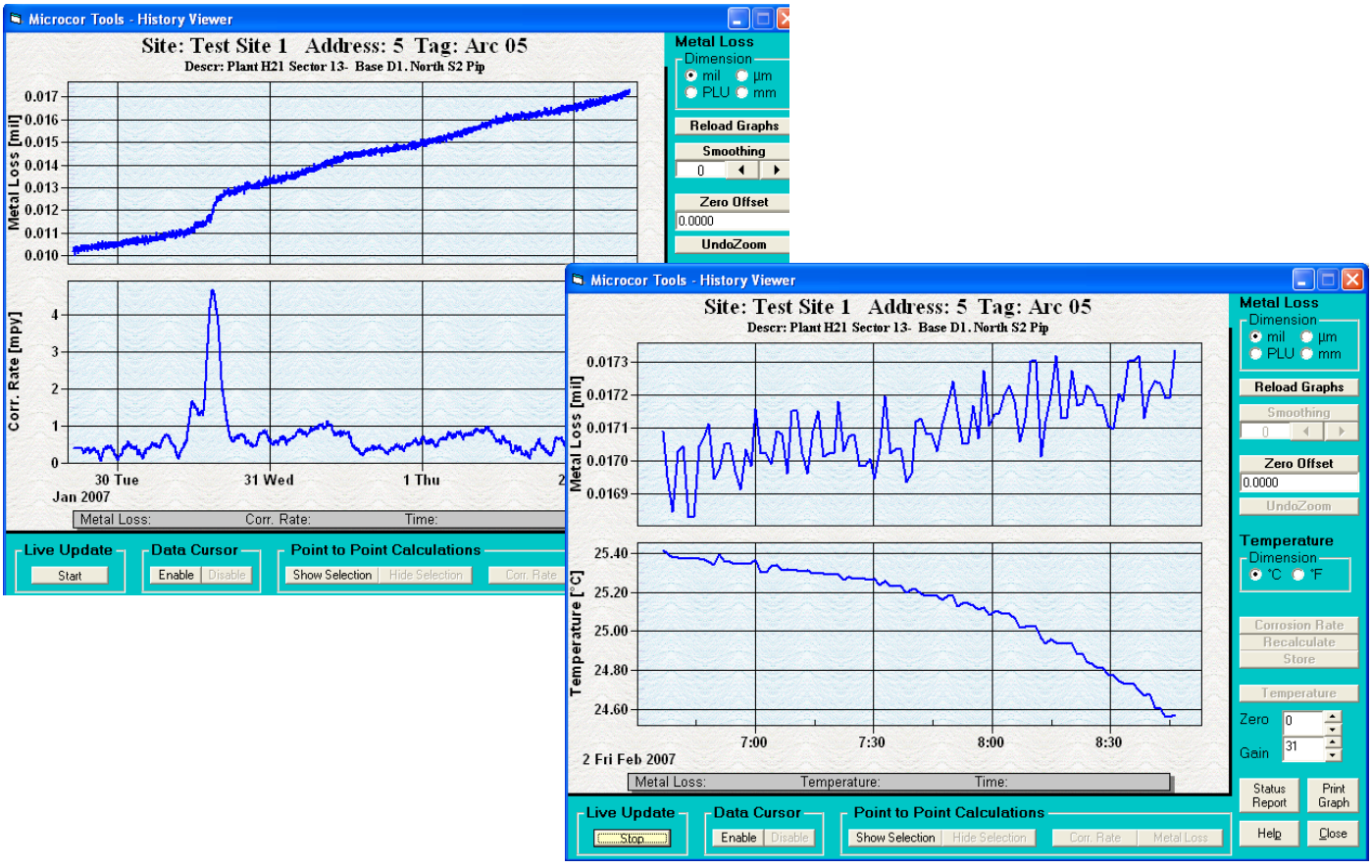
ROHRBACK COSASCO SYSTEMS

MICROCOR® TOOLS

Reference Manual



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Introduction and Installation

CHAPTER 1

The patented Microcor® Corrosion Monitoring Technology is developed to substantially increase the speed of response over conventional monitoring techniques, such as coupons, electrical resistance (ER) probes and linear polarization resistance (LPR). It has the ability to make rapid and accurate corrosion rate measurements in any environment.

Software Packages

The Microcor® Tools Software offers a cost effective and simple method to collect, save, transfer and display corrosion information from online-operated Microcor and E9020 Transmitters, and Microcor Data Loggers. The software is offered in two versions to accommodate different corrosion monitoring needs.

1. Microcor Tools Standard
2. Microcor Tools - Output Interfaces

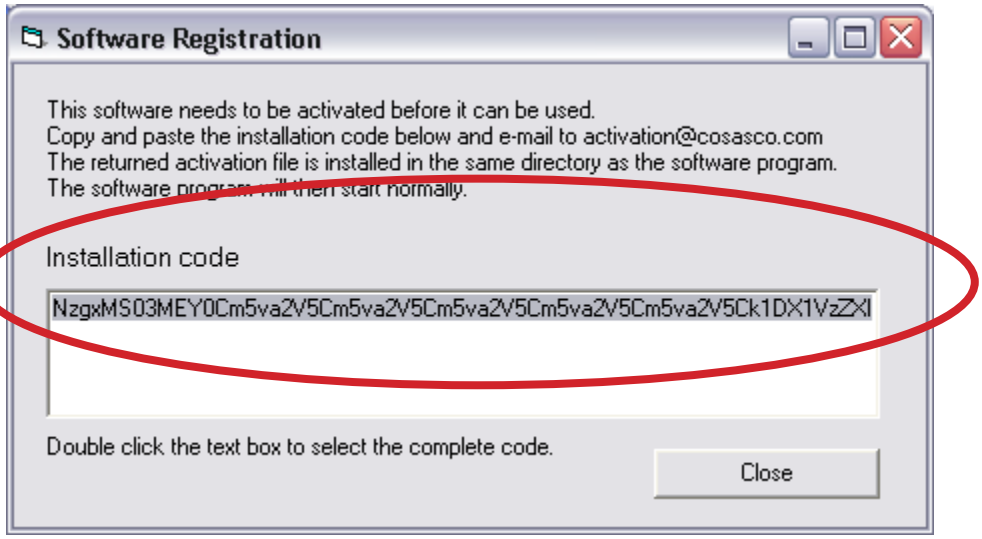
The **Microcor Tools Standard** version is a stand-alone software package for installation on the user computer to provide data retrieval, storage, and graphical presentation of results from Microcor and E9020 Corrosion Transmitters and Data Loggers.

Microcor Tools - Output Interfaces is an enhanced version of the standard software which provides Modbus and OPC output interfaces for data transfer from Microcor and E9020 online transmitters to Distributed Control Systems (DCS), Process Control Systems (PCS), or Supervisory Control and Data Acquisition (SCADA) systems. This software package is included on RCS Supplied hardware such as the Intelligent Interface Unit (IIU).

Software Installation and Activation

The Microcor Tools Software CD comes with the software installation package, manuals, and datasheets for PC installation. To install the software, insert the CD in the CD-ROM drive and the AutoPlay feature will open the welcome page which will provide the necessary links for the installation and other options. If the AutoPlay feature is disabled, browse to the **MicrocorTools.exe** file on the CD and double-click and follow the onscreen instructions to finish the install. If the default install settings are kept (recommended) when installing the Microcor Tools Software, all associated files will be installed in the **C:\Program Files\MicrocorTools** directory.

The Microcor Tools - Output Interfaces version requires an activation key from the manufacturer. Upon installation, run the software by navigating to **Start → All Programs → RCS → Microcor Tools.** A dialog box with the message "**License error: No valid license**" will be displayed followed by the **Software Registration** dialogue box with the **Installation Code** (see image below).



Note: Double-click the Installation Code to ensure the whole code is highlighted prior to copying. Sending incorrect or partial Installation Code will delay the Serial Key generation and return.

The Installation Code must be emailed to the manufacturer at Activation@Cosasco.com to generate the Serial Key file. Once the serial key is generated, a **MicrocorTools.all** file will be emailed back as a reply to the SAME email address. Copy this file and paste to the Microcor Tools installation directory (default location **C:\Program Files\MicrocorTools)** and open Microcor Tools Software – Output Interfaces.

Modifying the Database Location

Microcor Tools Software is not designed as a client/server application; however, it may be operated on a network with some minor limitations. The database may be read by multiple computers if the database is stored on a central server, but the basic configuration file **modb.CFG** and data may only be written by one computer at a time.

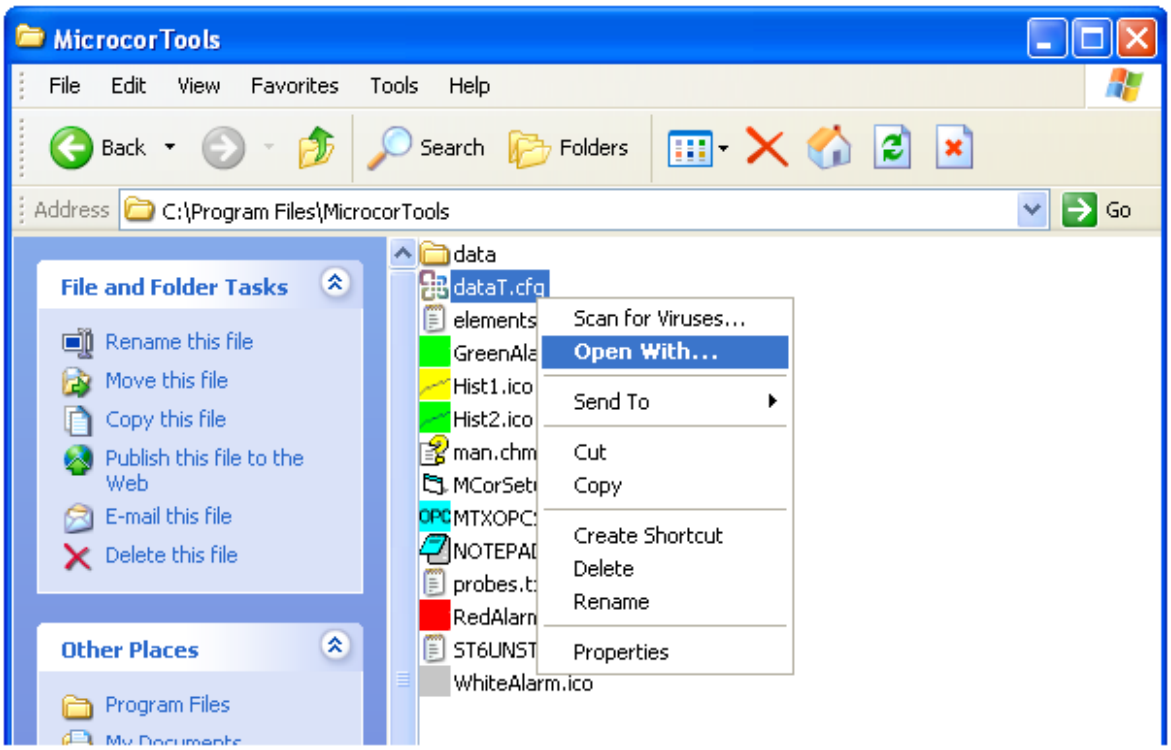
If requirements exist for making the database of the Microcor Tools available to multiple computers or if the database is to be stored on a central server, the location of the database can be changed as follows:

If for example the database is to be stored on a backup server that is mapped to the local computer such as in the directory path **Z:\Userdata\Microcor** proceed as follows:

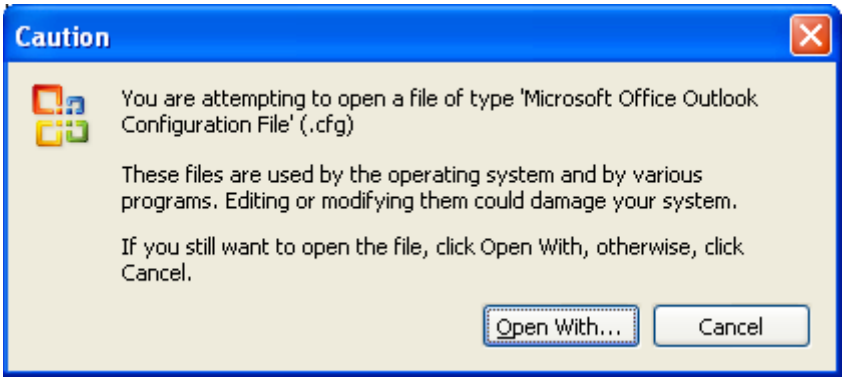
1. Create a **MicrocorToolsDatabase** subfolder in the **Z:\Userdata\Microcor.**

2. Find the **dataT.cfg** file (the default location is C:\Program Files\MicrocorTools) and rename it to **data.cfg**

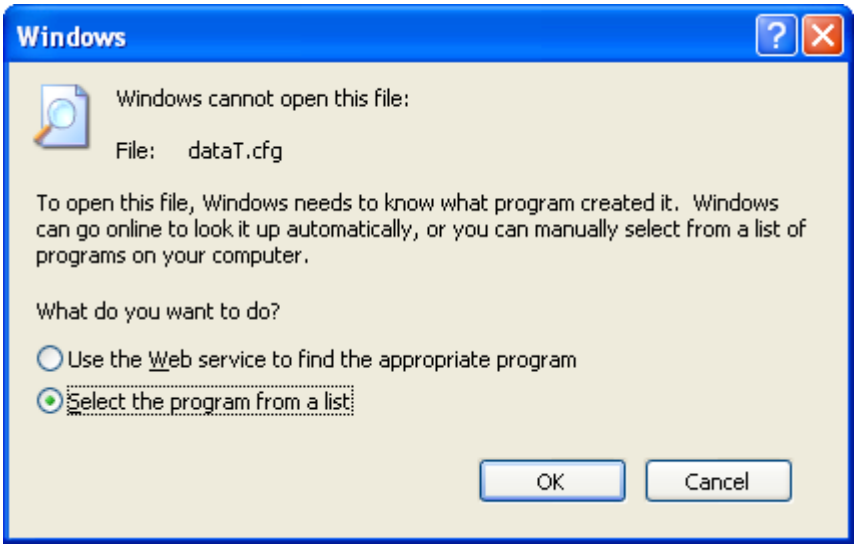
3. Right-click the **data.cfg** file and select **Open with** to edit the content with **Notepad** or **WordPad** (shown below):



Following Microsoft dialog boxes may appear:

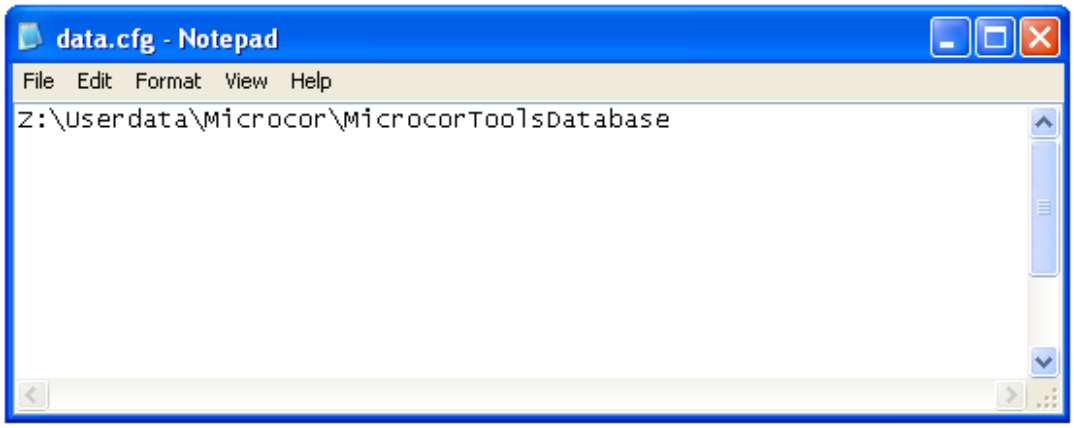


Choose **Open With**… and the following dialog box will open:



Choose **Select the program from a list** and click **OK**. Choose Notepad or WordPad from the next screen to proceed to edit the **data.cfg** file.

4. When the Notepad editor opens, change the path **C:\aa** with the following path **Z:\Userdata\Microcor\MicrocorToolsDatabase** (shown below) and **Save** and **Exit.**



Note: If the Microcor Tools Software program has already been used and data has been collected, then this collected data can be transferred to the new shared database location. Copy the **data** file directory (not the newly renamed data.cfg file) from C:\ Program Files\MicrocorTools to the new directory.

It is also possible to share the database when a single computer is shared amongst multiple users. Simply choose a shared location such as **Shared Documents** of the **All Users** profile for the database and follow the above procedure.

Optional DataRemoting Software Add-On for Remote Data Collection (WAN/LAN)

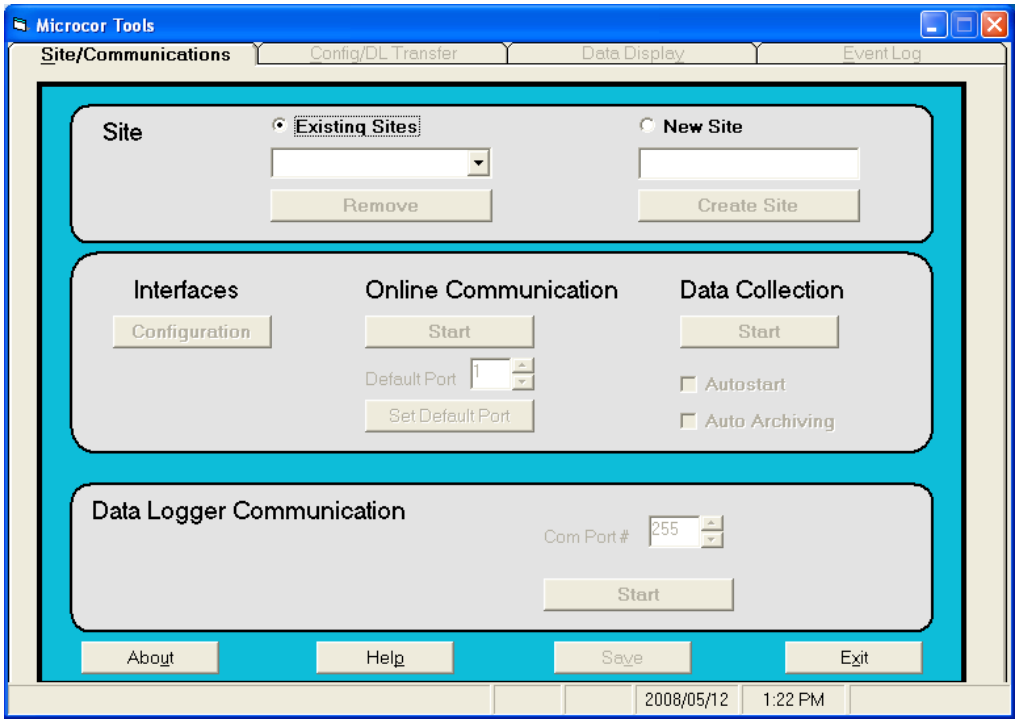
Microcor Tools Software offers Microcor® Tools DataRemoting System as an optional add-in software bundle that is designed to expand on the existing Microcor Tools – Output Interfaces capabilities and enable remote data collection over LAN/WAN configurations. Microcor Tools DataRemoting is ideal and cost effective for remote data backup, adding alternate or multiple data monitoring points, or centralization of multiple sites. The Microcor Remote Server will preserve original features, settings, and data collection capabilities for onsite management while allowing data transfer to a Microcor Remote Client (Central Server) over LAN/WAN via a Modbus IP.

Configuration and Setup

CHAPTER 2

To launch the **Microcor Tools** program, click **Start** → **All Programs** → **RCS** → **Microcor Tools.**

Note: This reference manual will use Microcor Tools – Output Interfaces screen captures unless otherwise stated, some of the command buttons and features may not be available on the Microcor Tools Standard version of the software.



Onscreen help is accessible by clicking on the **Help** button and the **Save** button will store and retain all configuration changes.

Create, Select and Remove Sites

A Site is a collection of up to 100 corrosion-monitoring locations. The corrosion information for these locations can be provided from the following data sources:

- Online data collection via the RS485 network from Microcor Transmitters
- Online data collection via RS485 network from Corrater E9020 Transmitters
- Offline data input from Microcor Data Loggers or data-transfer units
- Offline data imported from archives or files, or the previous versions of Microcor software.

Create a Site

Select the **New Site** option button and type a name in the text box (**Existing Sites** option button is selected by default). Click the **Create Site** command button.

Select an Existing Site

Select the Existing Sites option button, open the list box and click on the desired site name.

Remove a Site

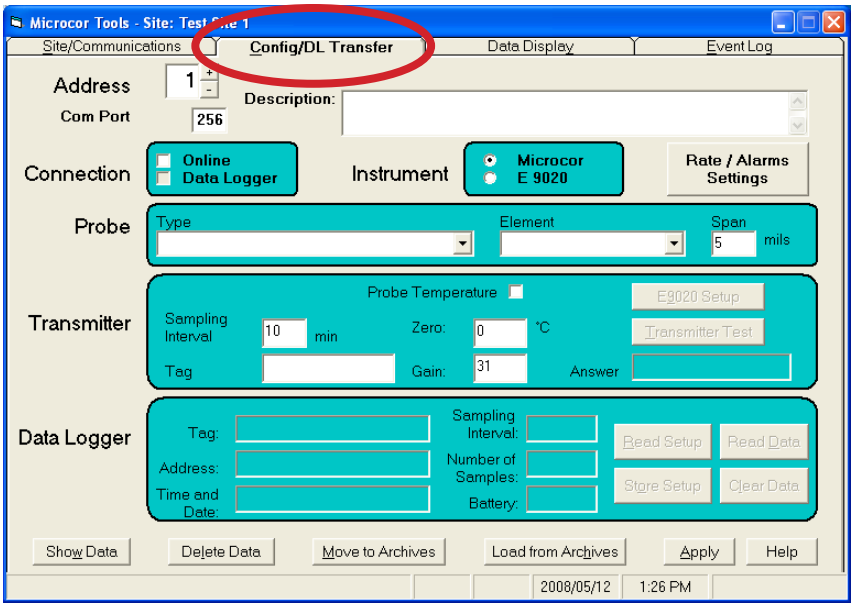
Select the **Existing Sites** option button, open the list box and click on the desired site name. Click the **Remove** command button to remove the site.

Use the **Save** command button at the bottom of the screen to store all settings for the selected site.

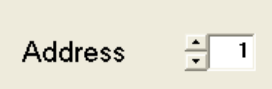
Configuring Site and Instrument Locations

1. Create a new **site** or use the Site list box on the **Site/Communications** tab to select a site.

2. Click the **Config/DL Transfer** tab to select the configuration screen.



3. Locate the **Address** area. Use the up/down control buttons to select the unit address or type the number in the text box (0 – 99).



If the data source for this location is an online transmitter, the **Address** must be equal to the transmitter address. Internally, each transmitter has a DIP switch with a selectable address (0 to 99 for Model MT 9485A and E9020 and 0 to 31 for Model MT 9485. The preset address is marked on the outside of the transmitter as the IN# or Instrument Number. See the transmitter manual for more details. If the data source is a data logger or data-transfer unit, RCS recommends that the IN # of the transmitter connecting to the data logger is used.

4. Type in the **Com Port #** being used on the computer to communicate with the instrument. This may be an actual hardware port on the computer or a virtual Com Port for operation with a TCP/IP converter via the network. This setting is only for **Online** connections and is disabled for **Data Logger** connections.

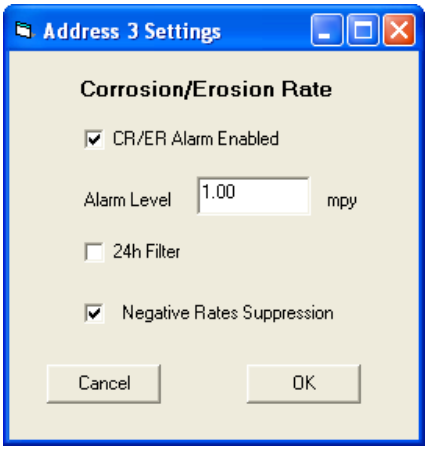
5. Complete the **Description** field with the provided free-format text description area to meaningfully identify the location (optional). The first 50 characters of the **Description** field will be displayed on the **History Viewer** graph display along with the Site, Address, and Tag information for easy identification.

6. Proceed to the **Connection, Instrument and Rate/Alarms Settings** area.

Click the checkbox to select either **Online** or **Data Logger** data transfer method. Data Logger checkbox is enabled only when the **Start** button on the **Data Logger Communication** section of the **Site/Communications** tab is pressed and when the instrument is set as Microcor. **Data Logger Communication** must be started to be able to check or uncheck the above Data Logger box. Supported transmitters are Microcor (MT 9485A and Microcor MT 9485) and Corrater E9020. E9020 transmitters are used with **Online** connections only.

Note: It is important to ensure that the "**Hibernate**," "**System Standby**" and "**Turn off hard disks**" on the **Windows Power Options** is turned to "**Never**" so data collection will not be interrupted on **Online** systems.

The **Rate/Alarms Settings** command button opens the following screen:



Users can choose to enable the alarm by selecting the **CR/ER Alarm Enabled** button. However, it is important to note that this feature is only relevant when used with **Online** systems. **Alarm Level** can be changed by typing in the desired value. The measurement units are specified to the right of the alarm level value and this can be changed in the Graphical Display **(History Viewer)** screen (click on the **Show Data** command button; see the **Retrieving and Plotting Data (History Viewer)** section for more details). Once the alarm is activated, the **Parameter 3** column on the **Data Display** screen will turn red if the corrosion rate exceeds the set alarm rate. A blinking red/gray indicator with text “ALARM” will replace the green “ALARM OK” indicator on the status bar located on the bottom of the Microcor Tools application screen (see the section on the **Online Data Collection** below for more details).

