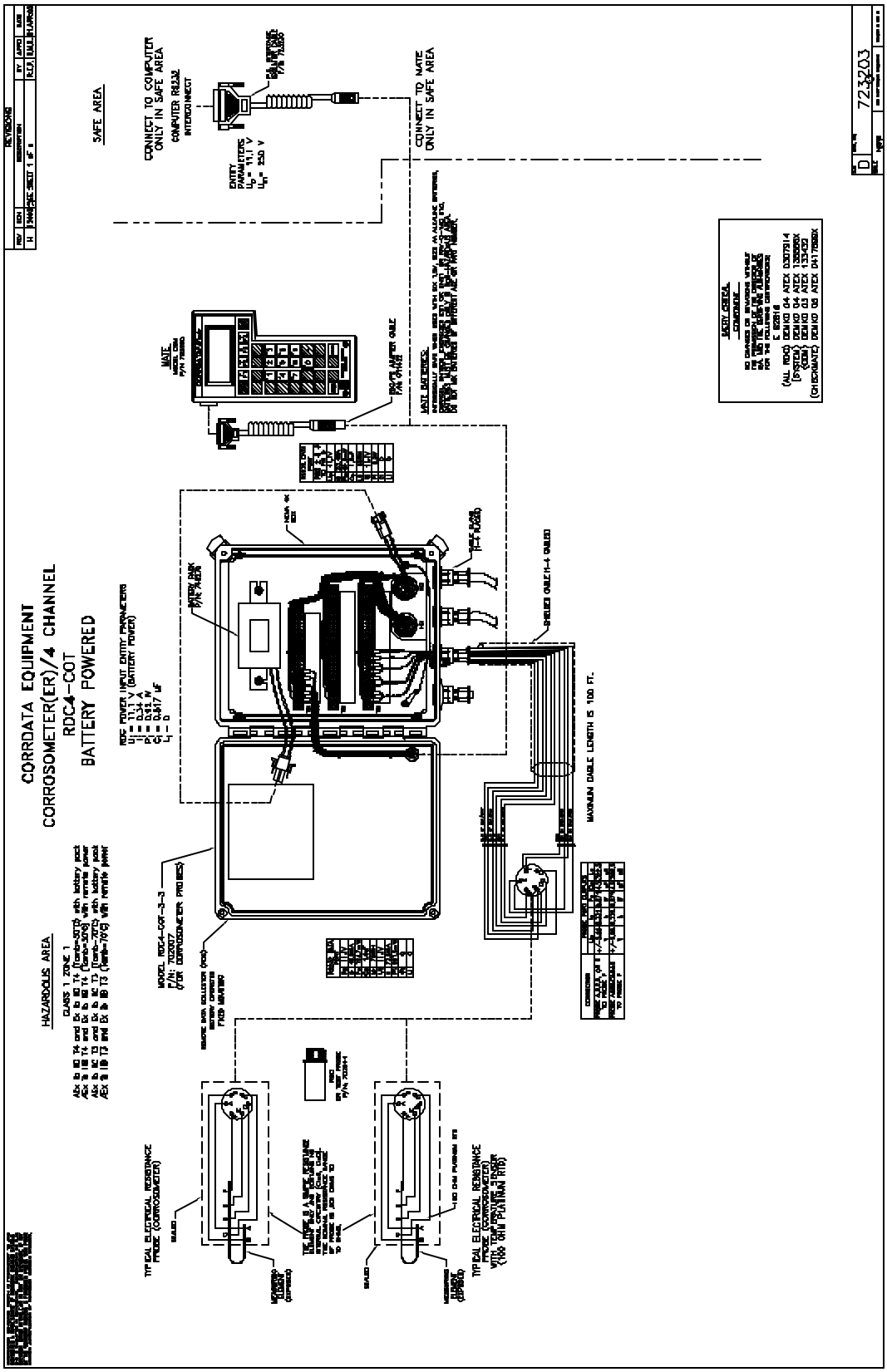


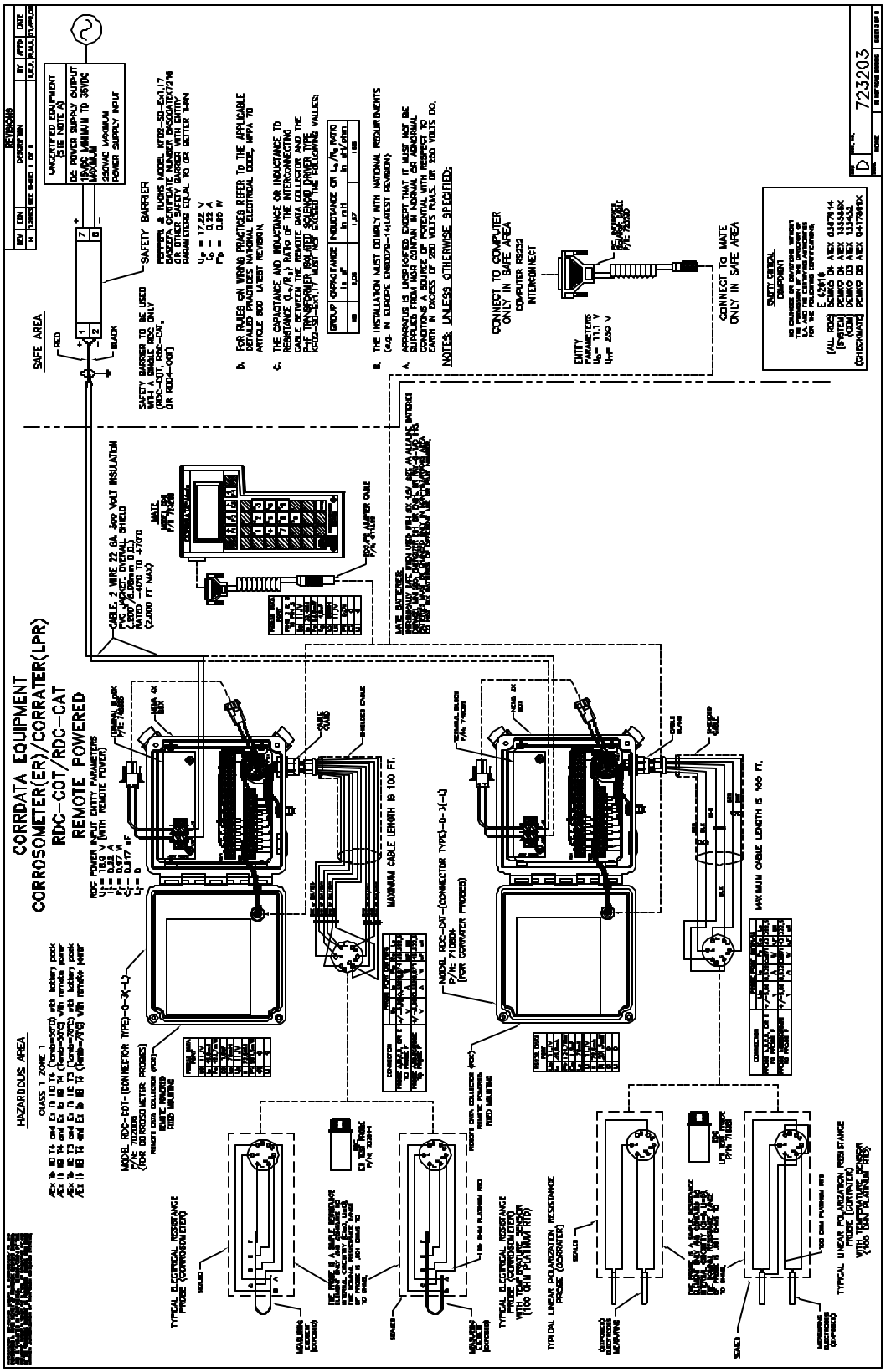
Certificate: 05 ATEX 0417899X
Report: 0417899