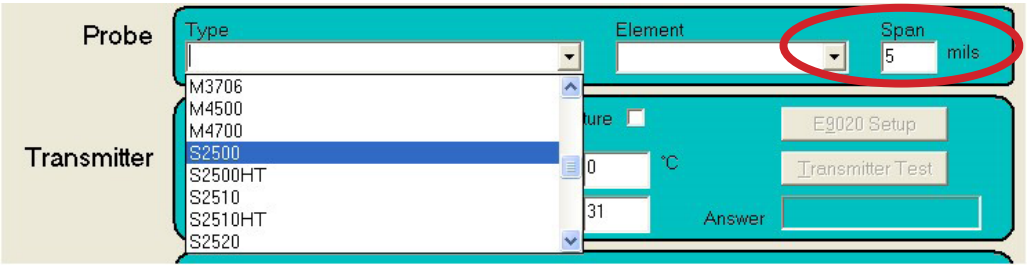
The standard method for corrosion rate calculations is Linear Regression, which can be changed by checking the **24h Filter**. Checking the **24h Filter** adds a 24 hour filter specifically to reduce the effects of any diurnal (24) thermal noise. Linear Regression values are adjustable and can be set on the Graphical Display (**History Viewer**) screen.

The **Negative Rates Suppression** enables the user to visually suppress the negative corrosion/erosion values on the graph that are due to the noise in the raw signal. When this option is enabled, negative values will show as zero (0) thus depicting the minimal corrosion/erosion as zero.

7. Proceed to and complete the **Probe** section once the above selections are made.

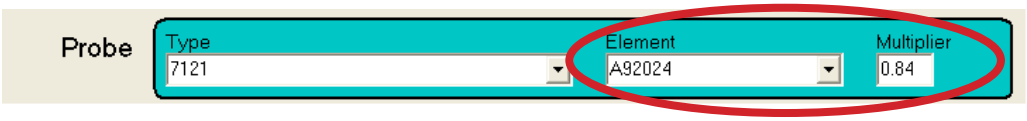
Type is an optional informational field which will be useful later when reviewing the corrosion/erosion data. **Element** passes information when configuring E9020 so it is highly recommended that this field not be empty. These pull-down menus will provide most of the typical RCS equipment configurations. It is possible however,

to type content in on these fields if the user requires customized, non-default selections. When working with Microcor Instruments, probes designated with type “M” are used for corrosion monitoring and type “S” are used for erosion monitoring.



Span [mils] is the useable life of the probe element when working with Microcor Instruments. This is always defined in units of mils and is one half of the probe element thickness (i.e. F10 or T10 probes have a 5 mil span). This required field is used to define the physical scale of the metal loss graph.

For E9020 Instruments, **Alloy Multiplier** is used instead of the **Span**.

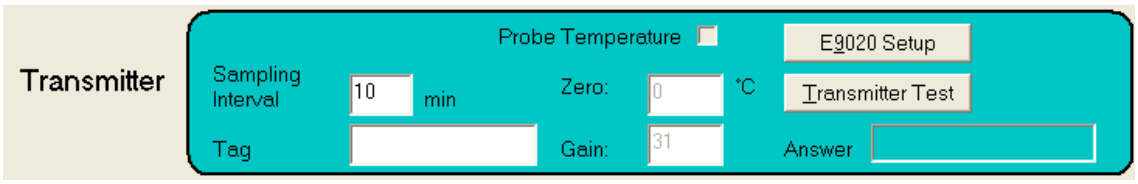


The appropriate **Span** or **Multiplier** is automatically set when the **Probe Element** is chosen from the drop down menu; however, users may change the **Span** or **Multiplier** by typing in a different value if necessary. If the required **Probe Element** is not in the list, choose **BLIND** as the **Element**, which will set the **Span** or **Multiplier** to 1; this can be changed as needed (set the **Alloy Multiplier** to the appropriate multiplier value for the metal or alloy of the electrodes as shown in the chart of Appendix 1).

Note: Make sure to choose the proper **Element** and **Multiplier** values as these will be passed automatically to the **E9020 Setup** screen.

Note: The BLIND setting may also be used with the Microcor Tools – Output Interfaces version when used on blind Intelligent Interface Units. This allows scaling changes for different probe spans to be accommodated internally on the IIU such as in DCS or SCADA systems.

8. Proceed and complete the **Transmitter** section (this information is necessary for both **Online** and **Data Logger** connection types).



Sampling Interval is used to set the data-record frequency.

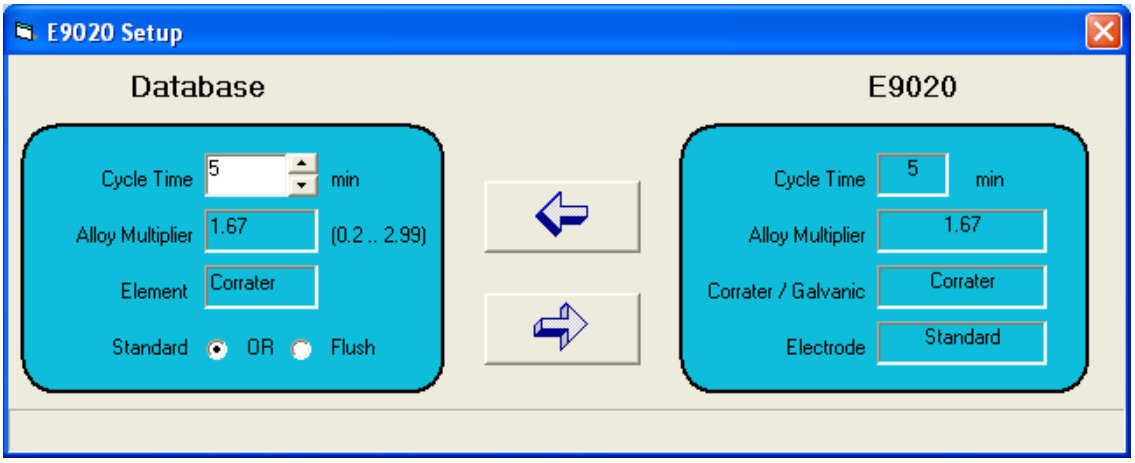
For **Online** metal loss (Microcor) transmitters (MT 9485A and MT 9485) the minimum recommended setting is 2 minutes. A typical **Sampling Interval** would be 5 minutes, which will yield 12 readings per hour. This option is unavailable for corrosion rate transmitters (E9020); the cycle time is configured by the **E9020 Setup** command button.

For Microcor Transmitters driven by **Data Loggers**, where battery consumption is a consideration, a **Sampling Interval** of 3 hours (180 minutes) is usually selected. This gives a battery life of up to one year, and still provides eight readings per day. The minimum recommended **Sampling Interval** for **Data Loggers** is 30 minutes with the maximum setting at 1440 minutes (one day).

Tag is an optional free-format text field used to identify the probe, which provides labeling on the graphical display (**History Viewer**) screen.

Check the **Probe Temperature** check-box if the transmitter has the probe temperature measurement capability and if the function is enabled by the internal transmitter DIP switch (see transmitter manual for details). Temperature measurement is available only on certain probe models. Select (type in) values for **Zero** and **Gain** to calibrate the measurement. If calibration parameters are unknown for probes and transmitters, select 0 for **Zero** and 31 for **Gain**. If the probe-temperature measurement function in the transmitter is not enabled or the transmitter does not support **probe-temperature** measurements uncheck the Probe Temperature check-box.

Use the **E9020 Setup** command button to open and configure the corrosion rate transmitters (shown below):



The two sections represent the settings stored in the computer (**Database**) and in the instrument (**E9020**). The arrow command buttons provide settings transfer capability from one to the other:

- from the Database to E9020
- from E9020 to the Database

To store the new configuration from the database to the E9020, choose the bottom arrow pointing to the right. To read the current configuration of the E9020 and store to the Database, choose the top button with the arrow pointing left.

Cycle Time is used to set the desired measurement cycle time. For water with conductivities greater than 100 µS, any cycle time of 5 minutes or more should be satisfactory. For lower conductivity water, or when filming type inhibitors are in use, it is recommended that the 20 minute cycle time be selected first. After consistent readings are obtained, a shorter time cycle can be selected as long as the readings do not increase substantially (>5%) over the readings taken with a 20 minute cycle.

The **Alloy Multiplier** and the **Element** values will be automatically updated from the **Config/DL Tranfer** screen values.

The default selection on the E9020 setup for the **Electrode** type is **Standard**. Keep the selection Standard if using a probe with protruding 5.0 square centimeter electrodes or select **Flush** if using a probe with flush 0.5 square centimeter electrodes.

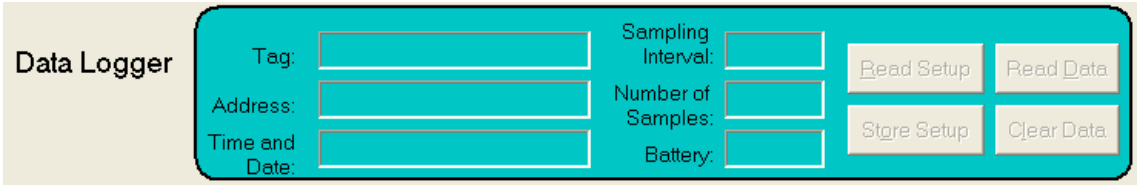
The **Transmitter Test** command button is enabled for **Online** connections. It sends requests to the transmitter and displays returned data in the **Answer** text field if the communication is successful.

9. If using data loggers, first make a complete list of the IDs (Addresses), **Tags** and descriptions to be used. This will help organize and manage sites.

   Note: The ID (address) of the data logger is independent of the address of the transmitter to which it is connected. The data logger communicates with a transmitter irrespective of the transmitter address. The ID (address) of the data logger is allocated by this software or from the Mate or Mate II during configuration of the data logger in order to segregate the different sets of data.

10. The Microcor Tools software allows the direct connection from a PC to a data logger, (this may be used ONLY in an electrically safe area). Alternatively, the data loggers can be programmed and data retrieved with the intrinsically safe Mate or Mate II instrument programmed in Micromate mode or with a Checkmate DL programmed for Microcor Systems, then the data can be transferred to the PC in the safe area.

11. When using a direct PC-to-data logger connection, the data logger screen below is used for configuration and data retrieval after the **Com Port #** is enabled in the **Data Logger Communication** section in the **Site/Communications** tab.



Read Setup command button – reads and displays the data logger setup and status information. Use this command to check the settings of the data logger before the data transfer.

Store Setup command button – reads the **Tag** and **Sampling Interval** settings from the **Transmitter** section and stores this information to the **Data Logger**. It will also set the data logger ID equal to the selected **Address**, and the data logger real-time clock to match the computer date and time.

> **Note:** Make sure the computer is set to the correct regional settings and time zone in the Control Panel (Classic View).

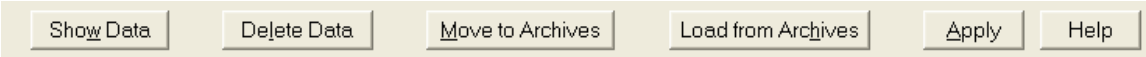
Read Data command button – reads the collected corrosion information from the data logger and stores it in the computer.

Clear Data command button – use this command to delete the data logger memory.

When using the Micromate to configure the Microcor Data Logger, see the section on **Configuration of Data Loggers with Micromate**. Refer to the Checkmate DL User Manual for instructions on configuring Microcor Data Loggers with Checkmate DL.

Commands

This section is used to handle history information; display, delete, move, and load data from archives.



Show Data command button – opens the **Microcor Tools – History Viewer** (see the **Retrieving and Plotting Data (History Viewer)** section for more details).

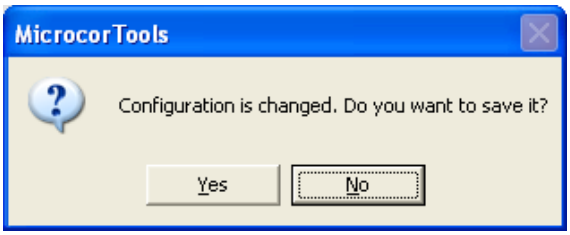
Delete Data command button – deletes the corrosion data stored for this location.

Move to Archives command button – moves the data file to an “archives” folder. Archive files have automatically assigned names. For example, the archive file of location Address 15, created on 13 May, 2003 is: ch15_13May03.dat. See separate section on **Archiving**.

Load from Archives command button – use this command to load data from archives or import data from previous versions of Microcor. Then use the **Show Data** command to display the information graphically. This command can also be used to import data from other Microcor files (on the hard drive or floppy disk).

Apply command button – only applies the changes to the current session. When the program is restarted, the applied settings will be lost.

Note: To permanently save the configuration on the hard disk, select the **Site/Communications** tab and choose **Yes** when the following dialogue box appears or the click the **Save** command button.



Note: Data files (*.DAT) that are imported do not include probe reading interval or probe span details. This must be separately added on the **Config/DL Transfer** screen. This information is stored in the file (*.SET) of the original data folder.

12. At this point the settings for the current instrument are complete. For the next instrument select new **Address** and repeat steps 1 to 11.

Note: The entries may be made for all of the instruments before saving the settings. However, saving the settings after the entries for each location avoids the chance of losing the data accidentally. To save the configuration on the hard disk, select the **Site/Communications** tab and click the **Save** command.

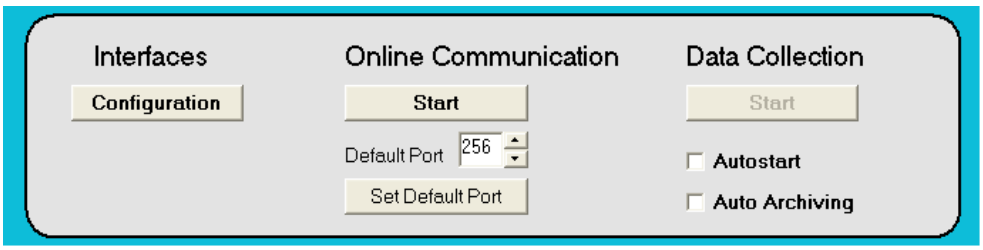
Online Data Collection

CHAPTER 3

Starting and Stopping Data Collection

For online data collection, use the **Online Communication** section in the **Site/ Communications** tab.

> **Note:** It is important to ensure that the "**Hibernate**," "**System Standby**" and "**Turn off hard disks**" on the Windows Power Options is turned to "**Never**" so data collection will not be interrupted on **Online** systems. Windows Power Options can be found on the Control Panel (Classic View) of the Windows Operating System.



1. If all transmitters communicating with the software are multi-drop connected to a single com port, it is possible to apply that com port value to all addresses with the **Default Port** and the **Set Default Port** command button. First, select the **Default Port** number (1 – 256) with the up/down keys. Then click the **Set Default Port** command button to apply that to all the transmitters. This control is ideal if all or majority of the transmitters are setup on one com port. It is possible to then navigate to the other addresses (that are not on the same com port) on the **Config/DL Transfer** tab and overwrite the com port.

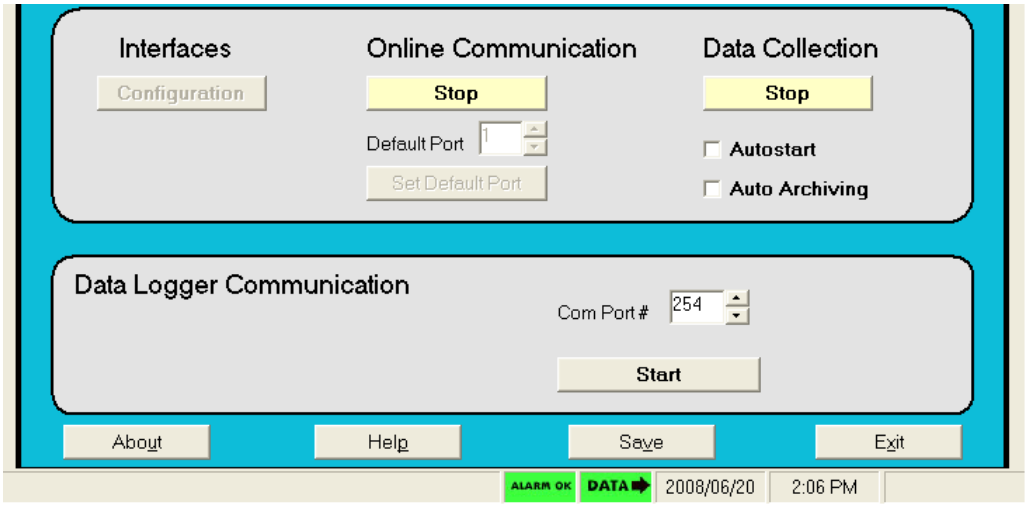
2. Click the **Start** command button to turn the communication on. At this point the program commences polling the **Online** connected transmitters. Real-time information from the transmitters is displayed in the **Data Display** tab. Use this view for troubleshooting and checking the operation of the transmitters and the RS485 bus.

> **Note:** Ensure that the Microsoft Windows "Turn off hard disks", "System standby" and "System hibernates" are disabled when setting up **Online Communication**.

3. Click the **Start** command button in the **Data Collection** section to start collecting data from the transmitters to their respective data files. One solid green indicator with text “ALARM OK” and one flashing green/yellow indicator with text “DATA” will appear on the status bar to indicate that the program is collecting data (see images below).

If the solid green indicator starts to blink red with text “ALARM” and gray, then it is indicating that the corrosion rate level of at least one unit has surpassed the set alarm level on the **Rate/Alarm Settings** area (only when alarm conditions are enabled on the **Rate/Alarms Settings** screen).

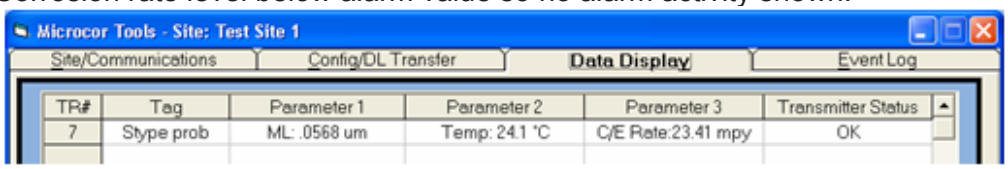
The **Parameter 2** (for E9020) and **Parameter 3** (for Microcor) of the unit(s) in alarm status (at the **Data Display** screen) will turn red and the **Event Log** will display detailed information of the unit(s). Click on the blinking “ALARM” indicator on the status bar to acknowledge the alarm. This will stop the blinking and reset the status bar indicator to solid red and the **Parameter** of the unit(s) in alarm to yellow. This means there is an ongoing alarm, and it is acknowledged. When the alarm is turned off or when the corrosion rate resets to below the alarm rate, the indicator light will turn to solid green with the text “ALARM OK”. If a unit enters an alarm status and resets prior to user acknowledgement, red indicator will change color to blinking green and gray and will reflect this on the **Event Log**; hence it is highly recommended that the **Event Log** is inspected regularly.



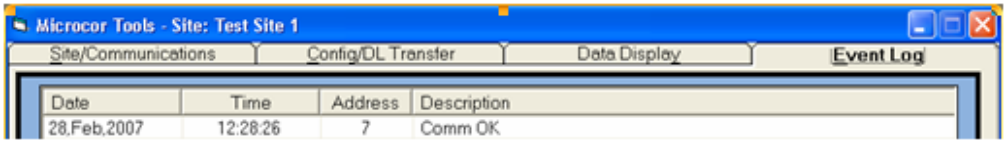
Normal Operation

Status Bar:
First Icon – Group Alarm - Solid green, indicates active data collection and corrosion rate level below alarm value.
Second Icon - Transmitter Status - Flashing green/yellow, indicates reading of probe transmitters is active (normal).

Data Display Screen:
Corrosion rate level below alarm value so no alarm activity shown.



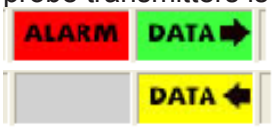
Event Log Screen:
Communication is okay.



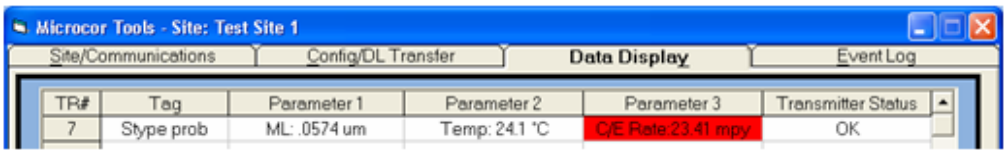
Active Alarm

Status Bar:
First Icon – Group Alarm - Flashing red/gray, indicates corrosion rate level of at least one unit has surpassed the set alarm value.

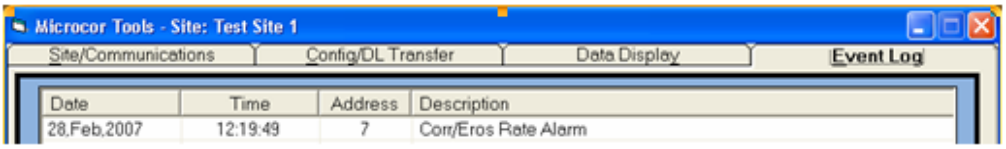
Second Icon - Transmitter Status - Flashing green/yellow, indicates reading of probe transmitters is active (normal).



Data Display Screen:
Parameter 3 will turn red to indicate active alarm status.



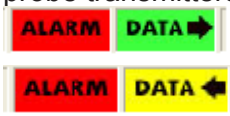
Event Log:
Alarm status is recorded on the **Description** area.



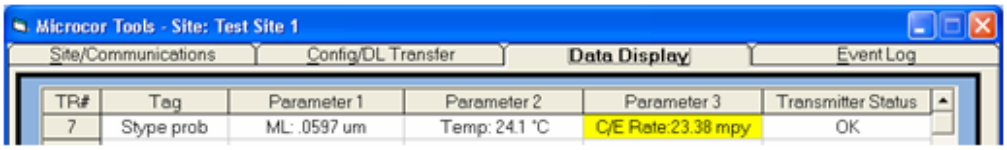
Alarm Acknowledged

Status Bar:
First Icon – Group Alarm - Solid red, indicates user acknowledged the alarm but the alarm condition still persists. This will turn to solid green when the alarm is turned off or when the conditions return back to normalcy.

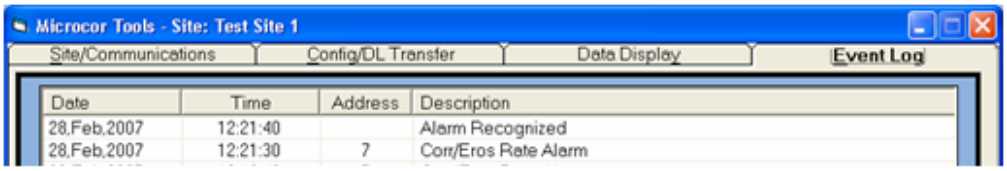
Second Icon - Transmitter Status - Flashing green/yellow, indicates reading of probe transmitters is active (normal).



Data Display Screen:
Parameter 3 will turn yellow to indicate user acknowledgment of tripped alarm.

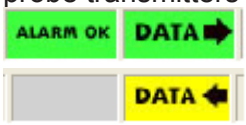


Event Log:
Description changed to show “Alarm Recognized” status.

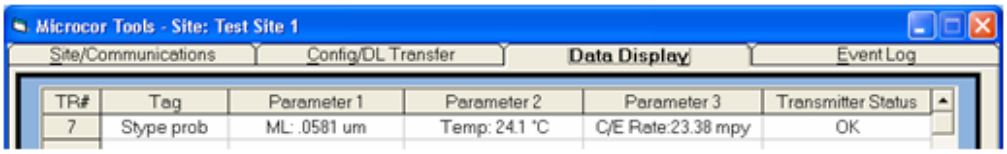


Alarm Reset Prior to User Acknowledgement

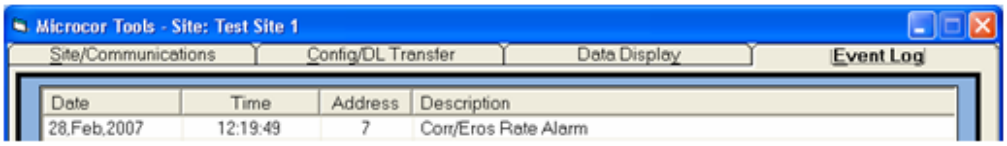
Status Bar:
First Icon – Group Alarm - Flashing green/gray, indicates alarm was tripped but the condition returned to normalcy.
Second Icon - Transmitter Status - Flashing green/yellow, indicates reading of probe transmitters is active (normal).



Data Display Screen:
Parameter 3 will not show any change of status.



Event Log:
Description will record the date, time and ID of the unit(s) which was in alarm status.



4. When using Microcor Tools for online monitoring, it should be setup in the Microsoft Windows Startup folder and the **Autostart** checkbox should be checked. This ensures that the program will restart automatically and commence the online communication and data collection when the computer is restarted after maintenance or power failure.

    Note: Users may require Power User or Administrative privileges to perform the below operations and should always consult the organization's IT Department for assistance and permissions.

To add Microcor Tools to the Windows Startup folder, copy the Microcor Tools icon form the desktop and paste it in the **C:\Documents and Settings\All Users\ Start Menu\Programs\Startup** directory.

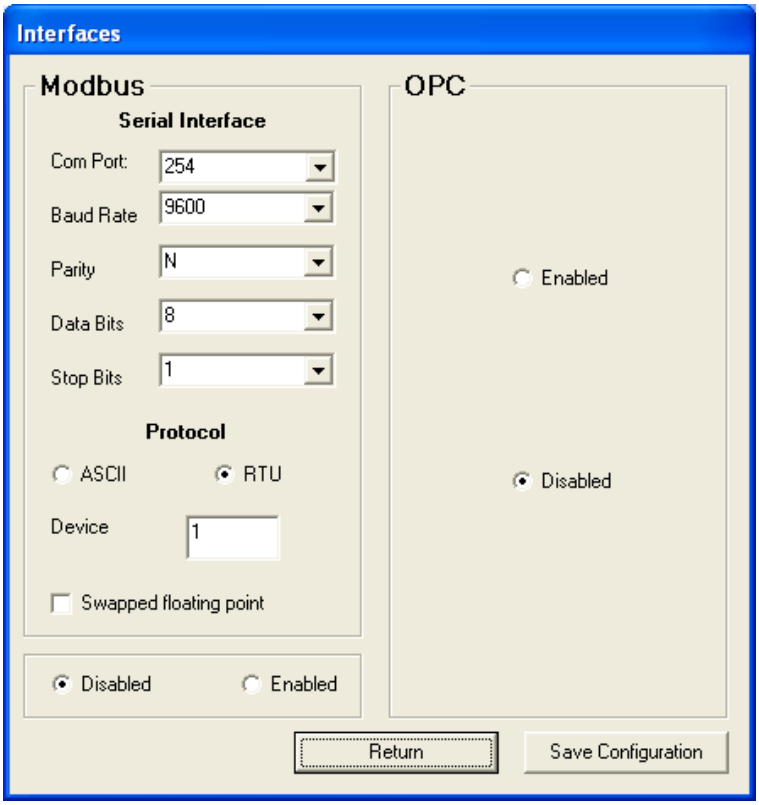
5. The **Auto Archiving** feature is designed for computers or embedded computers as in the RCS IIU with limited storage resources. If the **Auto Archiving** is selected, when a site collects 2MB of data (approximately 48,620 readings or 67 days of continuous data collection (temperature data collection enabled) at a sampling interval of 2 minutes), the data file is automatically transferred into the archives folders replacing the previously stored data file, and the current data file will be cleared for collection of new data.

    Note: When **Auto Archiving** is enabled, Microcor Tools initiates automatic archiving when the file reaches its limit, previous automatically stored archives will be deleted. This process will not delete any manually archived files.

6. **Microcor Tools** - **Output Interface** software (installed on all RCS Intelligent Interface Units) allows users to setup data communication with other computers. Click the **Interfaces Configuration** button to enter the setup screen shown below. Select the desired method of transfer and configure the fields if necessary. Click the **Enabled** radio button for the selected data transfer method and click the **Save Configuration** button prior to pressing **Return**.

Typically only one interface, either Modbus or OPC, is used at a time. However, it is possibly to use both output interfaces at the same time if required. Microcor Tools acts as a Modbus slave and its address is set in the **Device** window. The **Com Port** should be set to correspond to the hardwired connection to the Modbus Master. If Microcor Tools is supplied on an RCS computer or embedded PC, the Modbus communications may be via RS 232, or two or four wire RS 485 according to the unit ordered. Most commonly, Remote Terminal Unit (RTU) binary protocol is used for economy of transmission data length. This and the baud rate, parity, data bits, and stop bits should be set to match the Modbus master with which it is communicating. The Modbus addresses and data format is shown in Appendix 2. Generally, floating point is not part of the Modbus Standard but there exist two different versions for data transmission. The **Swapped floating point** is provided to adapt the Microcor Tools data output to the customer format.

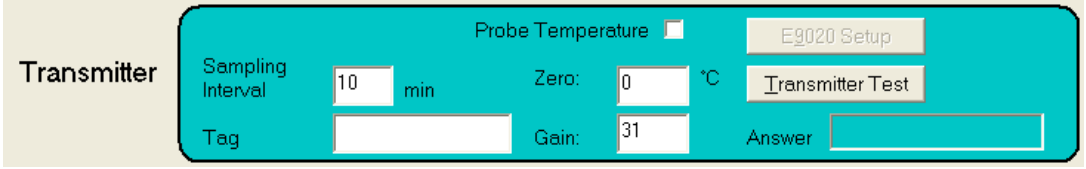
The OPC Interface is a Microsoft standardized database interchange protocol which uses the computers network interface card (NIC) to communicate via the network. Also included with the **Microcor Tools Software - Output Interface** option is a simple OPC Client Test Utility which enables testing of the OPC output. See Appendix 3 for further details.



7. To view the collected data, switch to **Config/DL** Transfer screen and change the **Address** to the desired ID. Click on the **Show Data** command button to open the **Microcor Tools – History Viewer** (see the **Retrieving and Plotting Data (History Viewer)** section for more details). An alternate method is to switch to **Data Display** screen and double click on the desired **Tag** to open the **Microcor Tools – History Viewer**.

Testing Channels

Individual transmitter channels may be checked with the **Transmitter** section on the **Config/DL Transfer** screen.



1. Click the Transmitter Test command button.

2. Successful transmission will return raw data and display it in the Answer text field.

Microcor Troubleshooting

If abnormal readings or excursions occur that cannot be explained, the system electronics should be verified by connecting the meter prover RCS PN 20407-001 (included in Microcor Installtion Kit RCS PN 702109) in place of the probe and/or probe adapter and checking that the reading is approximately 50% of the probe span.

If the meter prover shows the electronics are operating correctly, then inspect the probe-to-transmitter connections, the probe adapter and/or the probe for damage, high resistance, corrosion or poor connections.

After initial application of power, the transmitter takes approximately one minute to start up. During that time, it will send the error code -999,999 or -999,996 when the data is requested.

On ICMS3 systems, these codes will show up as error messages:
-999,999 – “Startup Mode”
-999,996 – “Auto Ranging”

If there is a probe or probe connection failure, error code -999,998 or -999,997 will be generated.
On ICMS3 systems, this will display as follows:
Code: -999,998 Display: Probe Fault (4)
Code: -999,997 Display: Probe Fault (1)

If communication with the selected transmitter fails, a “No Answer” error message will be generated in the status bar located at the bottom of the screen.

If an error message occurs, check the following:

- All connections are correct and the system is connected properly.
- The correct **Com Port #** is being used and that the **Online Communication** has been started on the S**ite/Communications** screen.
- The transmitter **Address** (or Instrument #) is correct.
- There is power to the transmitter.

3. Repeat the test by pressing **Transmitter Test** again.
4. Repeat as required for other RS485 locations.

Data Collection from Data Logger

CHAPTER 4

1. For data loggers installed in non-hazardous areas, the configuration and data retrieval may be done directly with a portable PC.

2. For data loggers installed in hazardous areas, the configuration and data retrieval is made with the intrinsically safe Corrdata Mate or Mate II Data Transfer units running Micromate software or with the Checkmate DL handheld instrument programmed for Microcor Systems. Collected data is then transferred to the PC in the safe area. In this case, the Micromate and Checkmate DL emulate each data logger so that the software program retrieves collected data from them as it would from a data logger.

Note: To configure a Microcor Data Logger from a Micromate or a Checkmate DL, follow the recommended suggestions below:

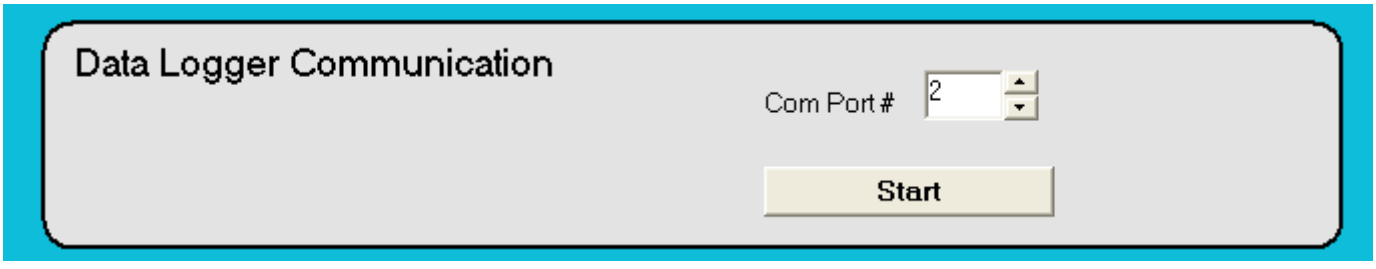
1. If a collection of data loggers exist on the PC, prepare a list that contains each data logger and its respective **Address** and **Tag** in advance to making the trip to the installed area.

2. Once in the field, connect the Micromate/Checkmate DL to the Microcor Data Logger and perform the programming with the information corresponding to the pre-made list from above. Refer to the Micromate and Checkmate DL User Manuals for more details.

Configuration of Data Loggers with PC

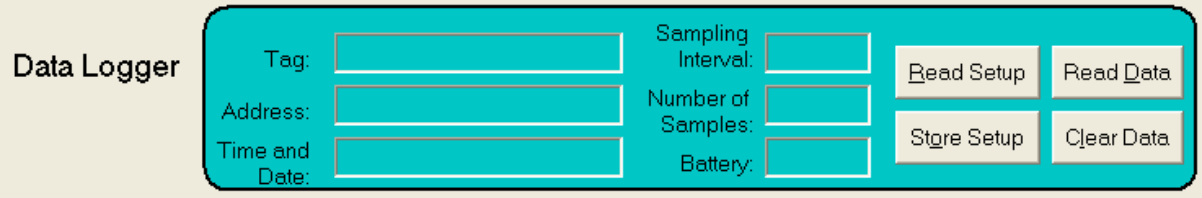
1. Connect the PC or portable PC to the data logger with the cable P/N 748204 for data logger Model ML 9500A or cable P/N 748243 for data logger Model ML 9500B.

2. Select the **Com Port #** being used on the computer and click the **Start** button.



3. Switch to the **Config/DL** Transfer screen and select the **Address** and click the **Data Logger** checkbox in the **Connection** section and configure the transmitter as described previously.

4. Click the **Store Setup** command button in the **Data Logger** section. This will populate the text fields in the **Data Logger** area accordingly. Verify all the text fields including **Time and Date,** and **Battery** for accuracy. **Read Setup** will interrogate the data logger and display stored values and will enable verification of these stored values.



If the data loggers are in a hazardous area, they will need to be configured with the Corrdata Mate or Mate II programmed with the Micromate software or Checkmate DL programmed for Microcor Systems. Make a note of the configuration information as this will have to be entered again into the Micromate or the Checkmate DL.

Data Collection from Data Loggers with PC

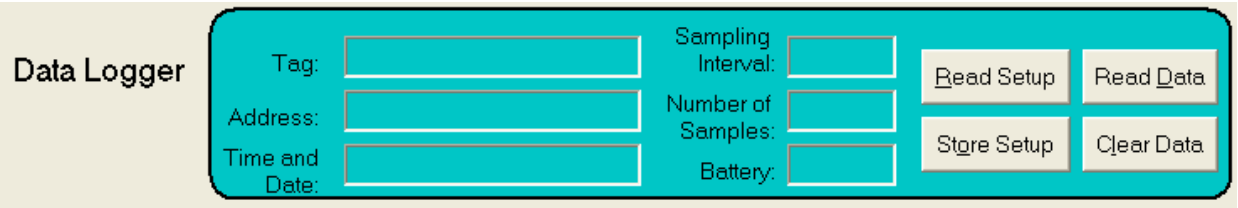
1. Connect the portable PC to the data logger communications port with cable P/N 748204 for data logger Model ML 9500A or cable P/N 748243 for data logger model ML 9500B.

2. Switch ON the portable PC and start the Microcor Tools Software program.

3. Select the Site from the Existing Sites or create a New Site. Select the Com Port # from the Data Logger Communication section and click Start command button.

4. Switch to the Config/DL Transfer screen. Select the desired Address and Comm Port.

5. Click the Read Setup command button in the Data Logger section. This will interrogate the data logger and display the resulting information in the text fields.



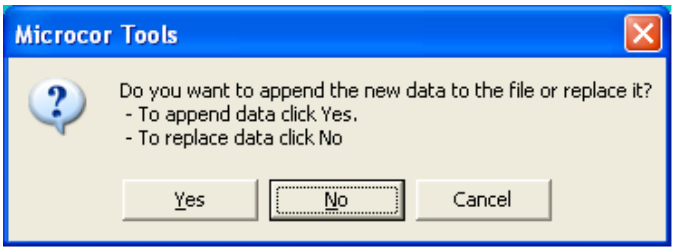
The time and date shown in **Time and Date** box should correspond to the current time. If there is an error or drift in the time, this can be corrected with the **Store Setup** command.

The **Battery** text field should read **OK**. If it reads **Replace**, then the battery needs to be replaced on the data logger and the **data MUST be cleared** after collection for data collection to recommence.

Important Note: **When the data logger battery gets too low to drive the transmitter, it shuts off the transmitter, and sets the Battery Replace flag. At this point there may still be enough power in the battery to drive the data logger for some time and even allow downloading of data. The battery must be replaced in order for the transmitter to run again. If the data is not cleared after the battery is replaced, the flag will not be reset and no data will be collected from the transmitter.**

The **Sampling Interval** text field should correspond to **Sampling Interval** in the **Transmitter** section.

6. Click the **Read Data** button. If data from this location has already been collected, the following message will appear:



- Press **Yes** to add the new data onto an existing file. This is the normal method if the data in the data logger is deleted after it is collected each time in order to speed data transfer. It also prevents reaching the maximum storage capacity in the data logger at which time the data collection stops.

- Press **No** if all of the data in the Micromate/Checkmate DL is to replace an existing file. This should be used if the data in the data logger is NOT cleared each time it is read. In this case the existing file is automatically archived.

- Press **Cancel** to exit the **Read Data** function.

Note: The Microcor Data Logger will store up to 8000 readings before collection memory is fully allocated; at this point, collection of data will halt until data is cleared from memory. The normal recommended practice is to collect data and then clear the data in the data logger. The new data is then appended to the stored data file on the PC and the data transfer time is minimized.

After a selection has been made, a counter in the status bar indicates the number of samples to be transferred. Status bar will read **End of Transfer** when the data is successfully transferred from the data logger to the **Microcor Tools Software** program.

7. Verify that the data is transferred correctly - click the **Show Data** command button to display the data with the **Microcor Tools – History Viewer.**

8. It is recommended to clear the data in the data logger by clicking the **Clear Data** command button at this point to reduce the data transfer times on later downloads.

9. Repeat the steps 1 to 8 for each of the data loggers from which data is collected. Make sure that the correct **Address** is selected for each data logger before loading the data.

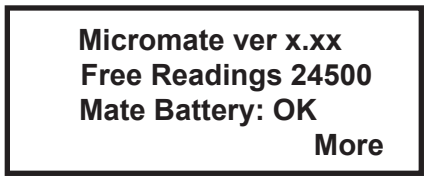
> **Note:** The data logger checks the battery status during the maximum-load time intervals. If the battery voltage is low, a battery **Replace** status is set in non-volatile memory. In this state the data logger does not power the transmitter and does not collect data. Other functions and commands such as **Read Setup**, **Store Setup**, **Load Data**, and **Clear Data** are not affected. The data logger will remain in this state until **Clear Data** command is executed after replacing the battery.

Configuration of Data Loggers with Micromate

First, connect the Microcor transmitter and data logger as described in their operating manuals. Ensure that the battery in the data logger is connected.

> **Note:** The data logger enclosure is rated explosion proof, with an intrinsically safe RS 232 communications port. When operating the data logger in a hazardous area, a hot work permit will be required to install or replace the battery which is housed in the explosion proof enclosure.

1. Verify that the Corrdata Mate or Mate II is programmed with the Micromate software for use with Microcor Data Loggers. The Corrdata Mate programmed as a Micromate will appear as follows when switched on:



If the Corrdata Mate is programmed for operation with Corrosometer and Corrater probes and data loggers, the screen will appear as follows when switched on:

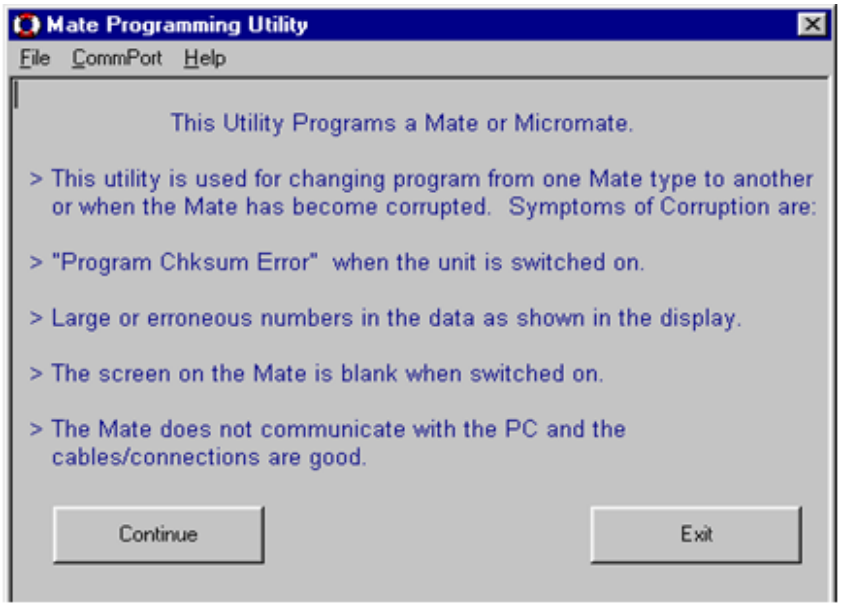
ROHRBACK COSASCO SYSTEMS

Read Disp Dump Mate

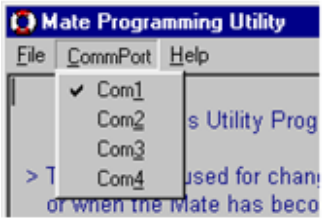
2. Setting up the Corrdata Mate or Mate II with Micromate software is described in steps 3 to 11. If Micromate is already installed on the Corrdata Mate or Mate II, skip to step 12. The Corrdata Mate or Mate II is software programmable. For reasons of memory limitations, the Corrdata Mate or Mate II is programmed either for use with the Corrosometer and Corrater range of probes and data loggers, or with the Micromate software for use with the Microcor range of data loggers. The **Mate Programming Utility** allows the program in the Corrdata Mate to be changed back and forth if required. This process is also used to set the Time Zone in the Micromate which is required for the correct date and time function of the **Microcor Software** application.

3. Make sure that the **Mate Programming Utility** has been installed on the PC.

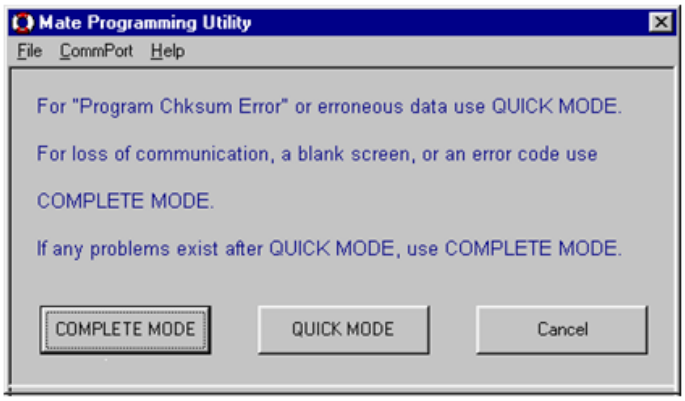
4. To start the **Mate Programming Utility**, click **Start → All Programs → RCS Programs → Mate Programming Utility.** The following screen will appear.



5. From the main menu select **CommPort**, and click on the **Com** port that will be used for communication with the Mate. This will usually be Com 1 or Com 2.



6. Click on the **Continue** button.



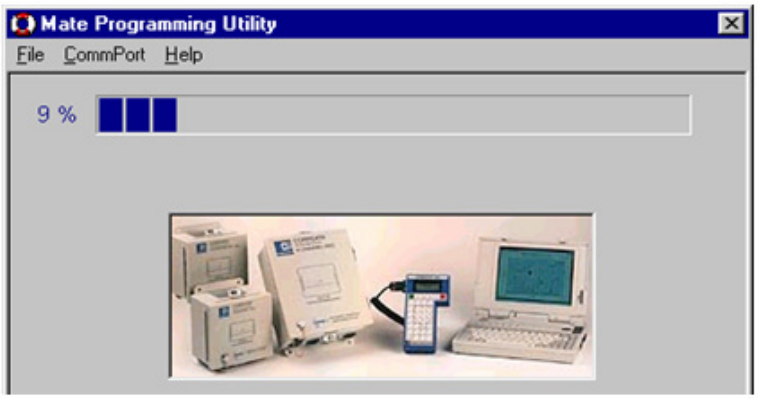
7. Select the **Quick Mode** unless any of the problems described on the image above have occurred. A pop-up screen will then ask if the Mate is already programmed as a Mate or a Micromate. This is because the key selections required to set up a Mate are different from setting up a Micromate.

8. Click the **Mate** or **Micromate** button as appropriate. If the unit is already programmed as a Corrdata Mate, which is how new units are shipped, selecting the **Mate** command button will display the following instructions:
   1. Connect Mate to COM Port 1 using Serial Adapter Cable
   2. Turn on Mate
   3. Press F1 (Read) on Mate
   4. Press F2 (MODE) on Mate

   If the unit is already programmed as a Micromate, the following instructions will be shown:
      1. Connect Micromate to COM Port 1 using Serial Adapter Cable
      2. Turn on Micromate
      3. Press F4 on Micromate (one or two times) until F4 reads OK
      4. Press F4 (OK) on Micromate
      5. Press F4 (Mate) on Micromate
      6. Press F2 (Prog/Mate) on Micromate

9. Follow the instructions above and then select the button to program the Mate as Mate or Micromate. In this case the selection would be **Make Micromate**.

A Scroll bar on the PC will indicate the progress of the programming and a scrolling of addressing being programmed on the Mate will show on the Mate screen.



Note: If the scroll bar operates on the PC but there is no scrolling of addresses on the Mate, then the Mate is not being programmed. This may be due to a bad connection or a wrong Com port. The PC is not able to indicate such a problem as there is no error status communication between the PC and the Mate during programming.

The Mate will beep and indicate when the programming is complete.

10. The programming of the Mate with the **Micromate** software also sets the **Time Zone** information into the Micromate automatically from the computer. The correct time zone is required as the underlying data format uses a GMT time reference.

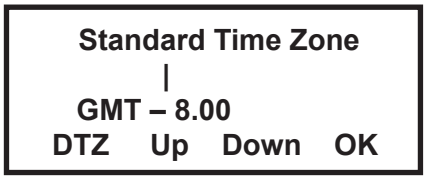
Note 1: If using the **Mate Programming Utility** to set the **Time Zone** into the Micromate Software, make sure that the time on the computer is correct and that the Regional Settings in the Control Panel (Classic View) of Windows are correct.

Note 2: It is also possible to program the **Time Zone** manually on the Micromate on startup.

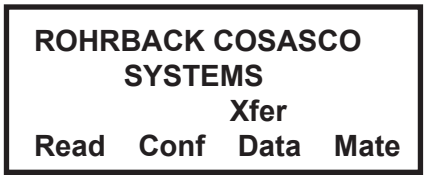
11. Switch on the **Micromate.** The following screen will appear:

Micromate ver x.xx
Free Readings 24500
Mate Battery: OK
More

The number of free readings should be 24500 if the Micromate memory is completely clear. If the number is less than 24500, and previously collected data has already been transferred to the PC, then it is best to clear the memory to obtain maximum data collection capacity. See step 13 below. If the Battery indicates **LOW** then the Micromate batteries need changing. Press **More (F4)**.



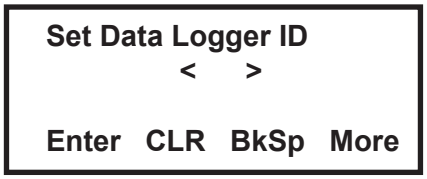
If the Micromate has been programmed from the PC, and the PC is correctly setup for regional settings and time, then this screen should show the correct time zone with the number of hours from GMT (+ numbers of hours for locations East of London, - numbers of hours for locations West of London). Standard Time Zone indicates there is no daylight savings. Daylight Time Zone indicates that Daylight Savings Time is in operation. If any of these settings are incorrect, check the computer and verify that the time and date settings are correct. On the Micromate, the number of hours east or west of London may be changed with the **Up (F3)** and **Down (F4)** keys. The Standard and Daylight Savings may be toggled with the **F1** key. Press **More (F4)** to display the following screen.



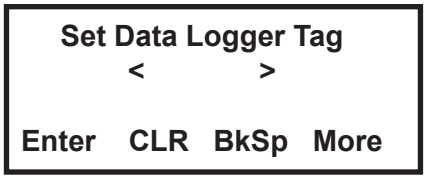
12. To clear the data in the Mate, if required, press **Mate (F4),** and **Clear Mate (F1)**. A warning will appear. Press **Yes (F1)** to complete memory clearance.