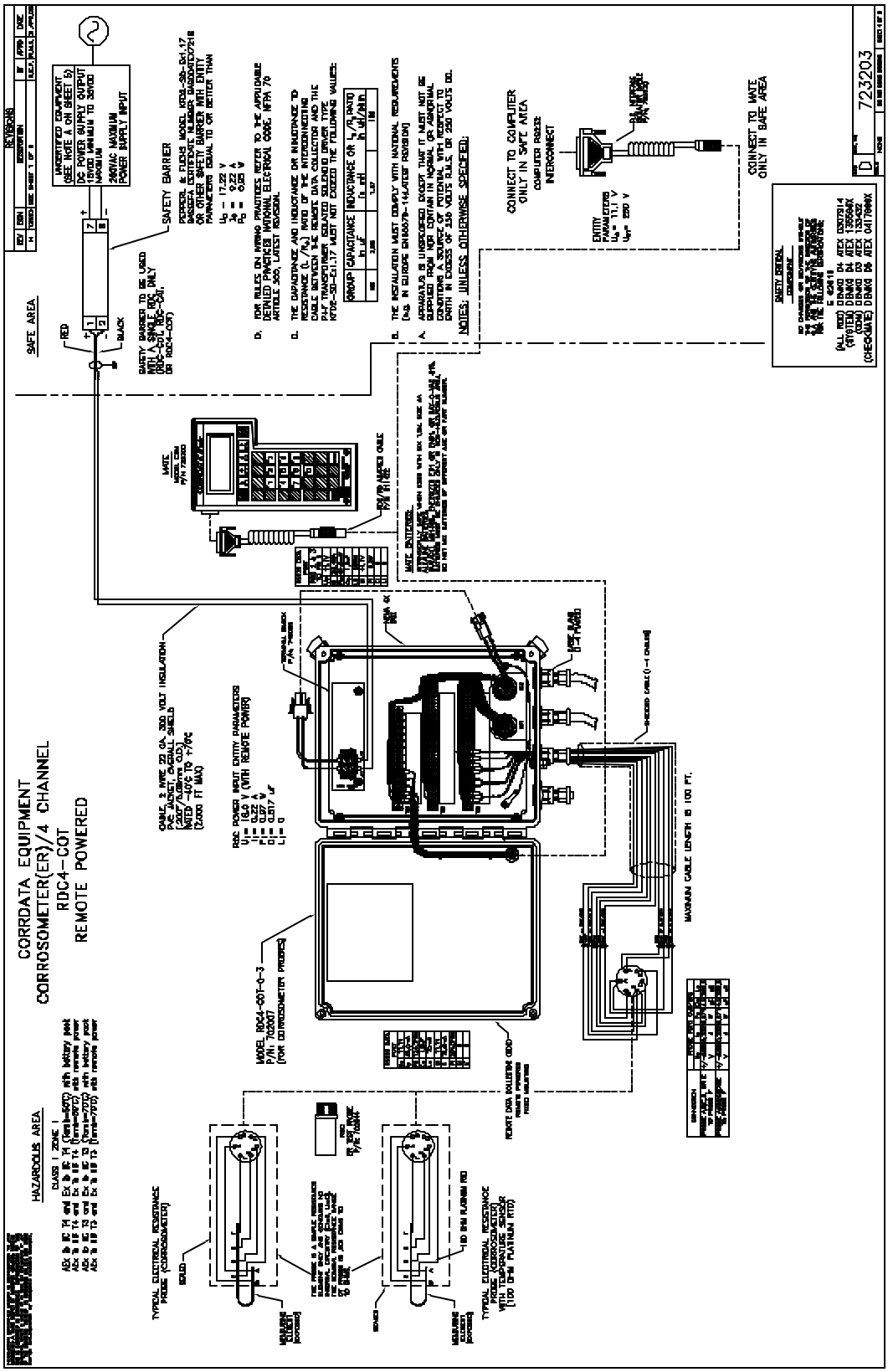
UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730, Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

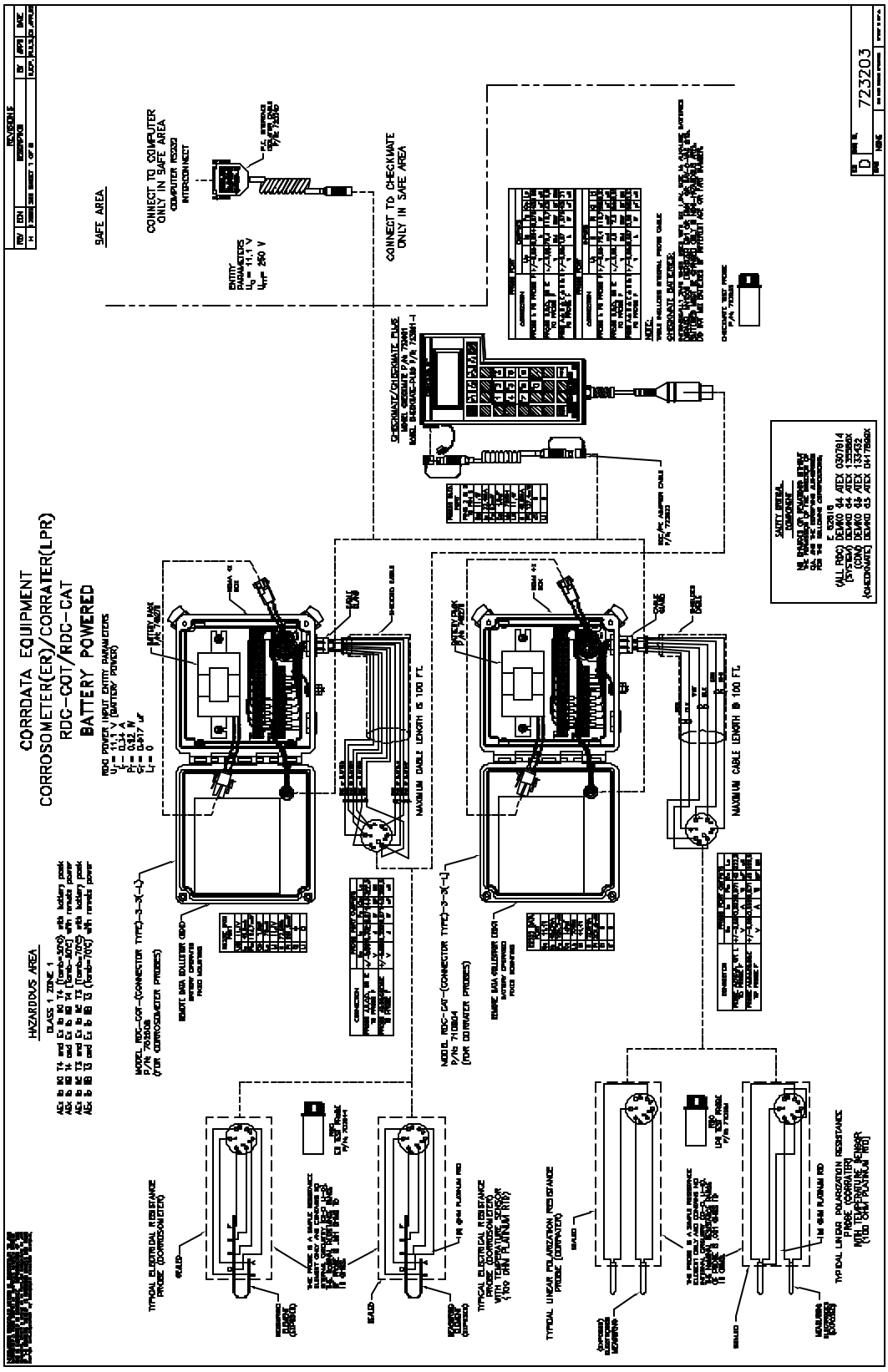
Appendix B
Interconnect Control Drawing