13. Produce a listing of the configuration information for the data loggers.

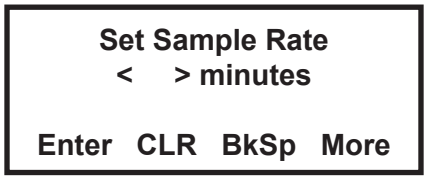
14. Connect the Micromate to the first data logger to be configured with the cables supplied. From the Micromate main screen above press **Conf (F2)** to display the screen:



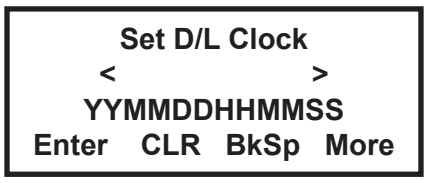
15. Enter the **Logger #** for the **ID**. This is the same as the **Address #** in the software. The **Clear (F2)** clears the complete entry. **BkSp (F3)** backspaces one character to enable correction. Press **Enter (F1)** to complete the entry and navigate to the following screen:



16. Enter the **Tag** number for this location, up to 12 characters, and press **Enter (F1)** to complete the entry and move to the next screen:



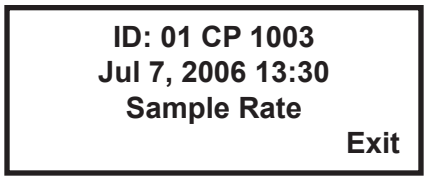
17. Enter the **Sample Rate** or the reading frequency (required). For a data logger, where battery consumption is a consideration, a reading interval of 3 hours or 180 minutes is usually well suited. This gives a battery life of around one year and still provides eight readings a day. The minimum recommended setting is 30 minutes. The maximum setting is 1440 minutes (one day). Press **Enter (F1)** to complete the entry. This brings up the following screen:



18. Enter the date and time in the format indicated in order to set the reference time into the data logger.

    YY is two digits for the year
    MM is two digits for the month
    DD is two digits for the day
    HH is two digits for the hour (24 hour clock)
    MM is two digits for the minute
    SS is two digits for the seconds (or just enter 00)

    Press **Enter (F1)** to complete the entry and configure the data logger. The Micromate will indicate configuration is in progress and then display the configured information such as follows:



Note: When configuring the data logger with the Micromate, it is not necessary to clear any data that may be left in the data logger. This is done automatically by the Micromate.

19. Leave the data logger to collect data. It will take its first reading at the end of the sample period.

20. Repeat steps 15 to 19 on the other data loggers that are to be configured.

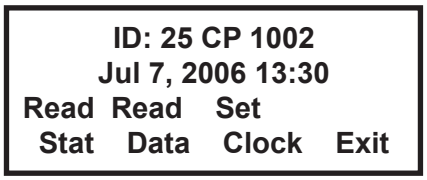
Data Collection from Data Loggers with Micromate

1. Connect the Micromate to the data logger communications port with the supplied cable.

   Note: There are separate cables for the ML 9500A and the ML 9500B. Take care to use the correct cable.

2. Switch on the Micromate, and press **F4** twice to clear the initial screens.

3. Press **Read (F1)** to display the following screen:

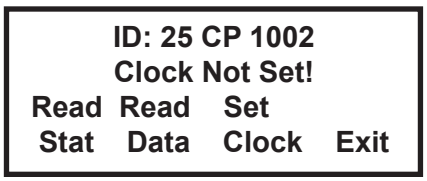


4. If the battery on the data logger has expired, the Micromate will indicate that there is no communication. In this case, change the data logger battery. When the battery runs low, the data logger will first switch off power to the transmitter, set the Battery Status to LOW, and stop taking readings. However, it will have enough power left for some time to allow communication with the Micromate.

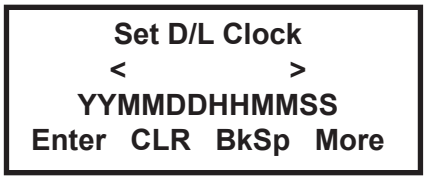
WARNING: If the battery status indicates low, the data logger memory must be cleared after data collection to reset the Battery Low flag and re-enable reading of the transmitter. See step 5 below. If the memory is not reset, the data logger will not restart taking readings from the transmitter.

Note: Changing the data logger battery in a hazardous area will require a hot work permit; make sure the local atmosphere is free of explosive gases.

After replacing the battery, re-read the data logger as described in steps 2 and 3. Replacing the battery will require the data logger clock to be reset. This will be indicated on the screen:

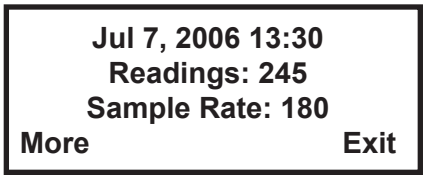


Press **Set Time (F3)** and enter the current date and time. Otherwise the default date is Jan 1, 2000. This function is also used to correct the time in the data logger when required.

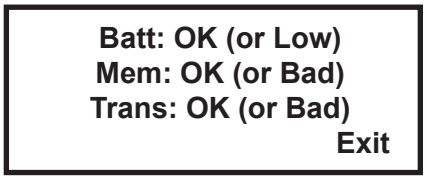


Press **Enter (F1)** to show the screen in Step 3 above.

5. It is then important to press **Read Stat (F1)** to check the status of the data logger, specially the battery status. This would give a screen such as the following:



Press **More (F1):**

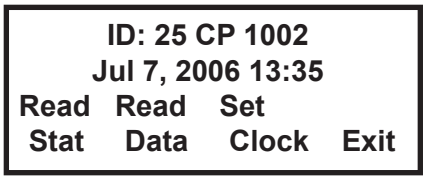


WARNING: **If the battery status indicates Low, collect the data in the data logger as described below, and then the data logger memory MUST be cleared (see step 8) to allow data collection to re-commence.**

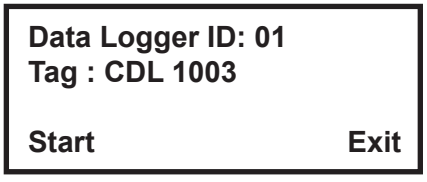
Memory Bad indicates a problem in the data logger memory requiring repair.

Transmitter Bad indicates that the data logger is not communicating with the transmitter. It suggests a problem with the interconnecting cable or transmitter.

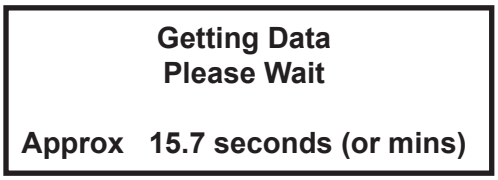
Press **Exit (F4)** to return to the following screen:



6. Press **Read Data (F2)** to commence collecting data. If the data logger has not had its **Logger #** or **ID** set (for example if it was configured directly from a portable PC using the previous MS 9000 version 1.8 software), the Micromate will request setting of an **ID** (**Address**) and **Tag**. If the data logger has already had the Logger # or ID set, then it will go directly to a screen similar to the following.

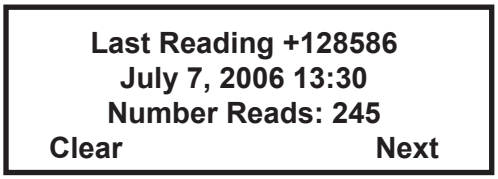


If there is insufficient memory for downloading the data, an error message “No Memory Space for Readings” will be displayed. At this point the existing data in the Micromate will have to be transferred to the PC and the memory in the Micromate cleared. If the memory is sufficient, the Micromate will display the following:



The count-down screen will indicate how long it will take for the data transfer.

7. When data collection is complete, the screen will display the last reading, the date and time of the last reading, and the number of readings taken (shown below):



The last reading confirms that the instrument is producing good numbers. If the reading is near +262144, the probe has almost expired and needs changing. The data logger will need to be powered down and the probe replaced. Upon power-up, the data logger will need re-configuring to set the correct time and date.

8. Press **Clear (F1)** to clear the data memory in the data logger. This MUST be done if the Battery Status indicated LOW and the battery has been changed. If the battery has not been changed or do not wish to clear the memory, press **Next (F4)**.

9. Repeat steps 1 to 8 for each data logger from which data is to be collected.

Note: Clearing the data in the data logger minimizes the data collection time and maximizes the amount of data logger data that may be collected with the Micromate before it must be transferred to the PC. The data logger will store up to 8000 readings before it stops recording.

Transferring Collected Data from Micromate to PC

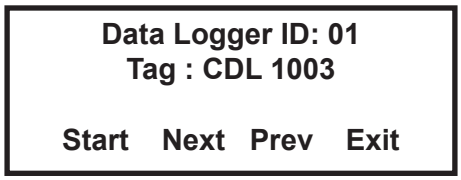
1. Connect the Micromate to the PC communications port with the supplied cable.

2. Switch on the portable PC and start the **Microcor Tools** program.

3. From the **Site/Communications** tab in the **Microcor Tools** software, select the appropriate site from the **Existing Sites** area and set the **Com Port #** if necessary in the **Data Logger Communications** section, then press the **Start** command button.

4. On the **Config/DL Transfer** tab select the **Address** (data logger ID) of the first data logger for which information is to be collected from.

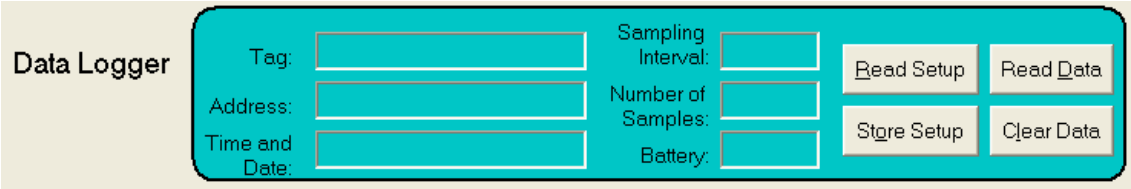
5. Switch on the Micromate and press **(F4)** twice to go to the main screen. Then press **Xfer Data (F3)**. A screen such as the following will appear:



The first **Data Logger # or ID** will be the lowest number in the list. Check that the **Data Logger #** or **ID** on the Micromate and the **Address** on the PC match. If not press **Next (F2)** or **Prev (F3)** until they do match. Press **Start (F1)** and the following screen will be displayed:

At this point the Micromate is emulating the selected data logger.

6. Click the **Read Setup** command button in the **Data Logger** section on the Microcor Tools software. This will check if the communication port is valid and show the setup information.



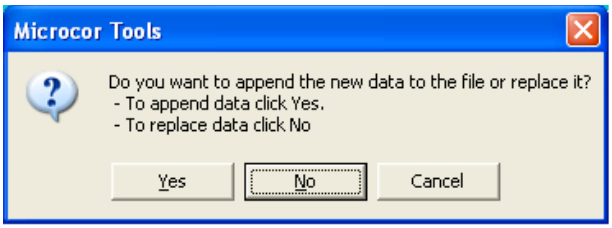
The time and date shown in the **Time and Date** text field should correspond to the time the data was downloaded from the data logger.

The **Battery** text field should read **OK**. If it reads **Low**, then the battery in the data logger should be changed and memory cleared.

The **Sampling Interval** text field in the **Data Logger** section should correspond to **Sampling Interval** text field in the **Transmitter** section.

> **Note:** The **Store Setup** and **Clear Data** are not functional when working with the Micromate even though the status bar at the bottom of the screen indicates operation. These are only operational when working directly with the PC and the data logger. When using the Micromate, the configuration and clearing of the data logger is done by the Micromate.

7. Click the **Read Data** command button. If data from this location has already been collected, the following message appears:



- Press **Yes** to add the new data onto an existing file. This is the normal method if the data in the data logger is deleted after it is collected each time in order to speed data transfer. It also prevents reaching the maximum storage capacity in the data logger at which time the data collection stops.

- Press **No** if all of the data in the Micromate is to replace an existing file. This should be used if the data in the data logger is NOT cleared each time it is read. In this case the existing file is automatically archived.

- Press **Cancel** to exit the **Read Data** function.

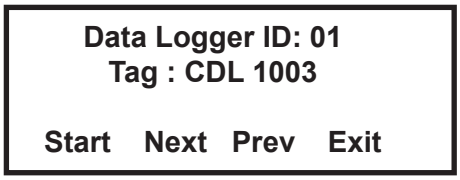
Note: The Microcor Data Logger will store up to 8000 readings before collection memory is fully allocated, then the collection of data will halt until data is cleared from memory.

After a selection has been made, a counter in the status bar indicates the number of samples to be transferred. Status bar will read **End of Transfer** when the data is successfully transferred from the data logger to the **Microcor Tools** program.

8. Verify that the data is transferred correctly - click the **Show Data** command button to display the data with the **Microcor Tools – History Viewer.**

9. At the end of the transfer, press **Exit** on the Micromate screen shown below:

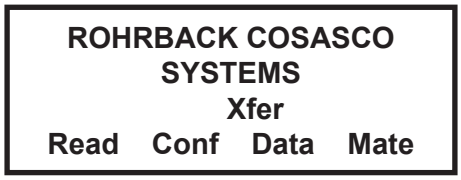
This will return to the previous screen:



10. Press **Next (F2)** to select the next **Data Logger #** or **ID** for data transfer from the Micromate to the PC. Select the corresponding **Address** on the PC and repeat steps 6 to 9 above. Repeat these steps to transfer data from other data loggers.

Note: An asterisk (*) after the ID number on the Micromate indicates that this ID has been transferred to the PC. This allows confirmation of which ID's have been transferred and which have not.

11. Clear the memory in the Micromate once all of the data is properly transferred and verified. This is done from the main screen shown below, by pressing **Mate (F4)** and **Clear Mate (F1)**:



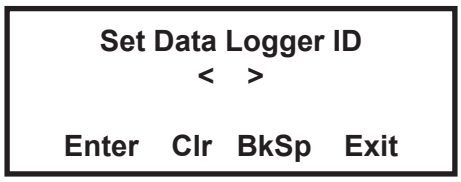
The Micromate is once again ready for data collection from data loggers.

Note: The data logger checks the battery status during the maximum-load time intervals. If the battery voltage is low, a battery **Replace** status is set in non-volatile memory. In this state the data logger does not power the transmitter and does not collect data. Other functions and commands such as **Read Setup**, **Store Setup**, **Load Data**, and **Clear Data** are not affected. The data logger will remain in this state until **Clear Data** command is executed after replacing the battery.

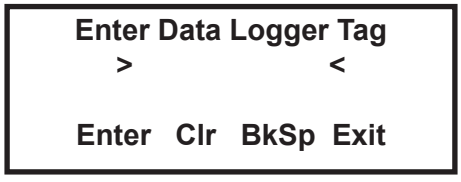
Configuration of Data Loggers with Checkmate DL

This section explains the manual configuration of Microcor probes (attached to a Microcor Data Logger) onto the Checkmate DL. Once the Microcor Data Logger information is properly configured into the Checkmate DL, Data Loggers will need to be programmed. See the Checkmate DL User Manual for more details.

Connect the Checkmate DL to the Microcor Data Logger; from the **Standby** display, press **Conf (F2)** to proceed to the **Set Data Logger ID** display:



Enter a the desired ID number from 0 to 99 and press **Enter (F1)** to proceed to the **Set Data Logger Tag** display. If the ID selected has already been configured, the user will be notified; if continued with the configuration, all previously accumulated data will be erased from the Data Logger.



In the **Enter Data Logger Tag** display, enter up to twelve (12) alpha/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 **Standby** display.

Press **Enter (F1)** to proceed to the **Set Sample Rate** display:

```
Set Sample Rate
>      < minutes

Enter   Clr   BkSp   Exit
```

Set the desired sample rate and press **Enter (F1)** to complete the configuration.

Data Logger is successfully configured when the Checkmate DL displays the screen below. Date and Time settings are automatically programmed into the Data Logger using the programmed Checkmate DL time and date. Press **Exit (F4)** to return to the **Standby** screen from the following display:

```
ID: XX XXXXXXXXXXX
MMM DD, YYYY HH:MM
Samp Rate: XXXX
                Exit
```

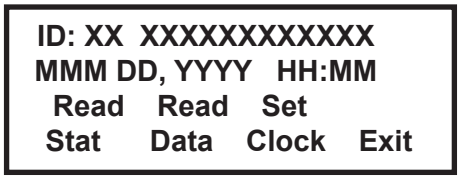
Note: It is necessary to set the correct DAYLIGHT or STANDARD time zone into the Checkmate DL to accurately Date and Time stamp Data Logger readings. Refer to the **Available Memory Space and Standard Time Zone** section of the Checkmate DL reference manual for more details.

If the following error message appears on the Checkmate DL during the Data Logger configuration, verify the Checkmate DL is properly connected to the Data Logger.

```
ERROR
Error Reading Logger
Check Connections
                Exit
```

Set Data Logger Time

The Data Logger Date and Time is automatically set when the unit is configured using the Checkmate DL. However, it is possible to update or reset the time if required or if the display indicates "**CLOCK NOT SET!**". To set the Data Logger Time and Date, connect the Checkmate DL to the Data Logger with the provided adapter cable connector. From the **Standby** screen, press **Read (F1)** to proceed to the following display with the attached Data Logger information:



Press **Set Clock (F3)** to update the Data Logger with the set time of the Checkmate DL.

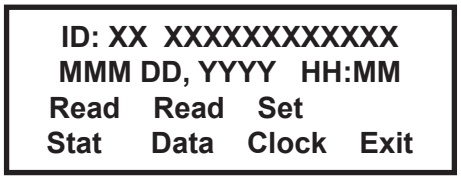
Note: It is necessary to set the correct DAYLIGHT or STANDARD time zone into the Checkmate DL to accurately Date and Time stamp Data Logger readings. Refer to the **Available Memory Space and Standard Time Zone** section of the Checkmate DL reference manual for more details.

Data Collection from Data Loggers with Checkmate DL

The Checkmate DL is designed to configure and gather data from all Microcor Data Loggers (ML 9500A and/or ML 9500B). The following section will explain the data collection procedure from Microcor Data Loggers.

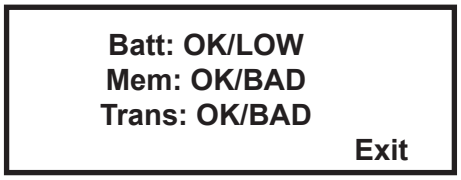
Read Data Logger Configuration and Status

Configurations already set into the Data Logger are easily read with the Checkmate DL. Connect the Checkmate DL to the Data Logger with the provided adapter cable connector. From the **Standby** screen, press **Read (F1)** to proceed to the following display with the attached Data Logger information:



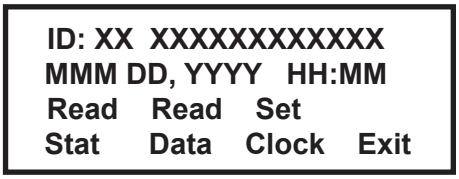
Press **Read Stat (F1)** to display the Data Logger time, number of readings and the sample rate as shown below:

Press **More (F1)** to continue to the next display which shows the battery, memory and transmission information as shown below. Battery status will show **OK** or **LOW**. Memory and Transmission will show **OK** or **BAD** depending on their status.

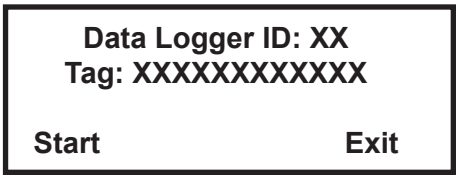


Reading / Clearing Data from Microcor Data Loggers

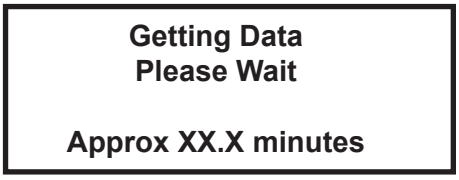
To read a Data Logger, connect the Checkmate DL to the Data Logger with the provided adapter cable connector. From the **Standby** screen, press **Read (F1)** to proceed to the following display with the attached Data Logger information:



Press **Read Data (F2)**; Checkmate DL will perform a series of internal checks and proceed accordingly. First, Checkmate DL will check whether the ID is properly assigned. If the ID is not properly assigned, it will prompt the user to set the Data Logger ID and the Tag information. It will then determine if any readings for this ID are stored in the Checkmate DL. If any data for the ID exists in the Checkmate DL, then the user will be prompted to either **Overwrite (F1)** or **Abort (F4)**. Overwriting will delete the existing data for that ID and replace it with the new data being read. Once these internal checks are performed and any issues resolved, Checkmate DL will proceed to the following screen:



Press **Start (F1)** from the above screen to begin the read process. The Checkmate DL will show the following screen during data transfer.

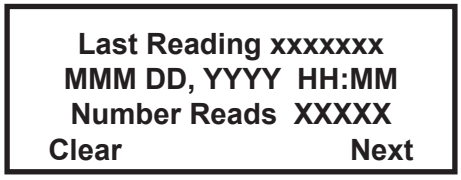


If "**NO MEMORY SPACE FOR READINGS**" screen appears (shown below), then the Checkmate DL memory will need to be cleared before transferring the data. It is recommended that ALL existing data on the Checkmate DL be transferred to a PC prior to erasing ANY data. Refer to the section on **Clearing the Checkmate DL Memory** on the Checkmate DL reference manual.

Once the data is successfully read and transferred, it is displayed as shown below. Users can at this time elect to delete the Data Logger content if desired.

Note: All data stored for the ID on the Checkmate DL will be erased if "**Clear**" button is pressed.

Press **Clear (F1)** to clear Data Logger readings or **Next (F4)** to return back to the Data Logger information screen without clearing the readings.



WARNING! It is recommended to clear the data in the Data Logger after transfer to the Checkmate DL. This reduces the amount and time of data transfer for future downloads. The data is then appended to the previous data when transferring the data from the Checkmate DL to the PC. Refer to the **Transferring Collected Data from Checkmate DL to PC** section.

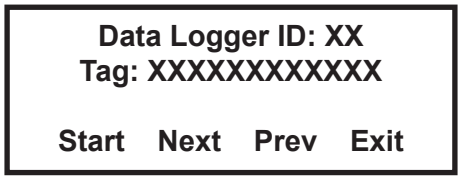
Transferring Collected Data from Checkmate DL to PC

Data Logger data is downloaded to the PC using the provided Microcor Tools Software program. Connect the Checkmate DL instrument to the 9 pin serial port on the PC using the provided cable. If there is no serial port in the computer, use the included serial-to-USB converter cable to complete the connection. Make sure to set the correct COM port number on the Microcor Tools Software program **Data Logger Communication** area (in most cases this will be COM 1, however verify this in the device manager).

Checkmate DL Data Transfer Procedure

From the **Standby** screen, press **Data (F3)** to advance to the following display:

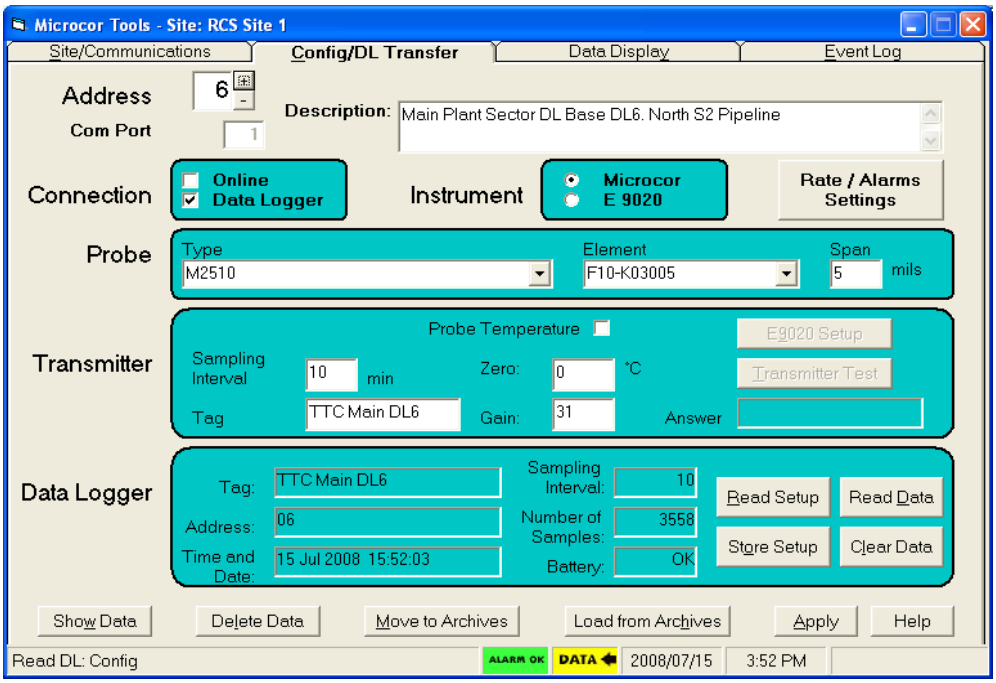
Press the **Start (F1)** to proceed to the next screen. Use **Next (F2)** and **Prev (F3)** to navigate the ID list (0 – 99) and select the desired ID to transfer data (shown below).



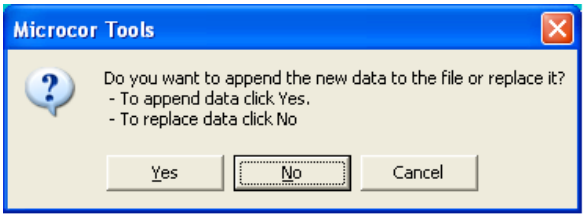
Once the ID is selected, press **Start (F1).** Following screen will appear:

Note: Make sure that the data (ID of the Data Logger) set in the Checkmate DL to be transferred corresponds with the **Address** selected in the Microcor Tools Software before transferring the data.

Data is now ready for transfer from the Checkmate DL to the PC. On the Microcor Tools Software program, select the **Site** and navigate to the **Config/DL Transfer** screen, select the **Address** and choose **Data Logger** as the **Connection** type and **Microcor** as the **Instrument** (see image below). Click the **Read Data** command button to begin the transmission. It is also possible to click the **Read Setup** command button to transfer the configuration data of the Data Logger to the **Data Logger** section on the **Config/DL Transfer** screen (shown below).