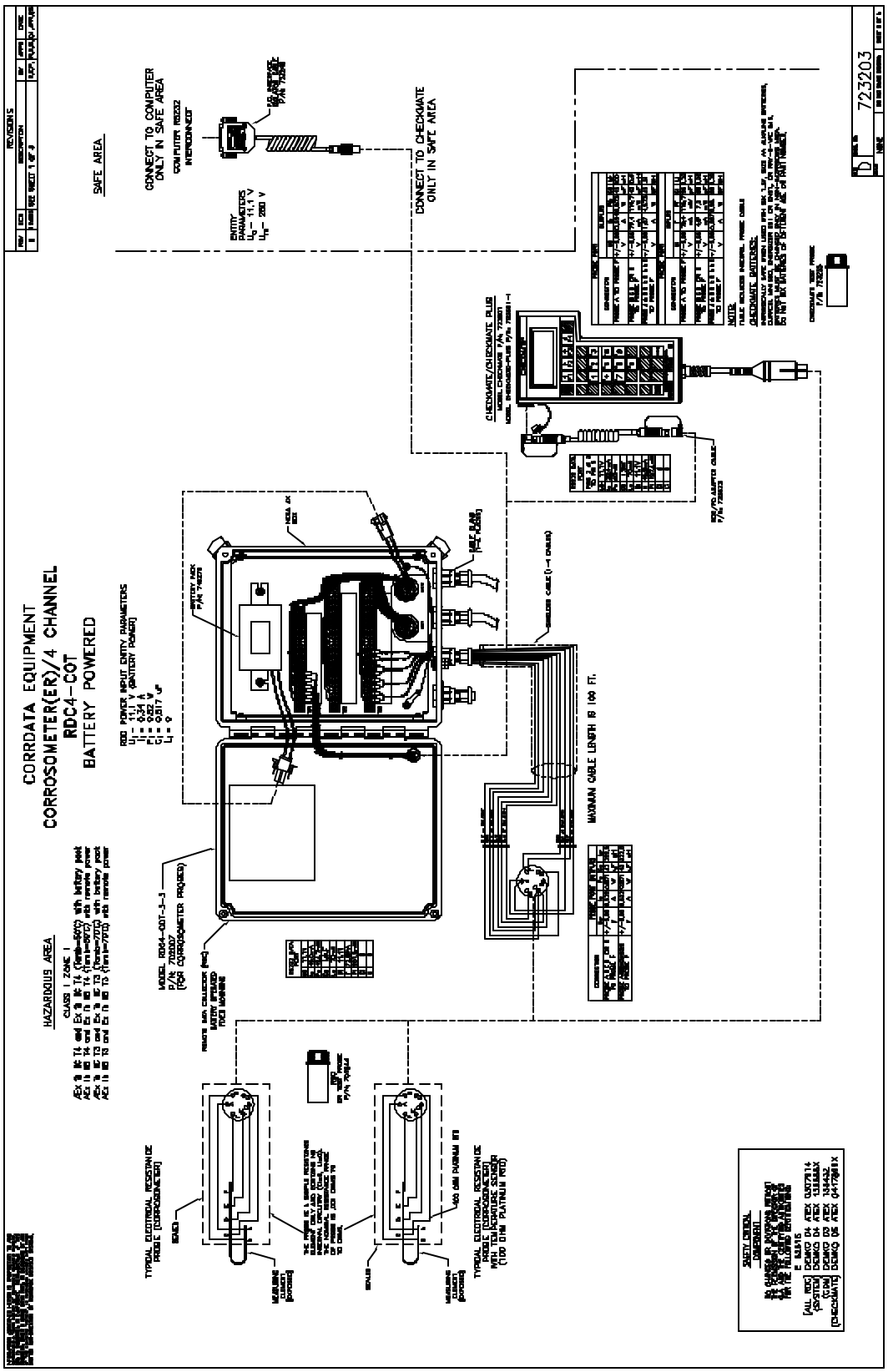

CORRDATA EQUIPMENT
CORROSOMETER(ER)/CORRATER(LPR)
RDC-COT/RDC-CAT
BATTERY POWERED
HAZARDOUS AREA
SAFE AREA
CONNECT TO COMPUTER ONLY IN SAFE AREA
CONNECT TO MATE ONLY IN SAFE AREA
MARINAN CABLE LENGTH IS 100 Ft.