If data already exists for the chosen address, following dialogue box will appear:



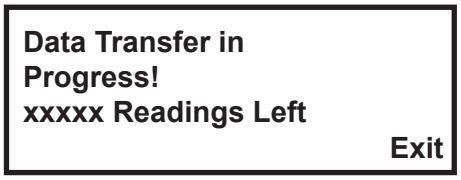
- Press **Yes** to add the new data onto an existing file. This is the normal method if the data in the data logger is deleted after it is collected each time in order to speed data transfer. It also prevents reaching the maximum storage capacity in the data logger at which time the data collection stops.

- Press **No** if all of the data in the Checkmate DL is to replace an existing file. This should be used if the data in the data logger is NOT cleared each time it is read. In this case the existing file is automatically archived.

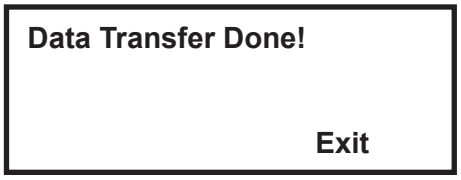
- Press **Cancel** to exit the **Read Data** function.

Note: The Microcor Data Logger will store up to 8000 readings before collection memory is fully allocated, then the collection of data will halt until data is cleared from memory.

After a selection has been made, a counter in the status bar indicates the number of samples to be transferred. Status bar will read **End of Transfer** when the data is successfully transferred from the data logger to the **Microcor Tools** program. During the data transfer, the following screen will be displayed on the Checkmate DL:



The number of readings (xxxxx) counts down as the data is transferred to Microcor Tools. Upon successful transmission, Checkmate DL will show the following screen:



Press **Exit (F4)** to return to the Data Transfer screen to choose another ID for data transfer.

Note: Information from only one Data Logger can be transferred at a time, when transferring information of more than one Data Logger, **change the Address on the Microcor Tools Software program for each transfer** so that all data is not transferred only to one ID address.

In case of any error messages displayed on Checkmate DL, check connections between Checkmate DL and the PC, make sure that Microcor Tools Software program is running and that the correct COM port is selected.

If data is still not transferred after checking the connection between the PC and Checkmate DL, please see the Troubleshooting section for further help.

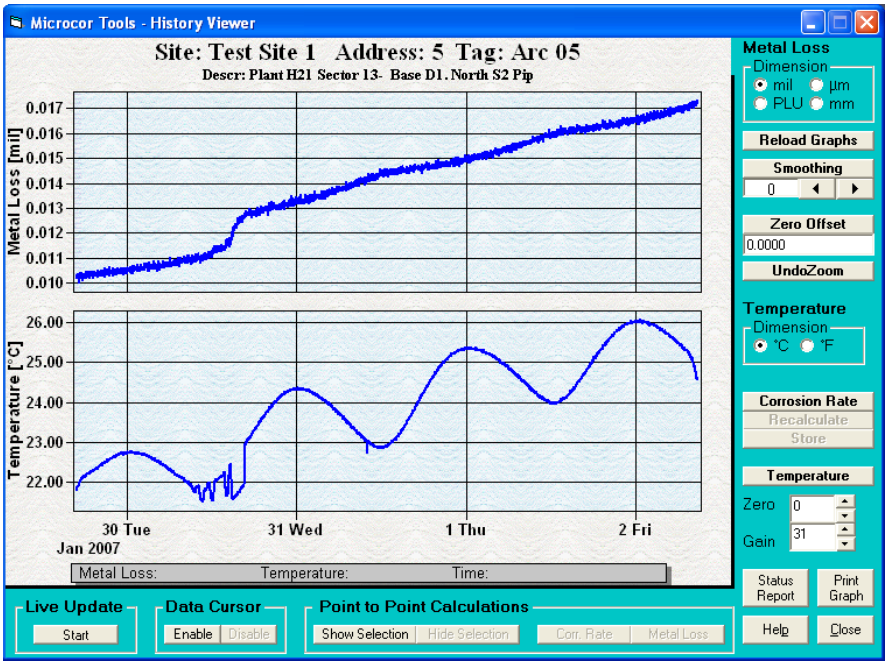
Retrieving and Plotting Data (History Viewer)

CHAPTER 5

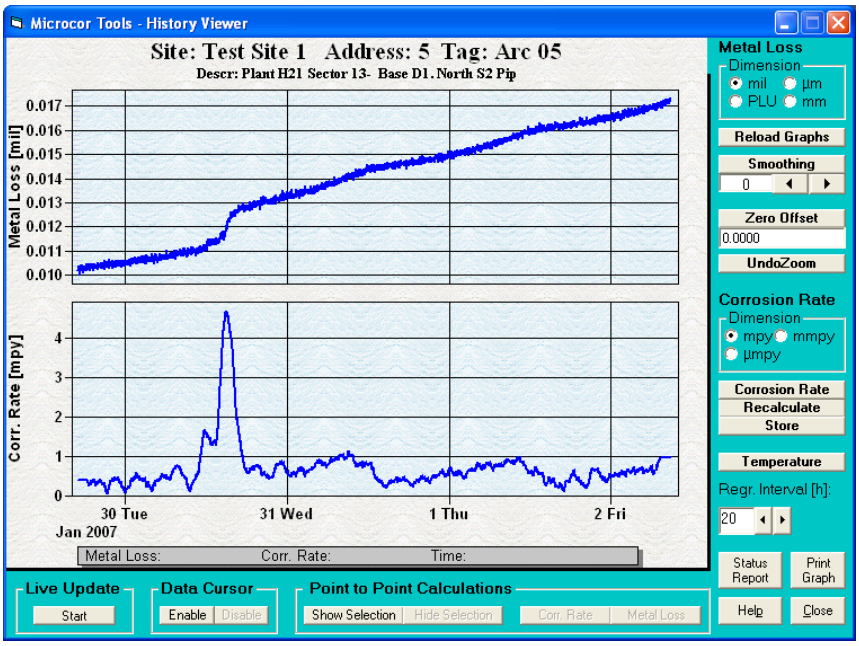
Microcor Tools allows retrieving and plotting of corrosion data. **Microcor Tools – History Viewer** can be used to view data collected **Online** or by **Data Logger** connection methods.

To open the **Microcor Tools** – **History Viewer** (graph feature), select the site from the **Site/Communications** tab, select the **Address** from the **Config/DL Transfer** tab, and click the **Show Data** command button. Alternate method to enter the **History Viewer** is to navigate to the **Data Display** tab and double-clicking the **Tag** of the desired unit.

Microcor Transmitters (MT 9485, MT 9485A)



In the above screen, the top graph is the **Metal Loss** and the bottom graph presents the probe **Temperature** (when applicable). The bottom graph can be switched to show the **Corrosion** or **Erosion Rate** for the same set of data when the **Corrosion** or **Erosion Rate** button is selected.



To show the corrosion rate graph, click the **Corrosion** or **Erosion Rate** command button (see section below for more details). Click the **Temperature** command button to display the probe temperature graph.

Note: The **Temperature** graph will open as the default bottom graph if the transmitter supports temperature monitoring capabilities and if the **Probe Temperature** check-box is selected; otherwise the graph area will remain blank (to view the **Corrosion** or **Erosion Rate** graph, **Corrosion** or **Erosion Rate** command button must be pressed. It will not open as a default graph). Data loggers do not support temperature measurements.

Use the upper **Dimension** box (top right-hand corner of the screen) to select the **Metal Loss** Y-axis units in **mils, µm, mm** or Probe Life Units (**PLU**). Use the lower **Dimension** box (middle right-hand side of the screen) to select units for the **Temperature** graph in **ºC** or **ºF** or **mpy, mmpy** or **µmpy** units if **Corrosion** or **Erosion Rate** graph is selected.

Corrosion/Erosion Rate is calculated by linear regression. This **Regression Interval** may be re-adjusted and the Corrosion/Erosion Rate recalculated by clicking the **Recalculate** command button. The default may suit many online systems but can be changed to optimize noise against sensitivity of the computed corrosion or erosion rate. The **24h Filter** can be enabled at the **Rate/Alarms Settings** area (in the **Config/DL Transfer** screen) to reduce the effects of any diurnal (24) thermal noise. The **Alarm Level** units are directly related to the above selected units and can only be changed by the above settings.

Once the settings have been optimized, the rate data may be saved with the **Store** button. When closing the graphical display window (**History Viewer**) a dialog box will prompt to save the settings. Select **Yes** to store these settings for automatic application to all new data.

Select (or type in) values for **Zero** and **Gain** to calibrate the measurement. If calibration parameters are unknown for probes and transmitters, select 0 for **Zero** and 31 for **Gain**.

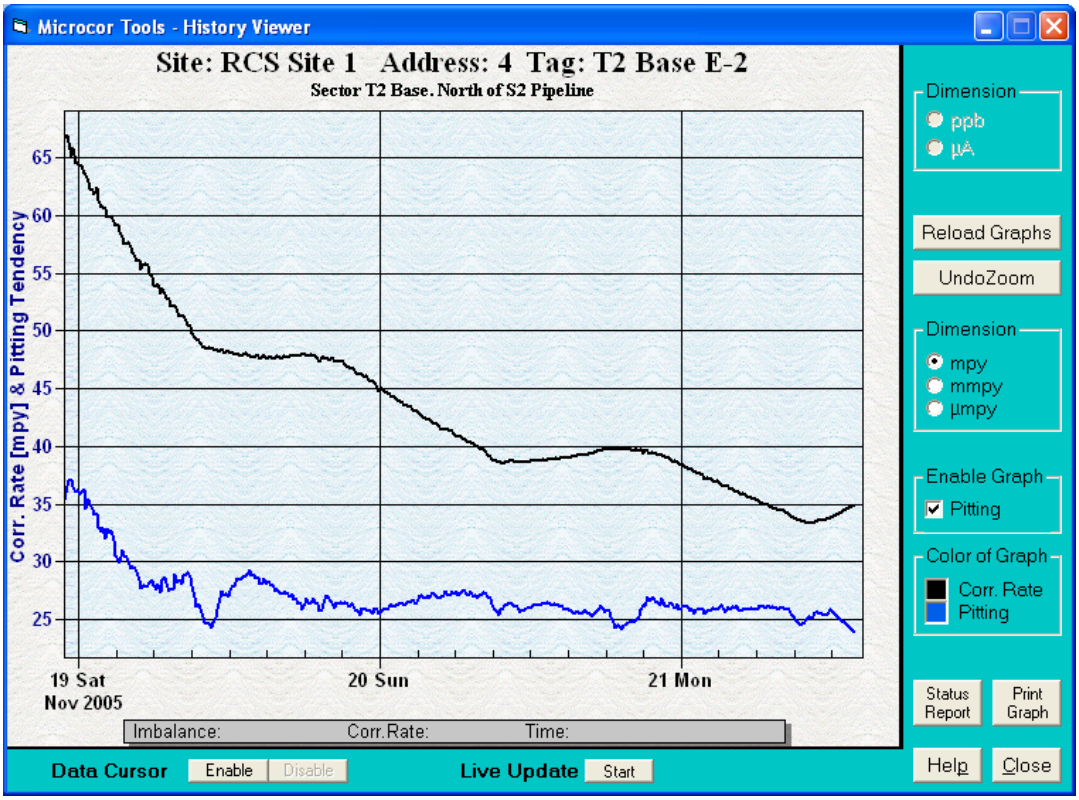
The **Zero Offset** will allow users to change the y-axis reference point to zero (0) by changing the value. This is a helpful feature when conducting tests to graphically view the data from a convenient starting point. It is recommended that this be returned to original value of zero so determination of probe life can be done accurately.

E9020 Transmitter (E9020)

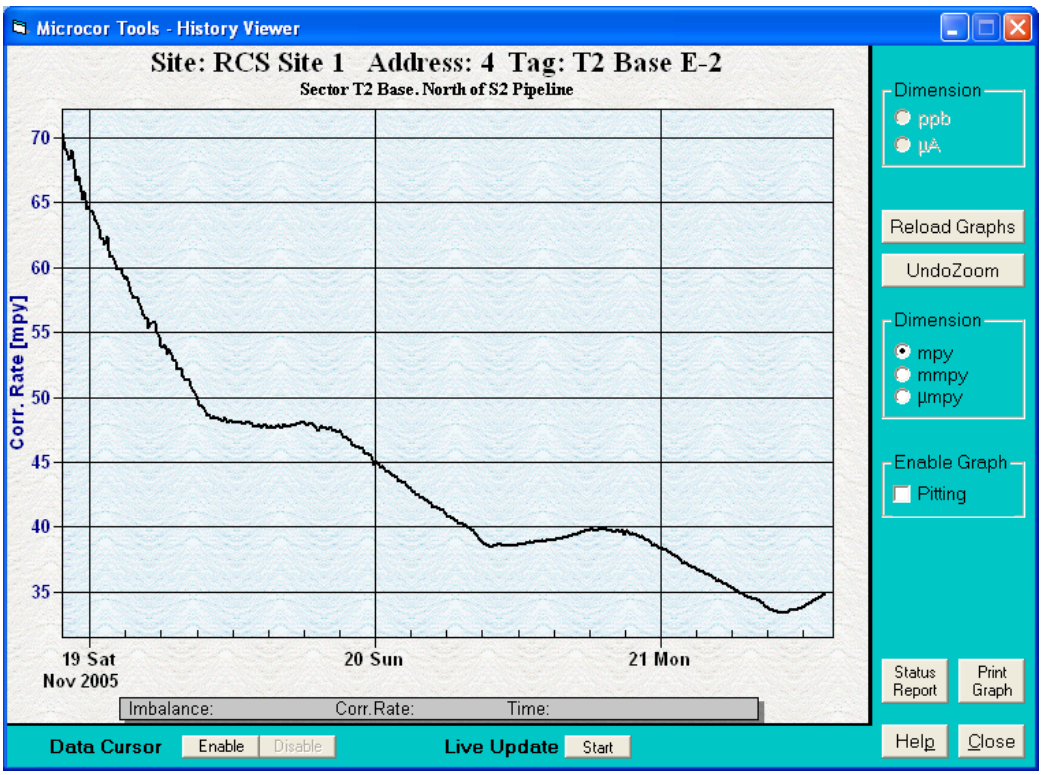
The E9020 transmitter operates with Corrater probes configured with the same alloy electrodes. In this mode, both corrosion rate and pitting tendency (or imbalance) is measured. When the probe has Galvanic electrodes installed, only the pitting tendency (or imbalance) measurement is used providing an indication of Galvanic current. Most commonly this measurement is used in sea-water injection systems where de-aeration is used to prevent corrosion by keeping oxygen levels to typically less than 20 ppb (parts per billion). At these low levels of oxygen the galvanic current is linearly related to the oxygen (or dissolved gasses) level.

Corrater Probes

The data for **Corrosion Rate** and **Pitting Tendency** is shown in one graph for Corrater probes with standard electrodes of the same alloy.

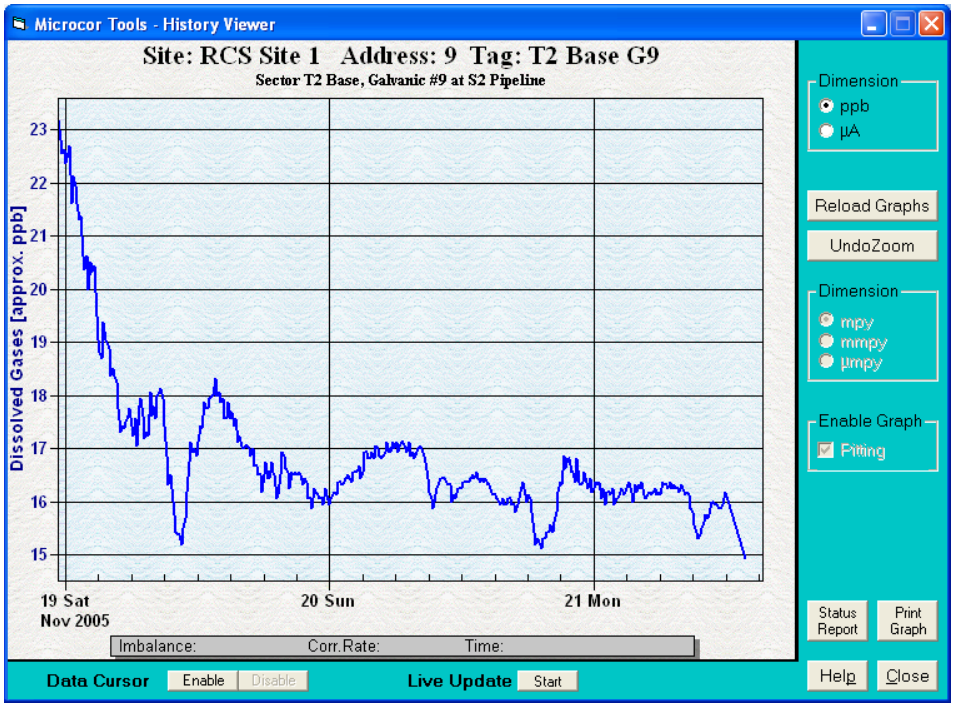


The **Corrosion Rate** graph is painted **black** and the **Pitting** graph is painted **blue**. Use the **Dimension** box (center right-hand corner of the screen) to select the **Corrosion Rate** units in **mpy, mmpy,** or **µmpy**. Pitting tendency does not have units of measure but is interpreted in magnitude to the corrosion rate reading. When the pitting tendency reading is greater than the corrosion rate and erratic in value, this is indicative of pitting type corrosion. Under general corrosion conditions, the pitting tendency shows values much lower than the corrosion rate value and typically be near zero. For ease of interpretation the units of pitting tendency are set to match the corrosion rate units. The graph above shows a pitting reading about half the value of the corrosion rate reading indicating generally little pitting. The graph below shows just the corrosion rate with pitting de-selected.



Galvanic Probes

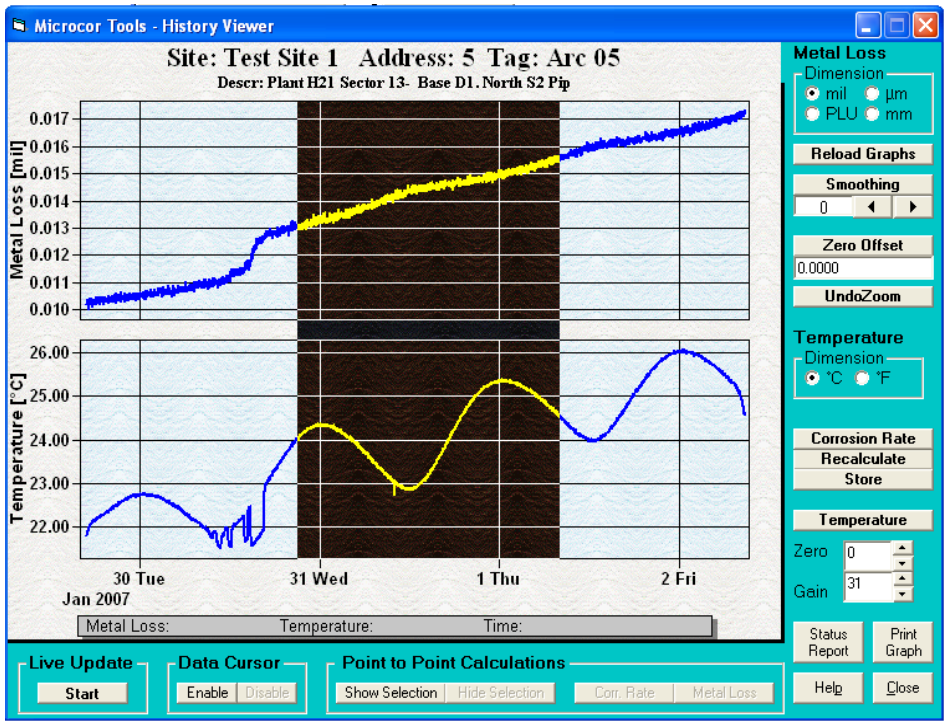
When using Galvanic electrodes, only the pitting (or imbalance) graph is generated. Imbalance units can be switched between Galvanic current in microamperes (**µA**) or in part per billion (**ppb**) of oxygen based on an approximate empirical calibration of 4 µA per ppb of oxygen. Typical Galvanic graph is shown below:



Zoom Commands

To select a zoom area:

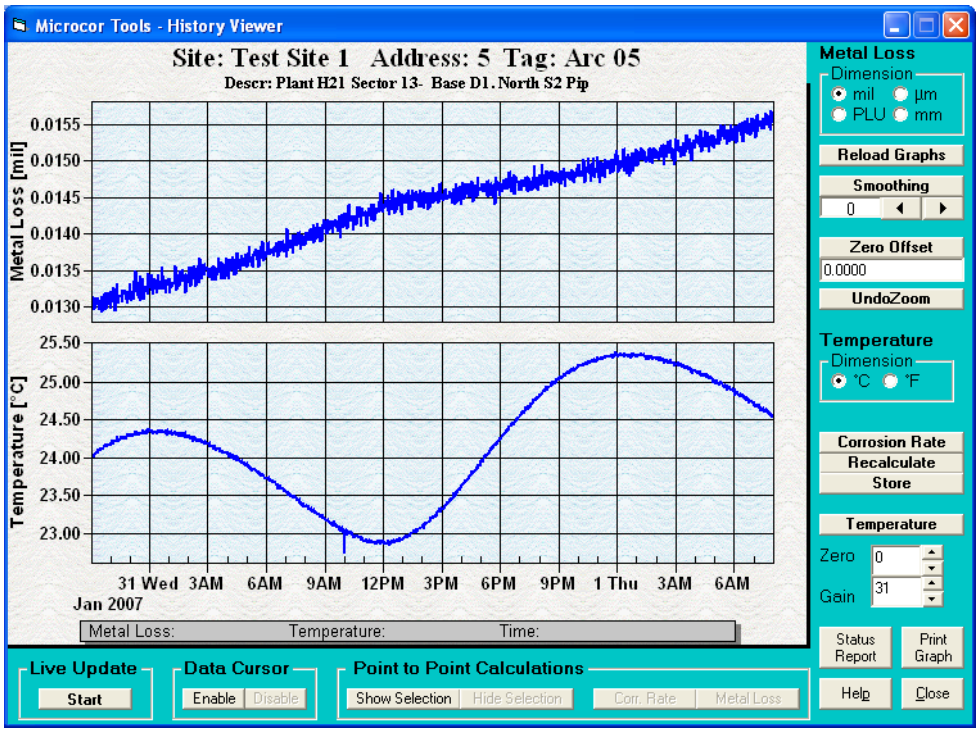
1. Navigate to the graph, press and hold the left mouse button on the starting location.
2. Move the mouse horizontally and release the button at the desired end location.



Use the **UndoZoom** command button to return to the previous state of the graph.

Note: **UndoZoom** command button will only undo the last nine (9) graphical zoom changes and will adjust the Y-axis unit range to match the maximum ranges of the graphs. Click the **Reload Graphs** to return to the original graphs.

The zoom result from the above graph is shown below:

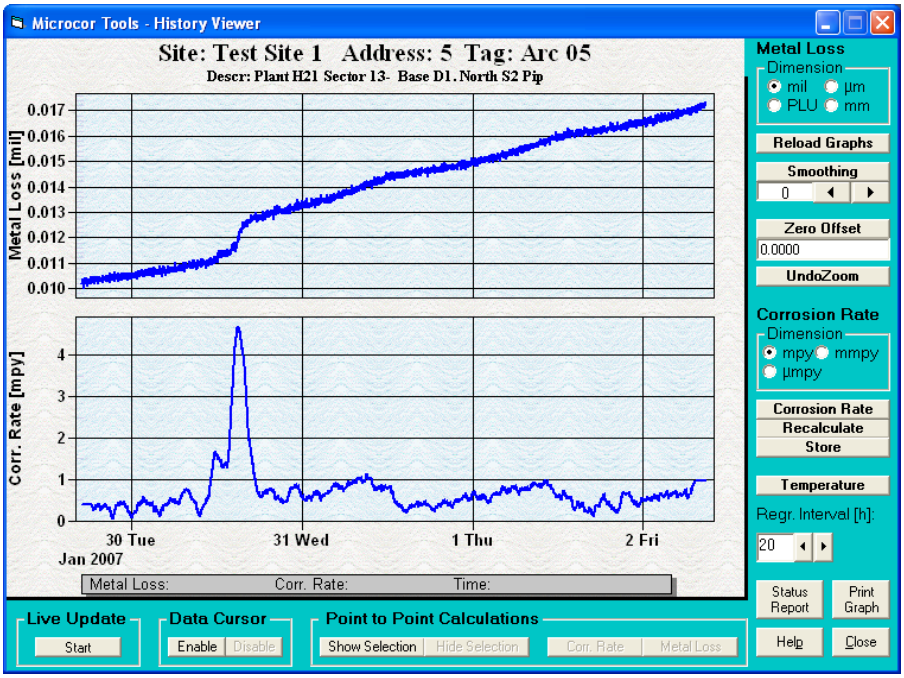


Smoothing is a process by which data points are averaged with their neighbors in a series to blur the sharp edges to depict smoother data points. At the default of zero, it plots every data point. The setting is the number of points used in a moving average to smooth the **Metal Loss** data. The maximum setting number is 100. Increase and decrease the number for more or less smoothing of graphs.

Note: This setting does not affect the data used for the Corrosion or Erosion Rate computation, since it is computed from the raw data.

Generating a Corrosion or Erosion Rate Graph for Microcor Transmitters

To generate a graph of Corrosion or Erosion Rate against time, press t**he Corrosion** or **Erosion Rate** command button.



The **Regression Interval [h]** control allows selecting a time interval used to calculate the **Corrosion** or **Erosion Rate** graph (linear regression algorithm).

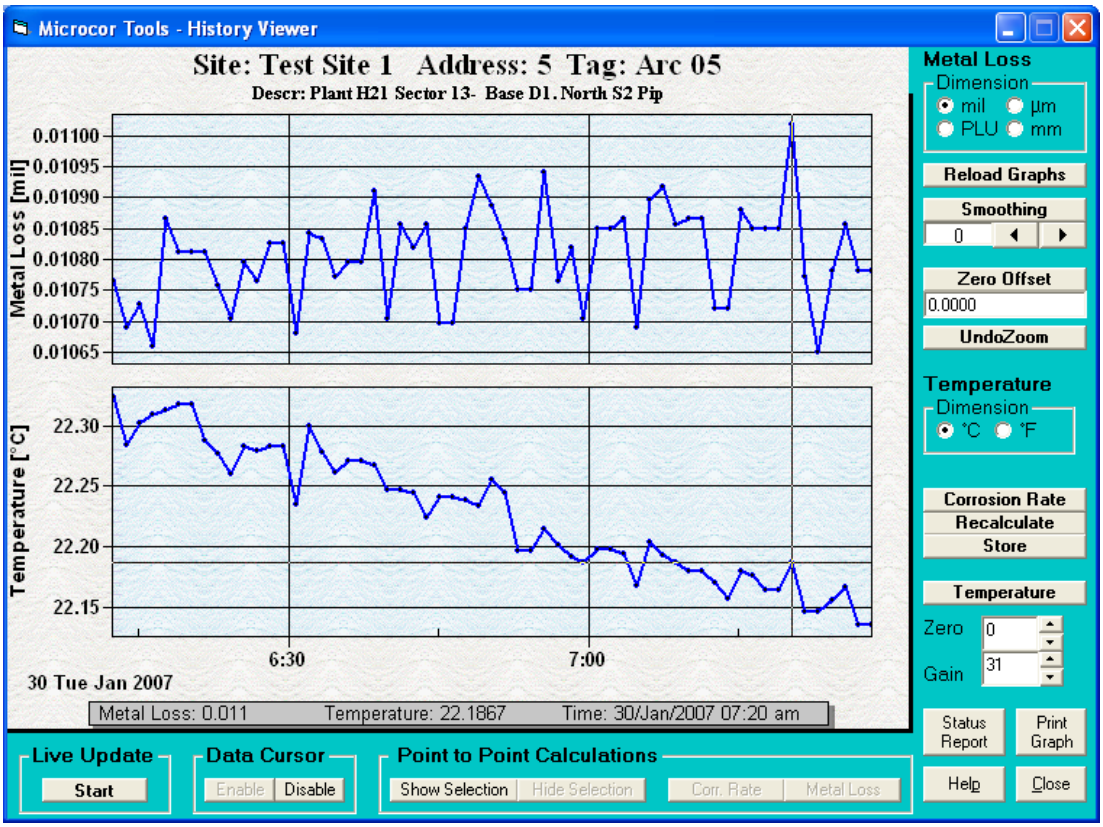
The Corrosion/Erosion Rate will be in units corresponding to the Metal Loss units that have been selected in Mils per Year (**mpy**), Millimeters Per Year (**mmpy**) or Micrometers per Year (**µmpy**), and will be calculated by linear regression on an initial default-running-window of 24 hours (20 hours when the collection time is set to 2 minute intervals). This regression period is displayed in hours and may be re-adjusted and the Corrosion/Erosion Rate re-run with the **Corrosion** or **Erosion Rate** command button. The interval may need adjustment to optimize noise versus sensitivity of the rate graph.

The Corrosion/Erosion Rate graph is computed from the metal loss data by determining the slope of the best straight line through the metal loss data. The best straight line is computed statistically by the method known as linear regression. For example if we have 7 days of metal loss data, we may typically want to calculate the slope or corrosion/erosion rate based on a moving 1 days worth of data. In this case, the first corrosion/erosion rate data point is produced after the first one day's worth of data. So for 7 days worth of metal loss data there is only 6 days worth of corrosion/erosion rate data. That is, the corrosion/erosion rate data will always be less than the metal loss data by the amount of the regression period.

The corrosion/erosion rate essentially represents the tangent to the metal loss curve. So if we use 1 day's worth of metal loss data for computation, then the corrosion/erosion rate value is calculated from half the regression period before and half the regression period after that time. Consequently with 7 days of metal loss data, the 6 days of corrosion/erosion rate data starts time-wise with ½ day blank at the beginning and ½ day blank at the end of the 7 day period. In fact, the Microcor Tools graph will show a horizontal line on the graph at each of these locations equal to the starting and ending corrosion/erosion rate values respectively.

Data Cursor

The **Data Cursor** function provides information for an individual data point. The **Enable** command button marks the data points on the graph with dots. Mouse clicking on the data point will refresh the **Metal Loss**, **Temperature/Corrosion Rate** (depending on the graph selected) and **Time** readings on the gray bar located at the bottom section of the graph. To disable the **Data Cursor** function, click the **Disable** command button.

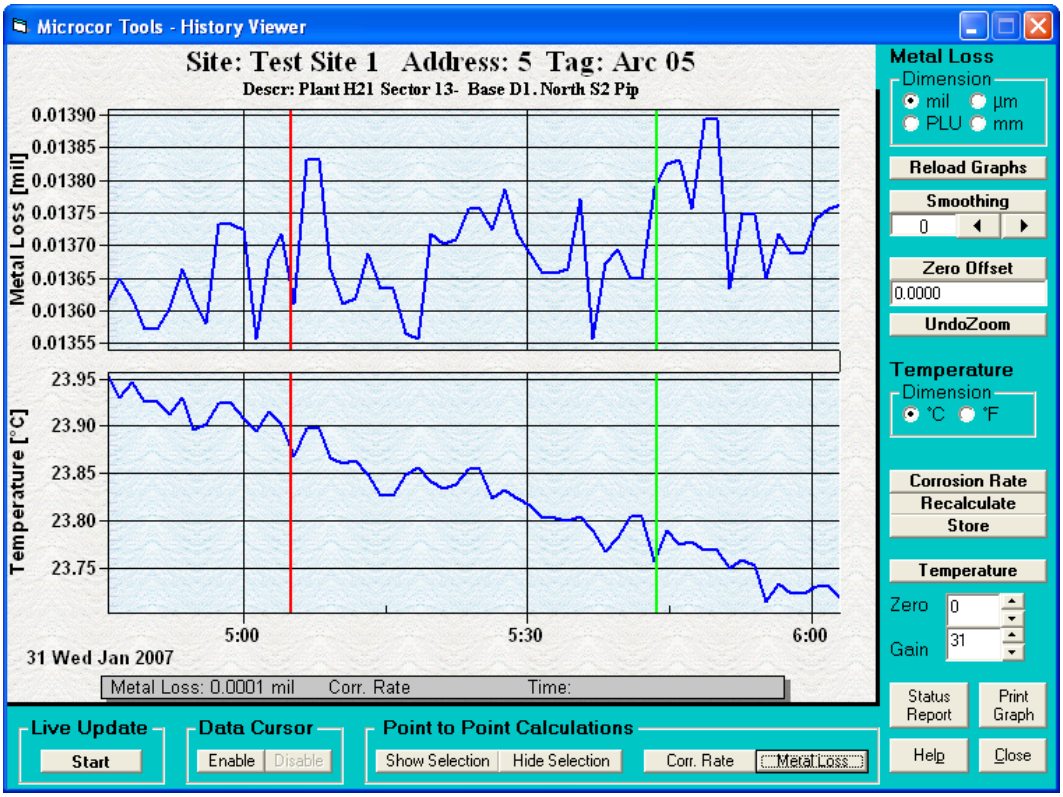


Point to Point Calculations

This function provides metal loss and corrosion rate calculation for a selected time-interval.

- Click on the Show Selection command button.
  -Two vertical lines (red and green) will appear on the screen.
- Click and drag the lines to the desired positions on the graph.
- Click the Corr. Rate or Metal Loss command buttons for the calculations to appear on the gray bar located at the bottom section of the graph.

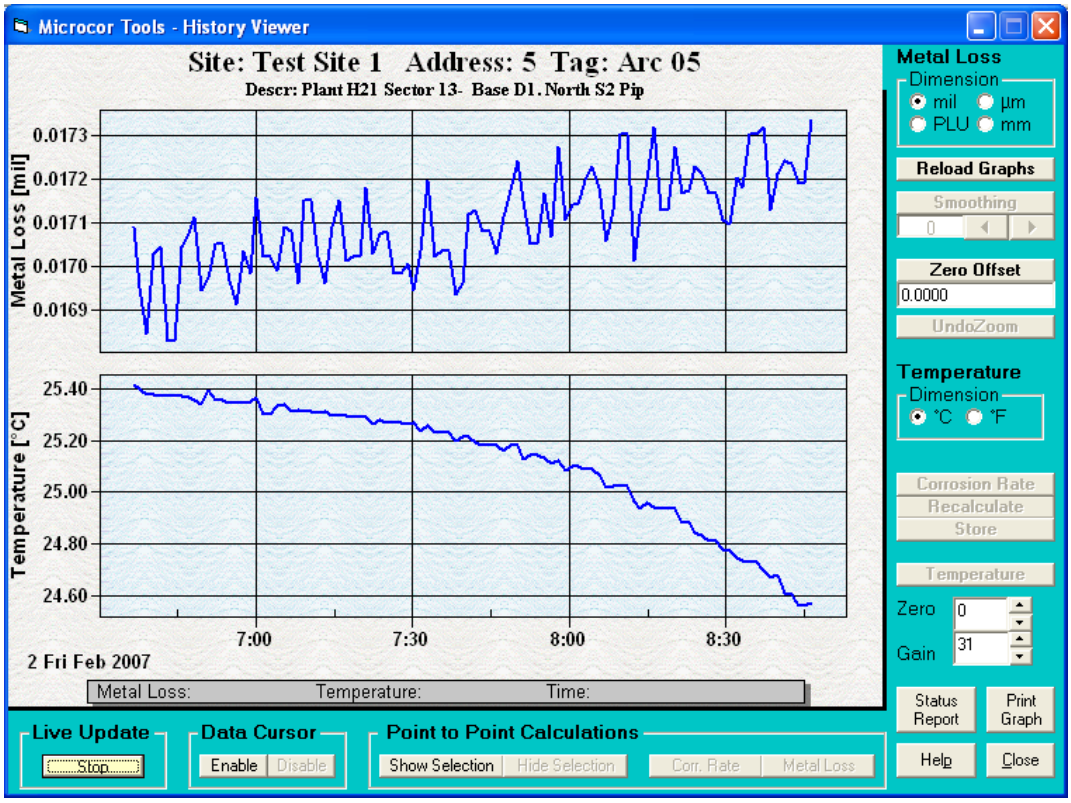
Click the **Hide** command button to disable this feature.



Live Update Graphing

When entering the **Microcor Tools – History Viewer**, the Metal Loss and Temperature (when applicable) graph(s) are loaded by default for the Microcor Transmitters and Imbalance and Corrosion Rate graphs are loaded for the E9020 Transmitters. These are static graphs where previously collected data stored in the Microcor Tools Software are loaded and displayed. It is possible to graphically display real-time data on systems with enabled online data collection (**Start** the **Online Communication** and **Data Collection** on the **Site/Communications** screen).

Zoom to the desired area of the graph and click the **Start** command button of the **Live Update**. The software will calculate the number of data points within the zoomed area and display that number of most recent data points and activate the real-time data update. It will invoke the data file every two minutes to obtain any newly collected data points and with each new data point update, it will drop the last (trailing) data point. **Live Update** displays raw, non-smoothed data. Alternatively, it is possible to click the **Start** command button of the **Live Update** prior to zooming to limit the display to the most recent 100 data points. It is possible to keep zooming-in while in **Live Update** mode, however, **UndoZoom**, **Smoothing**, switching between **Temperature** and **Corrosion Rate**, **Recalculate** and **Store** features are disabled. Choosing to **Stop, Reload Graphs, Enable** the **Data Cursor** or **Show** the **Selection Lines** will disable the **Live Update** and enable the previously disabled features.



The Corrosion/Erosion Rate graph is computed from the metal loss data by determining the slope of the best straight line through the metal loss data. The best straight line is computed statistically by the method known as linear regression (this is further explained above in the **Generating a Corrosion or Erosion Rate Graph** section.

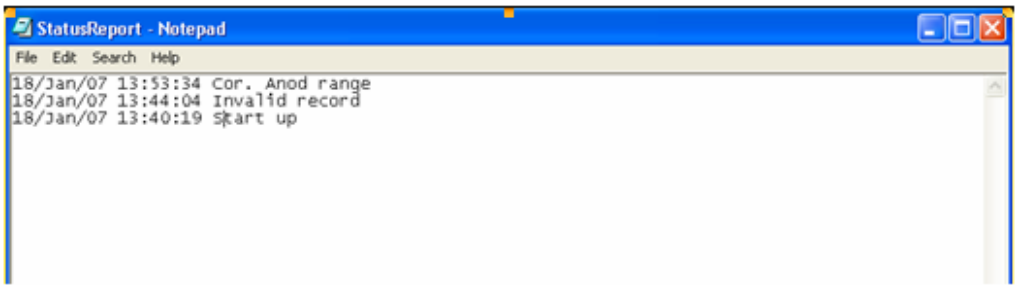
With on-line systems future data to use in computations is unavailable. So latest computed corrosion/erosion rate is really the value for half the regression period prior to the current time. In the absence of the future data it is assumed that this is also the best estimate of the current corrosion/erosion rate, and hence the horizontal line on the graph over this period (at the beginning and end of the graph).

When **Live Update** is activated, the rate graph is purposely shifted forward by half the regression period so that the latest computed corrosion rate value is shown at the present time. This makes it easier to view the metal loss and the best computed corrosion/erosion rate for the current time when zoomed-in. In the case of 7 days worth of metal loss data, this means that the 6 days of corrosion rate data will now be positioned with a blank period of 1 day at the start of the 7 days and no blank period at the end of the 7 days.

Note: If data is imported using the **Load from Archives** feature, ensure the **Transmitter Sampling Interval** is set to the original settings to obtain accurate number of data points when **Live Update** is used with the zoom feature.

Generating a Status Report

The history file that contains all the corrosion data also contains status codes. These status codes are not shown by the **Microcor Tools – History Viewer** graphs. The **Status Report** command button is intended to search the history file for status codes and to generate a report in standard text format. The command opens the report in the Notepad editor.

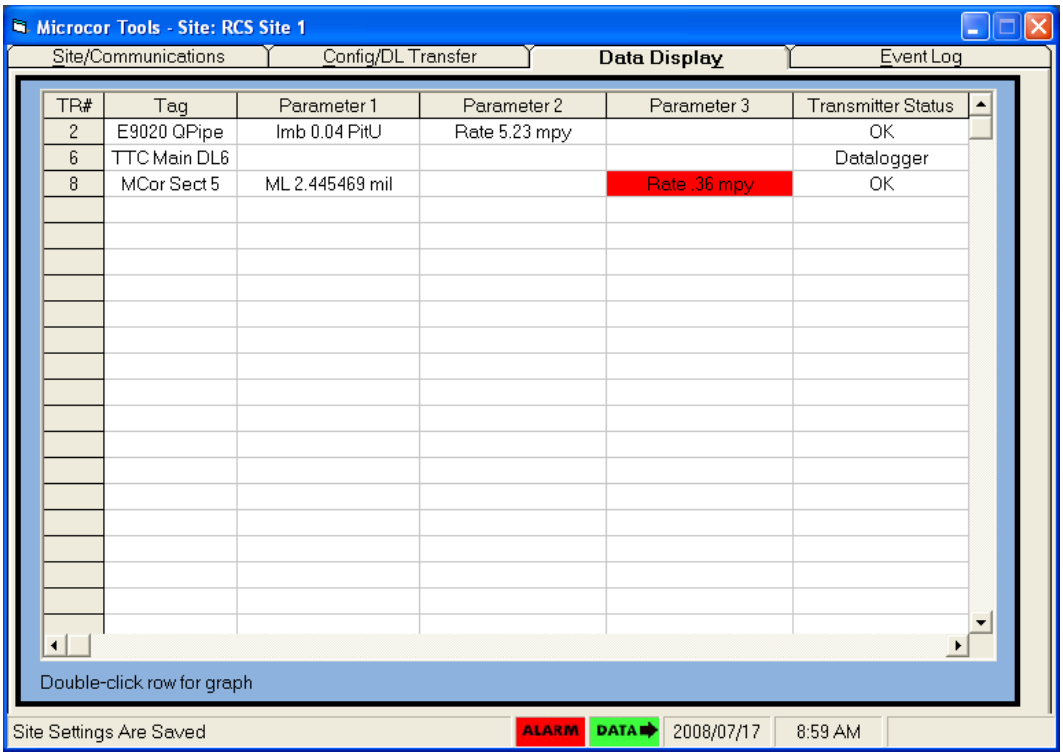


Use the Notepad “Print” or “Save As” commands to print or store the report on the hard drive.

Real-Time Data Monitoring

CHAPTER 6

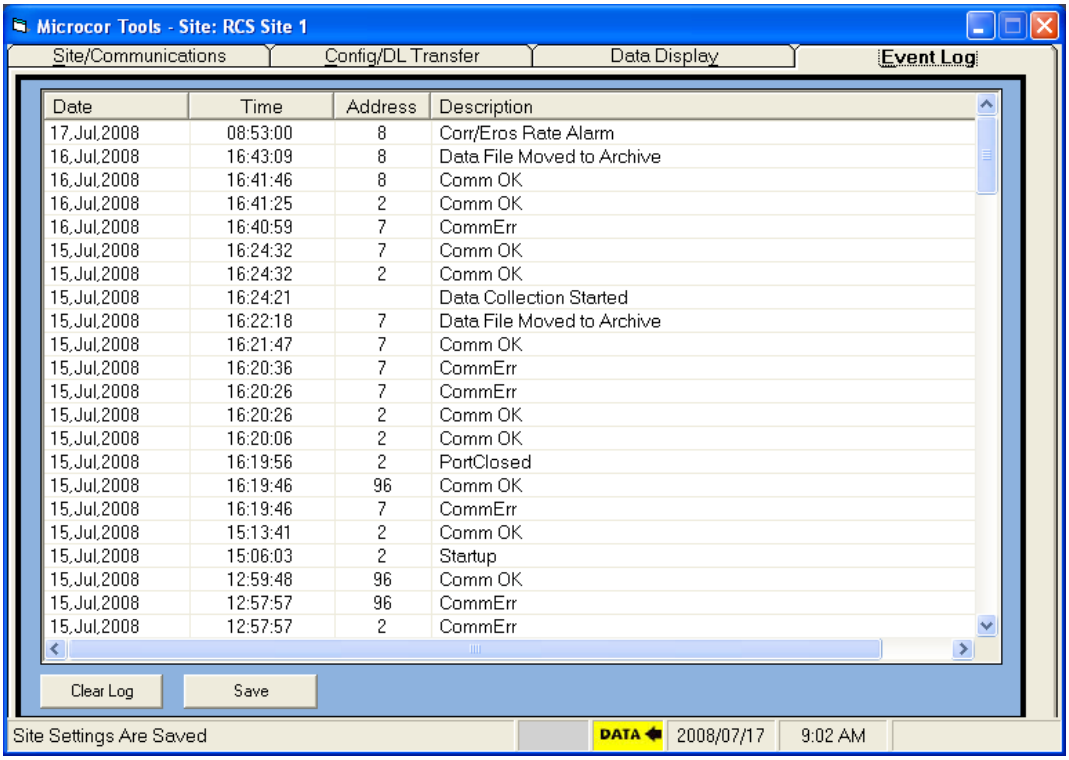
The **Data Display** tab is the most convenient global display for on-line systems. It shows current readings, alarm status codes and which addresses are data loggers. Each point on the **Data Display** maybe double-clicked to show the graphical display (**History Viewer**). This screen allows for monitoring and troubleshooting of RS485 bus and transmitters. Communication errors and transmitter status codes are listed in the **Transmitter Status** column while the column named **Parameter 3** will turn red if a unit is in alarm status. It will turn yellow when the alarm is acknowledged by the user; yellow means there is an ongoing alarm and it is acknowledged. When the alarm is turned off or when the corrosion rate resets to below the alarm rate, the column will return to normal. If a unit enters an alarm status and resets prior to user acknowledgement, red indicator will change color to blinking green and gray (on the bottom status bar of the screen) and will log this on the **Event Log**.



Event Log

CHAPTER 7

The **Event Log** tab is intended to collect and store different types of events in the system and to present them in a table format. The events are stored in a 500 element buffer. The **Save** button permits export of the event log information in to a text-format file. If a unit enters an alarm status and resets prior to user acknowledgement, red indicator will change color to blinking green and gray (on the bottom status bar of the screen) and will log this on the **Event Log**; hence it is highly recommended that the **Event Log** is inspected regularly.

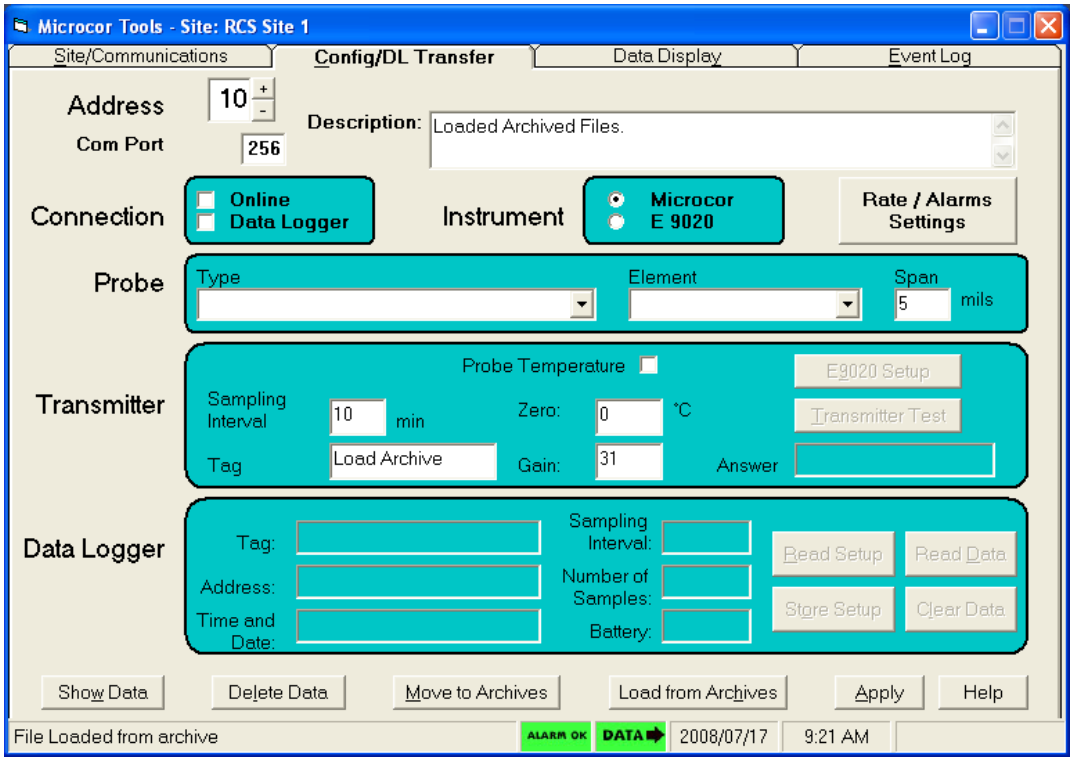


Date	Time	Address	Description
17,Jul,2008	08:53:00	8	Corr/Eros Rate Alarm
16,Jul,2008	16:43:09	8	Data File Moved to Archive
16,Jul,2008	16:41:46	8	Comm OK
16,Jul,2008	16:41:25	2	Comm OK
16,Jul,2008	16:40:59	7	CommErr
15,Jul,2008	16:24:32	7	Comm OK
15,Jul,2008	16:24:32	2	Comm OK
15,Jul,2008	16:24:21		Data Collection Started
15,Jul,2008	16:22:18	7	Data File Moved to Archive
15,Jul,2008	16:21:47	7	Comm OK
15,Jul,2008	16:20:36	7	CommErr
15,Jul,2008	16:20:26	7	CommErr
15,Jul,2008	16:20:26	2	Comm OK
15,Jul,2008	16:20:06	2	Comm OK
15,Jul,2008	16:19:56	2	PortClosed
15,Jul,2008	16:19:46	96	Comm OK
15,Jul,2008	16:19:46	7	CommErr
15,Jul,2008	15:13:41	2	Comm OK
15,Jul,2008	15:06:03	2	Startup
15,Jul,2008	12:59:48	96	Comm OK
15,Jul,2008	12:57:57	96	CommErr
15,Jul,2008	12:57:57	2	CommErr

Archiving and Importing Data

CHAPTER 8

Collected data may be archived when the data files become large enough to slow down the graphing function, typically over 65,000 points. Data may also be retrieved from archives into the program, and this function may also be used to import data files such as those from the previous versions of the Microcor software or from other Microcor Tools software users.



Archiving Data

When moving data to the archives, this data is always stored in the **Archives** folder. The path is as follows; C:\Program Files\Microcor Tools\data\Site Name\ archives.