CORRODATA SYSTEM CERTIFICATION INTERCONNECT DIAGRAM
723203

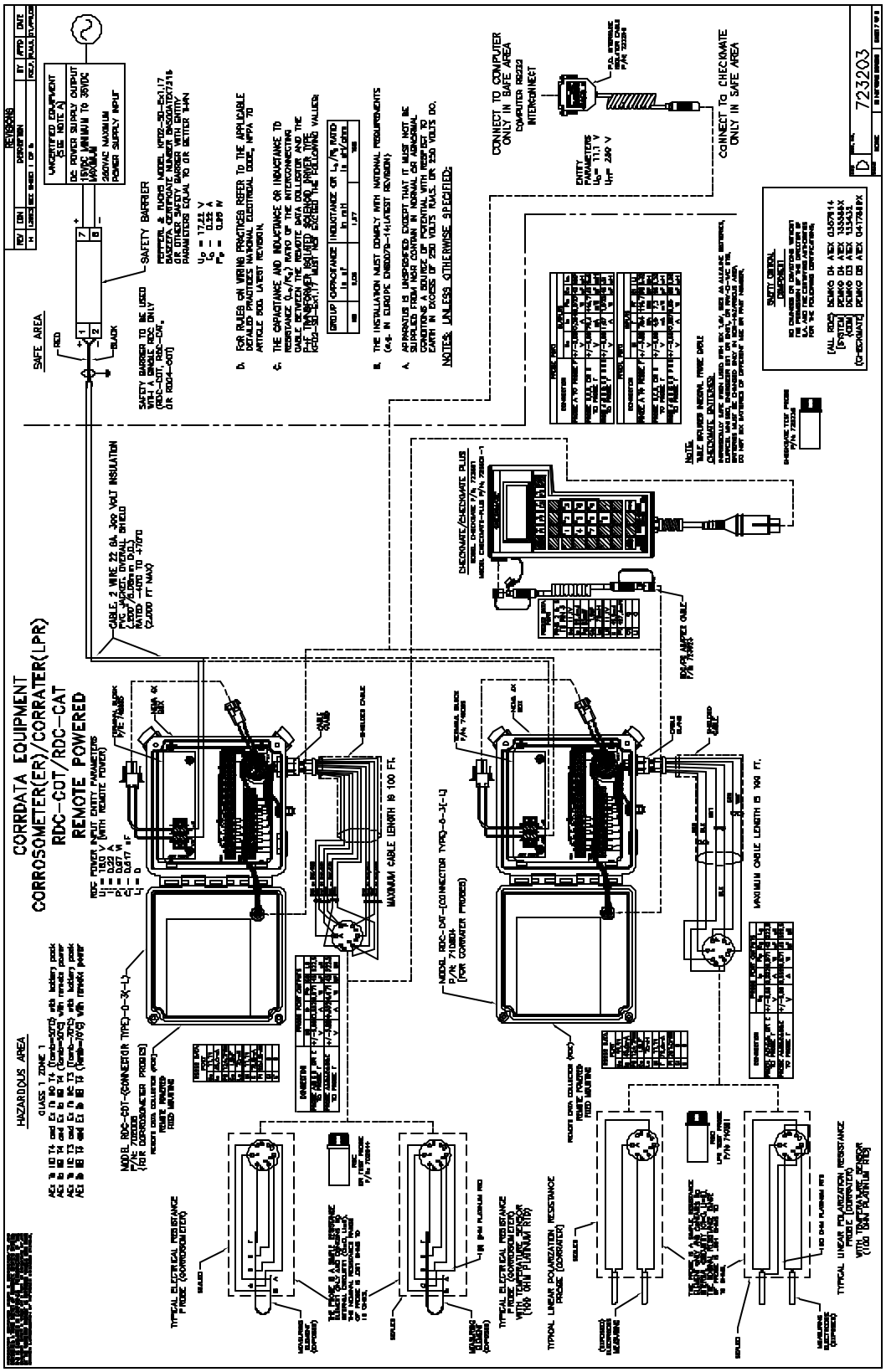

CORRDATA EQUIPMENT
CORROSOMETER(ER)/4 CHANNEL
RDC4-COT
BATTERY POWERED
SAFE AREA
HAZARDOUS AREA
CONNECT TO COMPUTER ONLY IN SAFE AREA
CONNECT TO MATE ONLY IN SAFE AREA
MAXIMUM CABLE LENGTH IS 100 FT.
723203

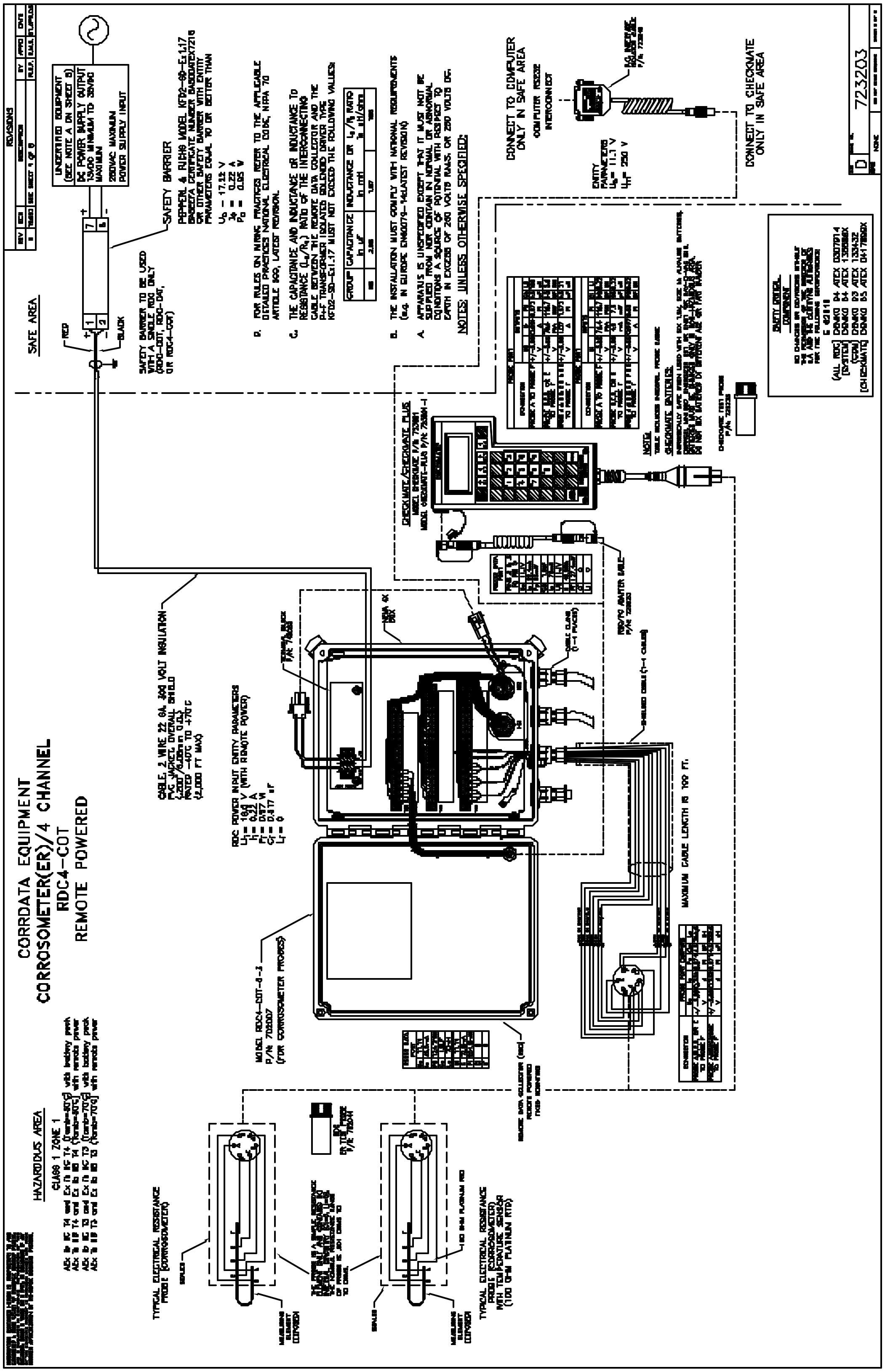

CORRDATA EQUIPMENT
CORROSOMETER(ER)/CORRATER(LPR)
RDC-COT/RDC-CAT
REMOTE POWERED
HAZARDOUS AREA
CLASS 1, ZONE 1
SAFE AREA
SAFETY BARRIER
CONNECT TO COMPUTER ONLY IN SAFE AREA
COMPUTER RS232 INTERCONNECT
CONNECT TO MATE ONLY IN SAFE AREA
MAXIMUM CABLE LENGTH IS 100 FT.
MAXIMUM CABLE LENGTH IS 100 FT.
723203


CORRDATA EQUIPMENT
CORROSOMETER(ER)/4 CHANNEL
RDC4-COT
REMOTE POWERED
HAZARDOUS AREA
SAFE AREA
SAFETY BARRIER
CONNECT TO COMPUTER ONLY IN SAFE AREA
COMPUTER RS232 INTERCONNECT
CONNECT TO MATE ONLY IN SAFE AREA
MAXIMUM CABLE LENGTH IS 100 FT.
723203


CORRDATA EQUIPMENT
CORROSOMETER(ER)/CORRATER(LPR)
RDC-CAT/RDC-CAT
BATTERY POWERED
SAFE AREA
HAZARDOUS AREA
CLASS 1, ZONE 1
CONNECT TO COMPUTER
ONLY IN SAFE AREA
CONNECT TO CHECKMATE
ONLY IN SAFE AREA