To archive a data file, select the **Address** to be archived and press the **Move to Archives** command button. Each time a file is archived, the date is added to the file name to prevent overwriting of any earlier dated file. This protection function does not operate if the data has the same date, therefore, archiving is permitted only once per day.

Archive files have automatically assigned names. For example, the archive file of location Address 15, created on 13 May, 2003 is ch15_13May03.dat. The same address archived the following day would be ch15_14May03.dat.

Note: The naming convention used for archiving allows only one archive per day.

Importing Archived Data

To retrieve an archived file, press the **Load from Archives** command button. The default opening location of the browse box will be the Archives folder.

To import data from some other data files such as those from the previous versions of Microcor or from other Microcor Tools users, browse to the required file and select the **Open** button.

Data files (*.DAT) can be imported from other Microcor Tools users or previous versions of Microcor Tools. However, these files do not contain user specified details as probe span and probe reading interval. This information will need to be manually entered on the **Config/DL Transfer** screen to accurately process the data for display and calculations. This information can be found in the source data file (*.SET); probe reading interval can also be found on the graph by clicking the **Enable** on the **Data Cursor** and checking the reading interval.

Auto Archiving

The **Auto Archiving** feature in the main screen is designed for computers with limited storage resources. If the **Auto Archiving** is selected, when a site collects 2MB of data (approximately 48,620 readings or 67 days of continuous data collection (temperature data collection enabled) at a sampling interval of 2 minutes), the data file is automatically transferred into the archives folders replacing previously stored data file. Naming convention of these archive files are different compared to use instigated archive file. For example, the archive file of location Address 15 is ch15.dat.

Note: When **Auto Archiving** is enabled, Microcor Tools initiates automatic archiving when the file reaches its limit, previous automatically stored archives will be deleted. This process will not delete any manually archived files.

Appendix A

Alloy Multipliers

These factors are recommended for use with the E9020 instrument. They are based upon use of CORRATER® electrodes which have surface areas of 5cm2 for "standard" probes and 0.5 cm^2 for "flush" probes.

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

Modbus Configuration

Appendix B

Modbus Slave ID: 1
Modbus Data Type: Float 32 **Customer: Gas Company** **Purchase Order:**
Sales Order: 80829 **Rev F 7/22/2008** **Ref System Diagram Rev F**

					Microcor Transmitters - Model MT-9485A						Corrater / Galvanic Transmitter - Model E-9020					
					Trx Address (I/N)	Metal Loss (mils)	Temp Change (F)	Calc Rate (mpy	Calc Rate w/ 24h filter (mpy)	Status	Trx Address (I/N)	Pitting (no units) or Galvanic (uA)	Corrosion Rate / Potential (mpy)	Reserved	Reserved	Status
Description	Trx Comm Port	Tag Number	Range 1	Range 2		Modbus Address	Modbus Address	Modbus Address	Modbus Address	Modbus Address		Modbus Address	Modbus Address	Modbus Address	Modbus Address	Modbus Address
					0	40,001	40,003	40,005	40,007	40,009	0	40,001	40,003	40,005	40,007	40,009
					1	40,011	40,013	40,015	40,017	40,019	1	40,011	40,013	40,015	40,017	40,019
					2	40,021	40,023	40,025	40,027	40,029	2	40,021	40,023	40,025	40,027	40,029
					3	40,031	40,033	40,035	40,037	40,039	3	40,031	40,033	40,035	40,037	40,039
					4	40,041	40,043	40,045	40,047	40,049	4	40,041	40,043	40,045	40,047	40,049
					5	40,051	40,053	40,055	40,057	40,059	5	40,051	40,053	40,055	40,057	40,059
					6	40,061	40,063	40,065	40,067	40,069	6	40,061	40,063	40,065	40,067	40,069
					7	40,071	40,073	40,075	40,077	40,079	7	40,071	40,073	40,075	40,077	40,079
					8	40,081	40,083	40,085	40,087	40,089	8	40,081	40,083	40,085	40,087	40,089
					9	40,091	40,093	40,095	40,097	40,099	9	40,091	40,093	40,095	40,097	40,099
					10	40,101	40,103	40,105	40,107	40,109	10	40,101	40,103	40,105	40,107	40,109
					11	40,111	40,113	40,115	40,117	40,119	11	40,111	40,113	40,115	40,117	40,119
					12	40,121	40,123	40,125	40,127	40,129	12	40,121	40,123	40,125	40,127	40,129
					13	40,131	40,133	40,135	40,137	40,139	13	40,131	40,133	40,135	40,137	40,139
					14	40,141	40,143	40,145	40,147	40,149	14	40,141	40,143	40,145	40,147	40,149
					15	40,151	40,153	40,155	40,157	40,159	15	40,151	40,153	40,155	40,157	40,159
					16	40,161	40,163	40,165	40,167	40,169	16	40,161	40,163	40,165	40,167	40,169
					17	40,171	40,173	40,175	40,177	40,179	17	40,171	40,173	40,175	40,177	40,179
					18	40,181	40,183	40,185	40,187	40,189	18	40,181	40,183	40,185	40,187	40,189
					19	40,191	40,193	40,195	40,197	40,199	19	40,191	40,193	40,195	40,197	40,199
					20	40,201	40,203	40,205	40,207	40,209	20	40,201	40,203	40,205	40,207	40,209
					21	40,211	40,213	40,215	40,217	40,219	21	40,211	40,213	40,215	40,217	40,219
					22	40,221	40,223	40,225	40,227	40,229	22	40,221	40,223	40,225	40,227	40,229
					23	40,231	40,233	40,235	40,237	40,239	23	40,231	40,233	40,235	40,237	40,239
					24	40,241	40,243	40,245	40,247	40,249	24	40,241	40,243	40,245	40,247	40,249
					25	40,251	40,253	40,255	40,257	40,259	25	40,251	40,253	40,255	40,257	40,259
					26	40,261	40,263	40,265	40,267	40,269	26	40,261	40,263	40,265	40,267	40,269
					27	40,271	40,273	40,275	40,277	40,279	27	40,271	40,273	40,275	40,277	40,279

					28	40,281	40,283	40,285	40,287	40,289	28	40,281	40,283	40,285	40,287	40,289
					29	40,291	40,293	40,295	40,297	40,299	29	40,291	40,293	40,295	40,297	40,299
					30	40,301	40,303	40,305	40,307	40,309	30	40,301	40,303	40,305	40,307	40,309
					31	40,311	40,313	40,315	40,317	40,319	31	40,311	40,313	40,315	40,317	40,319
					32	40,321	40,323	40,325	40,327	40,329	32	40,321	40,323	40,325	40,327	40,329
					33	40,331	40,333	40,335	40,337	40,339	33	40,331	40,333	40,335	40,337	40,339
					34	40,341	40,343	40,345	40,347	40,349	34	40,341	40,343	40,345	40,347	40,349
					35	40,351	40,353	40,355	40,357	40,359	35	40,351	40,353	40,355	40,357	40,359
					36	40,361	40,363	40,365	40,367	40,369	36	40,361	40,363	40,365	40,367	40,369
					37	40,371	40,373	40,375	40,377	40,379	37	40,371	40,373	40,375	40,377	40,379
					38	40,381	40,383	40,385	40,387	40,389	38	40,381	40,383	40,385	40,387	40,389
					39	40,391	40,393	40,395	40,397	40,399	39	40,391	40,393	40,395	40,397	40,399
					40	40,401	40,403	40,405	40,407	40,409	40	40,401	40,403	40,405	40,407	40,409
					41	40,411	40,413	40,415	40,417	40,419	41	40,411	40,413	40,415	40,417	40,419
					42	40,421	40,423	40,425	40,427	40,429	42	40,421	40,423	40,425	40,427	40,429
					43	40,431	40,433	40,435	40,437	40,439	43	40,431	40,433	40,435	40,437	40,439
					44	40,441	40,443	40,445	40,447	40,449	44	40,441	40,443	40,445	40,447	40,449
					45	40,451	40,453	40,455	40,457	40,459	45	40,451	40,453	40,455	40,457	40,459
					46	40,461	40,463	40,465	40,467	40,469	46	40,461	40,463	40,465	40,467	40,469
					47	40,471	40,473	40,475	40,477	40,479	47	40,471	40,473	40,475	40,477	40,479
					48	40,481	40,483	40,485	40,487	40,489	48	40,481	40,483	40,485	40,487	40,489
					49	40,491	40,493	40,495	40,497	40,499	49	40,491	40,493	40,495	40,497	40,499
					50	40,501	40,503	40,505	40,507	40,509	50	40,501	40,503	40,505	40,507	40,509
					51	40,511	40,513	40,515	40,517	40,519	51	40,511	40,513	40,515	40,517	40,519
					52	40,521	40,523	40,525	40,527	40,529	52	40,521	40,523	40,525	40,527	40,529
					53	40,531	40,533	40,535	40,537	40,539	53	40,531	40,533	40,535	40,537	40,539
					54	40,541	40,543	40,545	40,547	40,549	54	40,541	40,543	40,545	40,547	40,549
					55	40,551	40,553	40,555	40,557	40,559	55	40,551	40,553	40,555	40,557	40,559
					56	40,561	40,563	40,565	40,567	40,569	56	40,561	40,563	40,565	40,567	40,569
					57	40,571	40,573	40,575	40,577	40,579	57	40,571	40,573	40,575	40,577	40,579
					58	40,581	40,583	40,585	40,587	40,589	58	40,581	40,583	40,585	40,587	40,589
					59	40,591	40,593	40,595	40,597	40,599	59	40,591	40,593	40,595	40,597	40,599
					60	40,601	40,603	40,605	40,607	40,609	60	40,601	40,603	40,605	40,607	40,609
					61	40,611	40,613	40,615	40,617	40,619	61	40,611	40,613	40,615	40,617	40,619
					62	40,621	40,623	40,625	40,627	40,629	62	40,621	40,623	40,625	40,627	40,629
					63	40,631	40,633	40,635	40,637	40,639	63	40,631	40,633	40,635	40,637	40,639
					64	40,641	40,643	40,645	40,647	40,649	64	40,641	40,643	40,645	40,647	40,649
					65	40,651	40,653	40,655	40,657	40,659	65	40,651	40,653	40,655	40,657	40,659
					66	40,661	40,663	40,665	40,667	40,669	66	40,661	40,663	40,665	40,667	40,669
					67	40,671	40,673	40,675	40,677	40,679	67	40,671	40,673	40,675	40,677	40,679
					68	40,681	40,683	40,685	40,687	40,689	68	40,681	40,683	40,685	40,687	40,689
					69	40,691	40,693	40,695	40,697	40,699	69	40,691	40,693	40,695	40,697	40,699
					70	40,701	40,703	40,705	40,707	40,709	70	40,701	40,703	40,705	40,707	40,709
					71	40,711	40,713	40,715	40,717	40,719	71	40,711	40,713	40,715	40,717	40,719
					72	40,721	40,723	40,725	40,727	40,729	72	40,721	40,723	40,725	40,727	40,729
					73	40,731	40,733	40,735	40,737	40,739	73	40,731	40,733	40,735	40,737	40,739

					74	40,741	40,743	40,745	40,747	40,749	74	40,741	40,743	40,745	40,747	40,749
					75	40,751	40,753	40,755	40,757	40,759	75	40,751	40,753	40,755	40,757	40,759
					76	40,761	40,763	40,765	40,767	40,769	76	40,761	40,763	40,765	40,767	40,769
					77	40,771	40,773	40,775	40,777	40,779	77	40,771	40,773	40,775	40,777	40,779
					78	40,781	40,783	40,785	40,787	40,789	78	40,781	40,783	40,785	40,787	40,789
					79	40,791	40,793	40,795	40,797	40,799	79	40,791	40,793	40,795	40,797	40,799
					80	40,801	40,803	40,805	40,807	40,809	80	40,801	40,803	40,805	40,807	40,809
					81	40,811	40,813	40,815	40,817	40,819	81	40,811	40,813	40,815	40,817	40,819
					82	40,821	40,823	40,825	40,827	40,829	82	40,821	40,823	40,825	40,827	40,829
					83	40,831	40,833	40,835	40,837	40,839	83	40,831	40,833	40,835	40,837	40,839
					84	40,841	40,843	40,845	40,847	40,849	84	40,841	40,843	40,845	40,847	40,849
					85	40,851	40,853	40,855	40,857	40,859	85	40,851	40,853	40,855	40,857	40,859
					86	40,861	40,863	40,865	40,867	40,869	86	40,861	40,863	40,865	40,867	40,869
					87	40,871	40,873	40,875	40,877	40,879	87	40,871	40,873	40,875	40,877	40,879
					88	40,881	40,883	40,885	40,887	40,889	88	40,881	40,883	40,885	40,887	40,889
					89	40,891	40,893	40,895	40,897	40,899	89	40,891	40,893	40,895	40,897	40,899
					90	40,901	40,903	40,905	40,907	40,909	90	40,901	40,903	40,905	40,907	40,909
					91	40,911	40,913	40,915	40,917	40,919	91	40,911	40,913	40,915	40,917	40,919
					92	40,921	40,923	40,925	40,927	40,929	92	40,921	40,923	40,925	40,927	40,929
					93	40,931	40,933	40,935	40,937	40,939	93	40,931	40,933	40,935	40,937	40,939
					94	40,941	40,943	40,945	40,947	40,949	94	40,941	40,943	40,945	40,947	40,949
					95	40,951	40,953	40,955	40,957	40,959	95	40,951	40,953	40,955	40,957	40,959
					96	40,961	40,963	40,965	40,967	40,969	96	40,961	40,963	40,965	40,967	40,969
					97	40,971	40,973	40,975	40,977	40,979	97	40,971	40,973	40,975	40,977	40,979
					98	40,981	40,983	40,985	40,987	40,989	98	40,981	40,983	40,985	40,987	40,989
					99	40,991	40,993	40,995	40,997	40,999	99	40,991	40,993	40,995	40,997	40,999
					100	41,001	41,003	41,005	41,007	41,009	100	41,001	41,003	41,005	41,007	41,009

Protocol

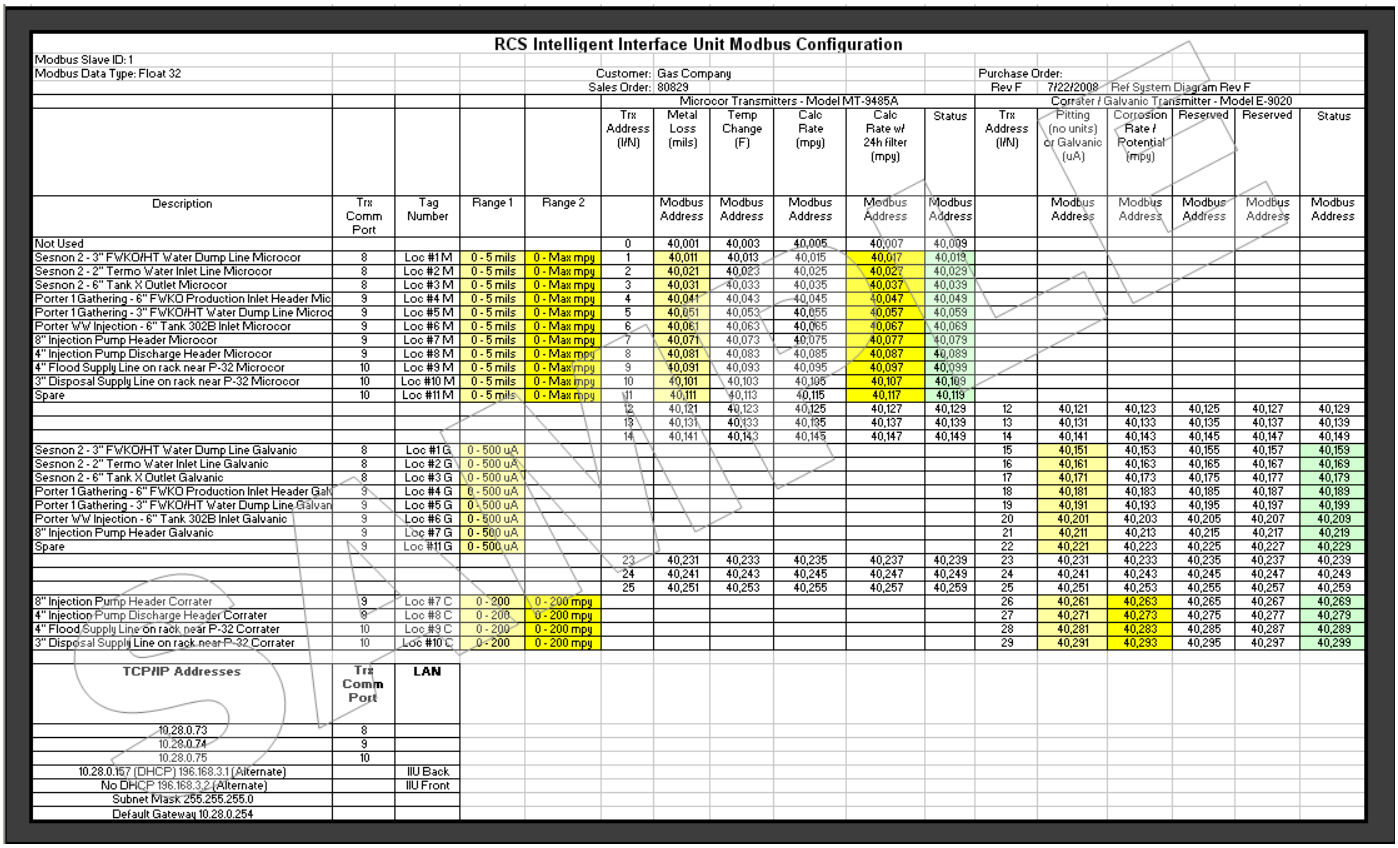
- Hardware output is RS-485 2 wire: Software output is settable ASCII or RTU, Default setting is 19200 Baud, 8 data bits, 1 stop bits, no parity

Scaling

- All outputs are scaled in engineering units as configured in the Microcor Tools with Output Interfaces software running on the IIU
- Error Codes from Microcor transmitters will produce large negative numbers in the applicable Modbus registers approx 3.8 times the probe span in engineering units set i.e for Microcor 5 mil span probe error codes typically around - 19.07
- Error Codes from E-9020 Corrater / Galvanic Transmitter will also produce large negative numbers in the applicable Modbus registers of approx. -762,935 on mpy units

Status Field for Microcor	
Status 1 - 2 Bytes	
Bit 0	Metal Loss Status (1=OK) Bit 0=1 if Bit 8=0, and Bit 9=0, and Bit 10=0
Bit 1	Temperature Status (1=OK)
Bit 2	Corrosion Rate Linear Regression (1=OK)
Bit 3	Corrosion Rate with 24 hr filter (1=OK)
Bit 4	Not Used
Bit 5	Not Used
Bit 6	Not Used
Bit 7	Not Used
Bit 8	Transmitter to IIU communication error (1=Error)
Bit 9	Transmitter in Startup (1=StartUp)
Bit 10	Probe or Probe Connection Failure (1=Failure)
Bit 11	Not Used
Bit 12	Not Used
Bit 13	Not Used
Bit 14	Not Used
Bit 15	Not Used
Status 2 - 2 Bytes	
Reserved	

Status Field for E-9020	
Status 1 - 2 Bytes	
Bit 0	Measurement Status (1=OK) Bit 0=1 if all Bits 8 to Bit 13 are =0
Bit 1	Not Used
Bit 2	Not Used
Bit 3	Not Used
Bit 4	Corrosion Rate Alarm (1=in alarm)
Bit 5	Not Used
Bit 6	Not Used
Bit 7	Not Used
Bit 8	Transmitter to IIU communication error (1=Error)
Bit 9	Transmitter in Startup (1=StartUp)
Bit 10	Probe or Probe Connection Failure (1=Failure)
Bit 11	Probe or Probe Connection Failure (1=Failure)
Bit 12	Probe or Probe Connection Failure (1=Failure)
Bit 13	Probe or Probe Connection Failure (1=Failure)
Bit 14	Not Used
Bit 15	Not Used
Status 2 - 2 Bytes	
Reserved	



RCS Intelligent Interface Unit Modbus Configuration

Modbus Slave ID: 1
Modbus Data Type: Float 32
Customer: Gas Company
Sales Order: 80829
Purchase Order:
Rev F 7/22/2008 Ref System Diagram Rev F

					Microcor Transmitters - Model MT-9485A						Corrater / Galvanic Transmitter - Model E-9020					
Description	Trx Comm Port	Tag Number	Range 1	Range 2	Trx Address (I/N)	Metal Loss (mils)	Temp Change (F)	Calc Rate (mpy)	Calc Rate w/ 24h filter (mpy)	Status	Trx Address (I/N)	Pitting (no units) or Galvanic (uA)	Corrosion Rate / Potential (mpy)	Reserved	Reserved	Status
						Modbus Address	Modbus Address	Modbus Address	Modbus Address	Modbus Address		Modbus Address	Modbus Address	Modbus Address	Modbus Address	Modbus Address
Not Used					0	40,001	40,003	40,005	40,007	40,009						
Sesnon 2 - 3" FWKO/HT Water Dump Line Microcor	8	Loc #1 M	0 - 5 mils	0 - Max mpy	1	40,011	40,013	40,015	40,017	40,019						
Sesnon 2 - 2" Termo Water Inlet Line Microcor	8	Loc #2 M	0 - 5 mils	0 - Max mpy	2	40,021	40,023	40,025	40,027	40,029						
Sesnon 2 - 6" Tank X Outlet Microcor	8	Loc #3 M	0 - 5 mils	0 - Max mpy	3	40,031	40,033	40,035	40,037	40,039						
Porter 1 Gathering - 6" FWKO Production Inlet Header Mic	9	Loc #4 M	0 - 5 mils	0 - Max mpy	4	40,041	40,043	40,045	40,047	40,049						
Porter 1 Gathering - 3" FWKO/HT Water Dump Line Microc	9	Loc #5 M	0 - 5 mils	0 - Max mpy	5	40,051	40,053	40,055	40,057	40,059						
Porter WW Injection - 6" Tank 302B Inlet Microcor	9	Loc #6 M	0 - 5 mils	0 - Max mpy	6	40,061	40,063	40,065	40,067	40,069						
8" Injection Pump Header Microcor	9	Loc #7 M	0 - 5 mils	0 - Max mpy	7	40,071	40,073	40,075	40,077	40,079						
4" Injection Pump Discharge Header Microcor	9	Loc #8 M	0 - 5 mils	0 - Max mpy	8	40,081	40,083	40,085	40,087	40,089						
4" Flood Supply Line on rack near P-32 Microcor	10	Loc #9 M	0 - 5 mils	0 - Max mpy	9	40,091	40,093	40,095	40,097	40,099						
3" Disposal Supply Line on rack near P-32 Microcor	10	Loc #10 M	0 - 5 mils	0 - Max mpy	10	40,101	40,103	40,105	40,107	40,109						
Spare	10	Loc #11 M	0 - 5 mils	0 - Max mpy	11	40,111	40,113	40,115	40,117	40,119						
					12	40,121	40,123	40,125	40,127	40,129	12	40,121	40,123	40,125	40,127	40,129
					13	40,131	40,133	40,135	40,137	40,139	13	40,131	40,133	40,135	40,137	40,139
					14	40,141	40,143	40,145	40,147	40,149	14	40,141	40,143	40,145	40,147	40,149
Sesnon 2 - 3" FWKO/HT Water Dump Line Galvanic	8	Loc #1 G	0 - 500 uA								15	40,151	40,153	40,155	40,157	40,159
Sesnon 2 - 2" Termo Water Inlet Line Galvanic	8	Loc #2 G	0 - 500 uA								16	40,161	40,163	40,165	40,167	40,169
Sesnon 2 - 6" Tank X Outlet Galvanic	8	Loc #3 G	0 - 500 uA								17	40,171	40,173	40,175	40,177	40,179
Porter 1 Gathering - 6" FWKO Production Inlet Header Gal	9	Loc #4 G	0 - 500 uA								18	40,181	40,183	40,185	40,187	40,189
Porter 1 Gathering - 3" FWKO/HT Water Dump Line Galvan	9	Loc #5 G	0 - 500 uA								19	40,191	40,193	40,195	40,197	40,199
Porter WW Injection - 6" Tank 302B Inlet Galvanic	9	Loc #6 G	0 - 500 uA								20	40,201	40,203	40,205	40,207	40,209
8" Injection Pump Header Galvanic	9	Loc #7 G	0 - 500 uA								21	40,211	40,213	40,215	40,217	40,219
Spare	9	Loc #11 G	0 - 500 uA								22	40,221	40,223	40,225	40,227	40,229
					23	40,231	40,233	40,235	40,237	40,239	23	40,231	40,233	40,235	40,237	40,239
					24	40,241	40,243	40,245	40,247	40,249	24	40,241	40,243	40,245	40,247	40,249
					25	40,251	40,253	40,255	40,257	40,259	25	40,251	40,253	40,255	40,257	40,259
8" Injection Pump Header Corrater	9	Loc #7 C	0 - 200	0 - 200 mpy							26	40,261	40,263	40,265	40,267	40,269
4" Injection Pump Discharge Header Corrater	9	Loc #8 C	0 - 200	0 - 200 mpy							27	40,271	40,273	40,275	40,277	40,279
4" Flood Supply Line on rack near P-32 Corrater	10	Loc #9 C	0 - 200	0 - 200 mpy							28	40,281	40,283	40,285	40,287	40,289
3" Disposal Supply Line on rack near P-32 Corrater	10	Loc #10 C	0 - 200	0 - 200 mpy							29	40,291	40,293	40,295	40,297	40,299

TCP/IP Addresses	Trx Comm Port	LAN
10.28.0.73	8	
10.28.0.74	9	
10.28.0.75	10	
10.28.0.157 (DHCP) 196.168.3.1 (Alternate)		IIU Back
No DHCP 196.168.3.2 (Alternate)		IIU Front
Subnet Mask 255.255.255.0		
Default Gateway 10.28.0.254		

OPC Configuration

Appendix C

OPC refers to OLE for Process Control protocol and is based on Microsoft's OLE/COM technology which is used for data transfer between databases.