MAXIMUM CABLE LENGTH IS 100 FT.
723203


CORRDATA EQUIPMENT
CORROSOMETER(ER)/4 CHANNEL
RDC4-COT
BATTERY POWERED
SAFE AREA
HAZARDOUS AREA
CLASS I ZONE 1
CONNECT TO COMPUTER ONLY IN SAFE AREA
CONNECT TO CHECKMATE ONLY IN SAFE AREA
MAXIMUM CABLE LENGTH IS 100 FT.
723203


CORRDATA EQUIPMENT
CORROSOMETER(ER)/CORRATER(LPR)
RDC-COT/RDC-CAT
REMOTE POWERED
HAZARDOUS AREA
SAFE AREA
SAFETY BARRIER
CONNECT TO COMPUTER ONLY IN SAFE AREA
CONNECT TO CHECKMATE ONLY IN SAFE AREA
MAXIMUM CABLE LENGTH IS 100 FT.
MAXIMUM CABLE LENGTH IS 100 FT.
723203


CORRDATA EQUIPMENT
CORROSOMETER(ER)/4 CHANNEL
RDC4-COT
REMOTE POWERED
SAFE AREA
HAZARDOUS AREA
SAFETY BARRIER
CONNECT TO COMPUTER ONLY IN SAFE AREA
CONNECT TO CHECKMATE ONLY IN SAFE AREA
NOTES: UNLESS OTHERWISE SPECIFIED
MAXIMUM CABLE LENGTH IS 100 FT.
723203