When **Microcor Tools – Output Interfaces** is used on the RCS Intelligent Interface Unit (IIU), the Microcor Tools acts as the OPC Server to provide data transfer to the DCS, PCS or SCADA system running the OPC Client. While the principle of operation is simple, configuration can be complex as OPC is integrated into Microsoft security.

Workgroup vs. Domain Setup

Setting up the OPC Server computer (will be referred to as an IIU from this point forward) will differ on a workgroup computer network compared to a domain computer network. The IIU must be properly configured according to the local network to communicate with the client.

In order for the IIU and Client to properly communicate in a Workgroup environment, a common username (with Administrative privileges) and password is required to be set on both computers. The IIU and the Client must both be logged on to the Workgroup with the same user credentials for successful data transfer.

If the local network is on a domain, the he IIU may be added onto the domain. In this case, common usernames and passwords are not required. If the IIU cannot be added to the domain, then logon to the Client computer using a local profile instead of the domain profile (consult the IT Department for more details and assistance). A common username (with Administrative privileges) and password is required for successful connection and data transfer.

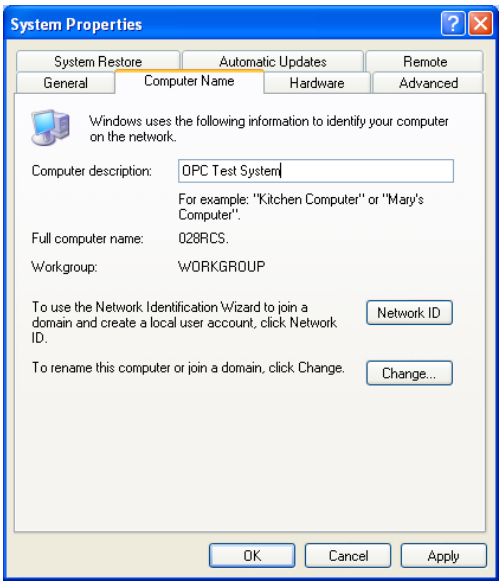
Most common Server-Client configurations supported are shown below:

OPC Server			OPC Client		
Server OS	**User Name**	**Network**	**Client OS**	**User Name**	**Network**
XP	rcsuser	Domain	XP	rcsuser	Domain
XP	rcsuser	Domain	XP	user2	Domain
XP	rcsuser	Domain	2000	rcsuser	Domain
XP	rcsuser	Domain	2000	user2	Domain

2000	user2	Workgroup	2000	user2	Workgroup
XP	rcsuser	Workgroup	XP	rcsuser	Workgroup
XP	rcsuser	Workgroup	2000	rcsuser	Workgroup
2000	rcsuser	Workgroup	XP	rcsuser	Workgroup
XP	rcsuser	D – LL*	XP	rcsuser	D – LL*
XP	rcsuser	Workgroup	2000	rcsuser	D – LL*
XP	rcsuser	Workgroup	XP	rcsuser	D – LL*

* PC is configured on the Domain but logged onto a local profile

Determine whether the client computer which will connect to the IIU is set up as a part of a domain or a workgroup network. To do this, navigate to **Start** → **Control Panel** (Classic View) → **System** and double click the **Computer Name** tab of the intended client computer (shown below):



Note: The above image shows that this computer (with the name **028RCS**) is in a Workgroup named **WORKGROUP**. If the system is in a domain, the word “Workgroup” will be replaced with “Domain” followed by the domain name.

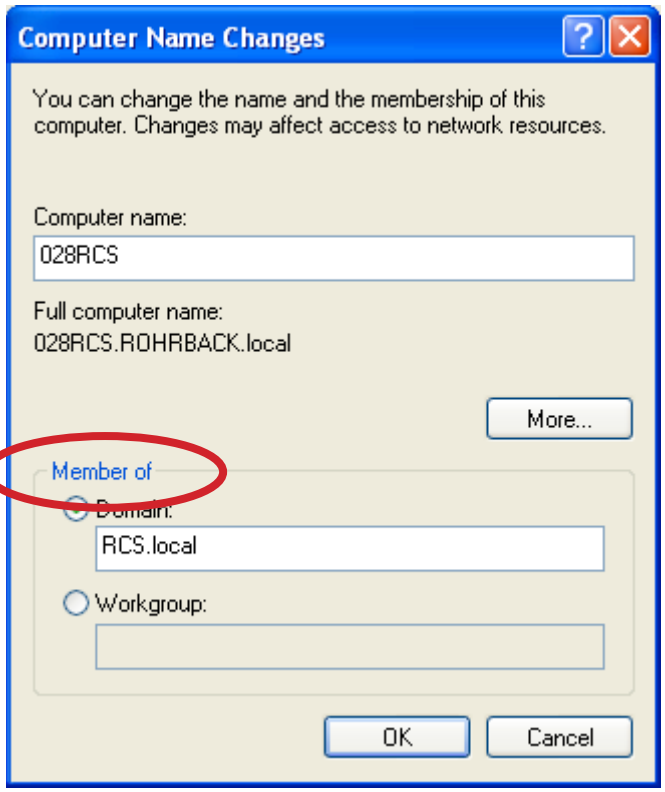
Configure the IIU on a Domain/Workgroup

Following are the steps taken to configure the IIU on a workgroup or a domain network. Administrative privileges on the IIU (username, password) are required in order to switch from a domain network configuration to a workgroup. If switching from a workgroup to a domain, Administrative privileges to the domain are required (consult IT Administrator for assistance). It is recommended that IT Department assistance is enlisted when going from a workgroup to a domain network.

Navigate to **Start** → **Control Panel** → **System** and double click the **Computer**

Name tab. Click on the **Change** button to advance to the **Computer Name Changes** screen (see image below).

On the **Member** of area, change from Domain/Workgroup as desired. When **OK** is clicked, it will prompt for a Username and Password of an administrator. If going to a workgroup, use a local computer administrator username and password, if going to a domain, have the IT Administrator enter the domain Administrator username and password.



The RCS Intelligent Interface Unit (IIU) by default is configured is as follows:

IIU Administrator Username: **Administrator**
Password: **RCSiiu**

Automatic Logon username and password:

Username: **rcsuser**
Password: **rcs**

Set up the IIU for a Workgroup Network Environment

The following section will explain the additional setup steps required when configuring the IIU in a workgroup network environment. An IIU as supplied is set by default as an OPC Server on a Workgroup with the name "WORKGROUP" and with automatic logon as Username **"rcsuser"** and password **"rcs".** For RCS supplied IIUs or for systems on domains networks, skip to the next section **2. Setup Automatic Logon – IIU Default** below.

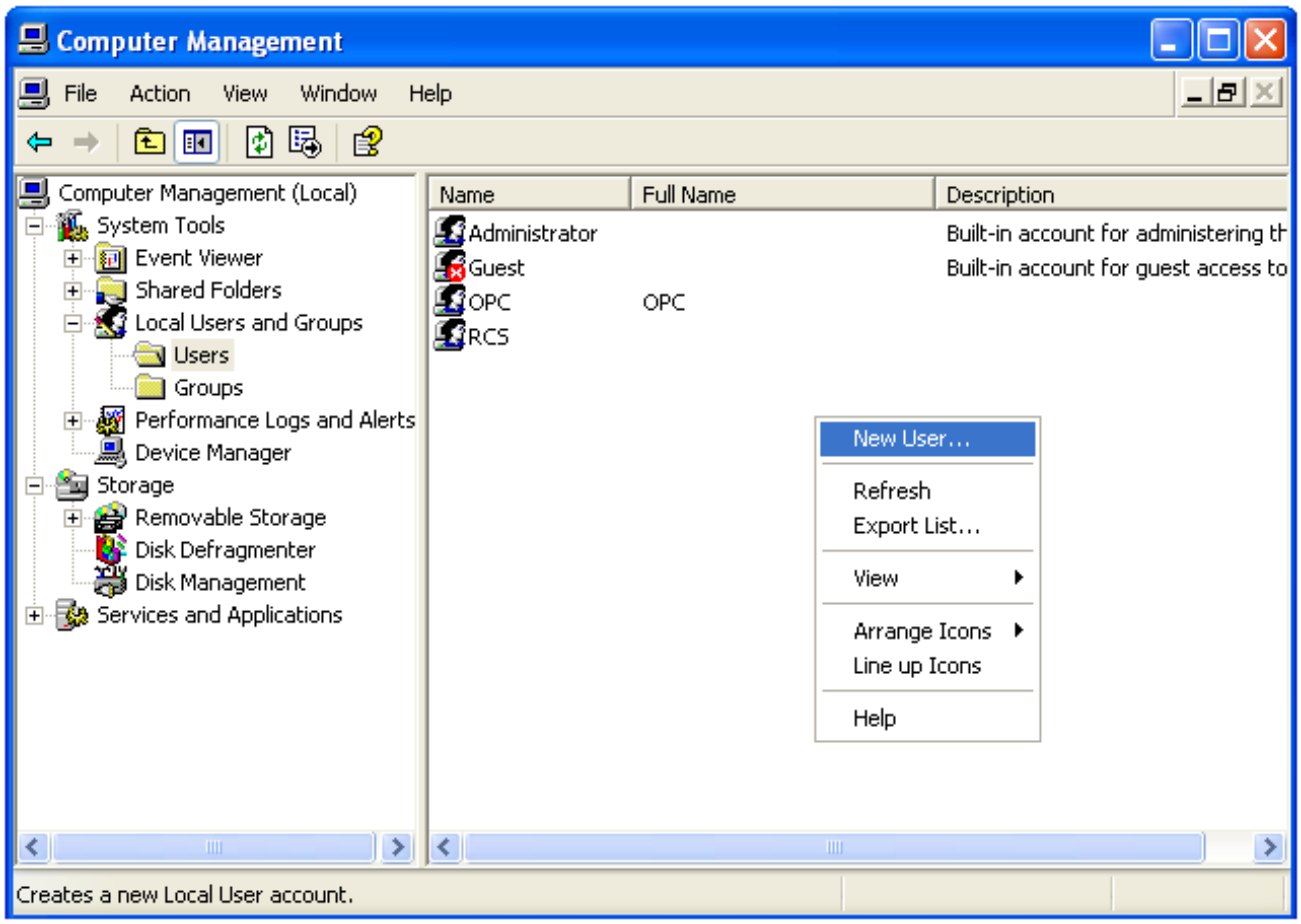
1. IIU on a Workgroup Network – IIU Default

In order for the IIU and Client to properly communicate it requires a common username and password to be set on both computers. It is recommended by RCS to use the following username and password with administrative privileges on both computers.

User Name: **rcsuser**
Password: **rcs**

Note: Administrative privileges are required on the computers to add a new user and make the necessary changes. It is recommended that the organization's IT Department is consulted for assistance/permission prior to changing configuration on the computers.

To create a new user profile, navigate to **Start** → **Control Panel** → **Administrative Tools** → **Computer Management** and expand **System Tools**. Find **Local Users and Groups**, expand and choose **Users.** Right-click on the right hand side and select **New User.**



This will open a New User dialogue box, Enter ***rcsuser*** as the **User name** and ***rcs*** as the **Password** and confirm the password.

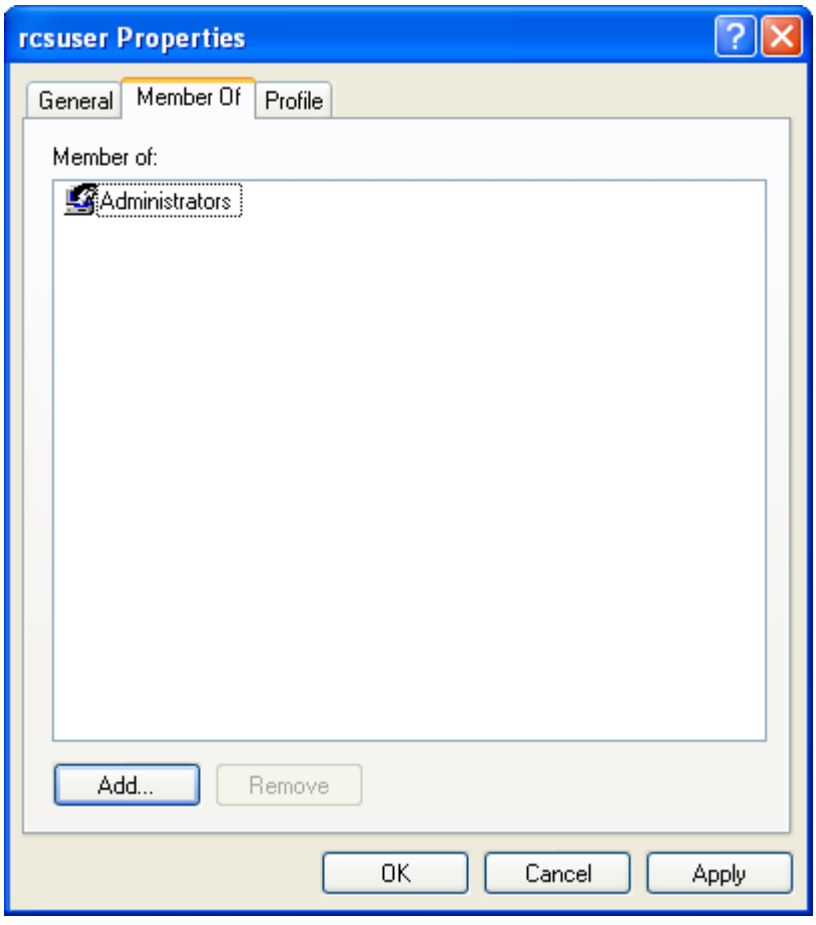
Before pressing the **Create** button;

1. Uncheck “User must change password at next logon.”
2. Check “password never expires.”
3. Check “User cannot change password.”

Press **Create** to create the user and **Close** the **New User** dialogue box. The new **rcsuser** profile can now be seen on the **Computer Management** screen. This user can now be added to be a member of the Administrators group. It is necessary for the rcsuser to have administrative privileges on the computer.

To set the configuration;

1. Right-click on the **rcsuser** name and select **Properties**.
2. Click on the **Member Of** tab. The rcsuser by default will be in the **Users** group.
3. Click **Add** and type in **Administrators** as the object type and click **OK**.
4. Click on **Users** and click **Remove** (once above steps are completed, rcsuser will have administrative privileges on the computer, see image below).



2. Setup Automatic Logon – IIU Default

Note: Administrative privileges are required to make changes to the registry. Follow steps with utmost caution to prevent serious damage to the operation of the operation system.

Caution: Deleting/Editing Registry Keys can cause serious damage to the operation of the system, only manipulate the described keys below. It is recommended that the organization's IT Department is consulted for assistance.

The following configures the username **rcsuser** and password **rcs** to automatically logon when the IIU is rebooted, substitute the proper username and password where applicable. Use the Registry Editor to add the auto logon information by following the steps below.

1. Click **Start** → **Run**, type ***regedit*** and click **OK**.

2. Locate the following registry key:
   - HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\WindowsNT\Current-Version\Winlogon

   - Double-click the **DefaultUserName** entry,
     1. Type **rcsuser**, and then click **OK**.

   - Double-click the **DefaultPassword** entry,
     1. Type **rcs** under the value data box, and then click **OK**.

     A. If there is no DefaultPassword value, create the value by following the steps below (If no DefaultPassword string is specified, Windows XP will automatically change the value of the AutoAdminLogon registry key from 1 (true) to 0 (false) to turn off the AutoAdminLogon feature):

     a. In Registry Editor, click **Edit,** click **New**, and then click **String Value**.

     b. Type **DefaultPassword** as the value name of the New Value created, and then press **ENTER**.

     c. Double-click the newly created key, and then type the password (rcs) in the **Value Data** box and click **OK**.

   - Double-click the **AutoAdminLogon** entry, type **1** in the **Value Data** box, and then click **OK**.
     1. If there is no AutoAdminLogon entry, create the entry by performing the following steps:
        a. In Registry Editor, click Edit, click New, and then click String Value.
        b. Type AutoAdminLogon as the value name, and then press ENTER.
        c. Double-click the newly created key, and then type 1 in the Value Data box.

3. Exit the Registry Editor.

4. Click **Start** → **Shutdown** → **Restart,** and then click **OK**. If the settings were changed successfully, the computer will automatically logon to the rcsuser profile.

3. Set Microcor Tools Software to Auto Launch – IIU Default

When using Microcor Tools for on-line monitoring, it should be setup in the Microsoft Windows Startup folder and the **Autostart** checkbox should be checked. This ensures that the program will restart automatically and commence the online communication and data collection when the computer is restarted after maintenance or power failure.

To add Microcor Tools to the Windows Startup folder, copy the Microcor Tools shortcut icon form the desktop and paste it in the **C:\Documents and Settings\All Users\Start Menu\Programs\Startup** directory.

Setup the Static Internet Protocol (IP) Address

In order for the IIU and the OPC Client computer to communicate, IP Addresses may need to be configured. The following recommended procedure is for networks that support Dynamic Host Configuration Protocol (DHCP).

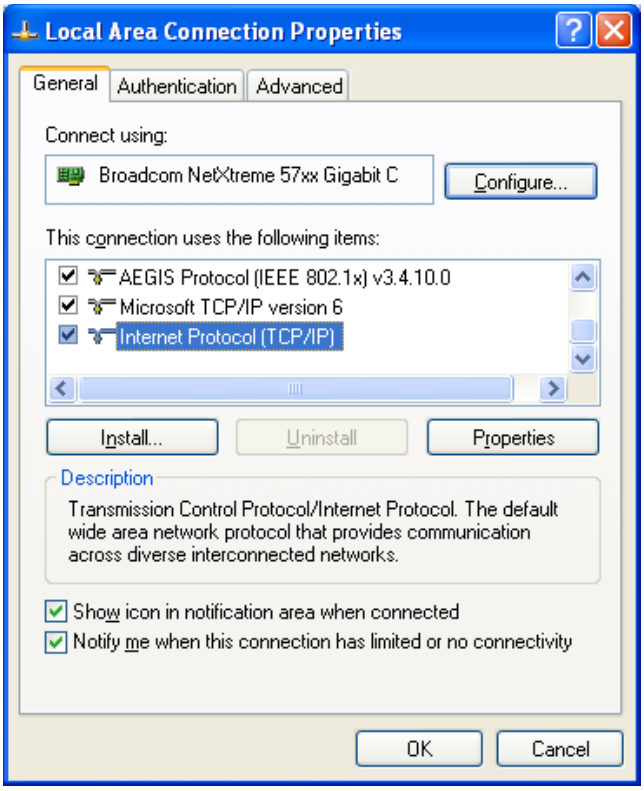
It is recommended that the IIU is set up with **Internet Protocol (TCP/IP) Properties** to **"Obtain IP Address automatically"** and the **Alternate Configuration** to be configured with the suggested following settings (default configuration of the IIU):

IP Address: **192.168.3.1**
Subnet Mask: **255.255.255.0**
Default Gateway: **192.168.3.254**

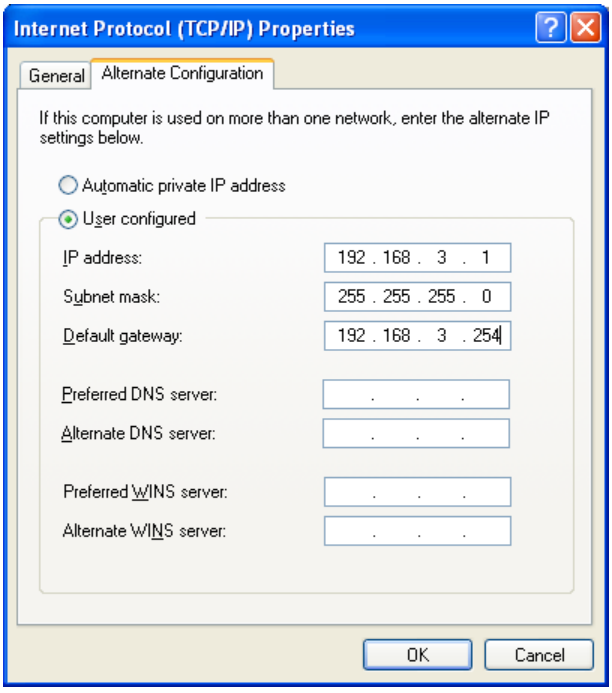
This configuration enables the IIU to be plugged directly into a network and obtain an IP Address from the DHCP Server or use the Alternate Configuration if a DHCP Server is not found or unavailable (i.e. if a cross-over cable is used). In order for the OPC Client computer to connect when a DHCP Server is unavailable, the Alternate Configuration on the client computer should be setup with an incremented IP Address such as **192.168.3.5** (IP Address range must be within **192.168.3.2** to **192.168.3.253**, however, if the IIU contains more than one network interface card, successive IP Addresses may be allocated, hence it is recommended that the client IP Addressing begins at 192.168.3.5). Consult the IT Department for more details.

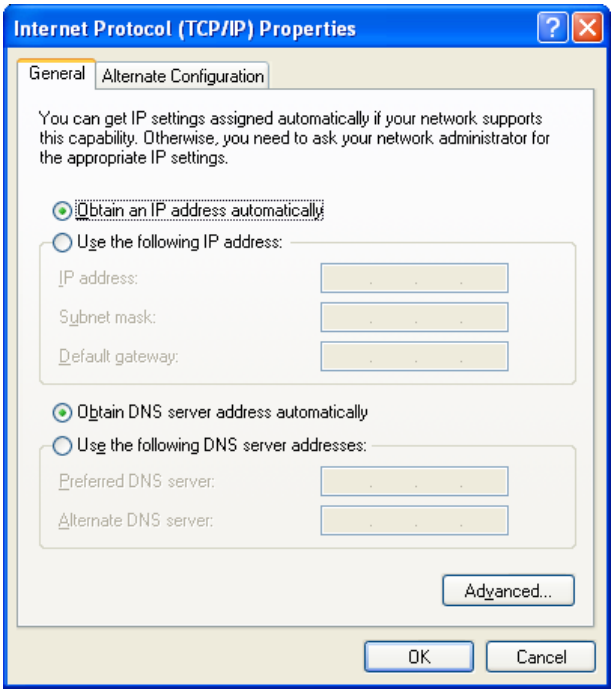
The typical navigational path and procedure to make the TCP/IP changes is as follows;

1. **Start → Control Panel → Network Connections → Local Area Connection.**
2. Right-click and select **Properties.**
3. Scroll, find and select the **Internet Protocol (TCP/IP)** under the **General** tab.
4. Click the **Properties** command button. See image below:



5. Set the configuration as follows under the **General** and **Alternate Configuration** tabs:

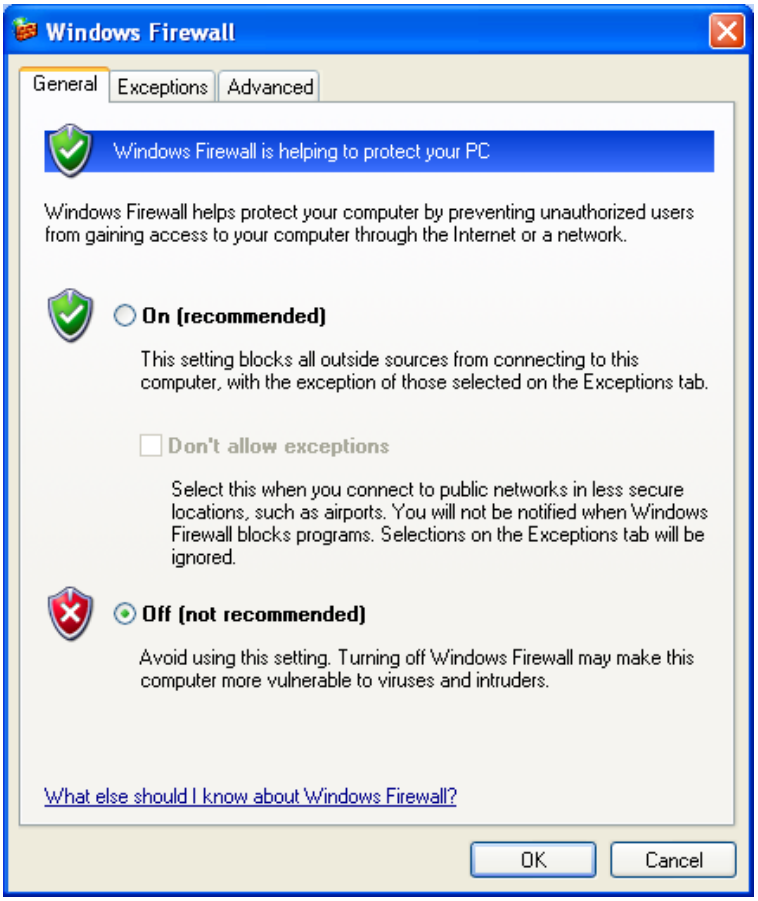




Note: If Static IP Addresses are used exclusively in the Domain or Workgroup, consult the IT Department for available Static IP Addresses, Subnet Mask, Default Gateway and assistance.

Windows Firewall Setup

Navigate to **Start** → **Control Panel** → **Windows Firewall** and select **Off (not recommended)** and click **OK**.



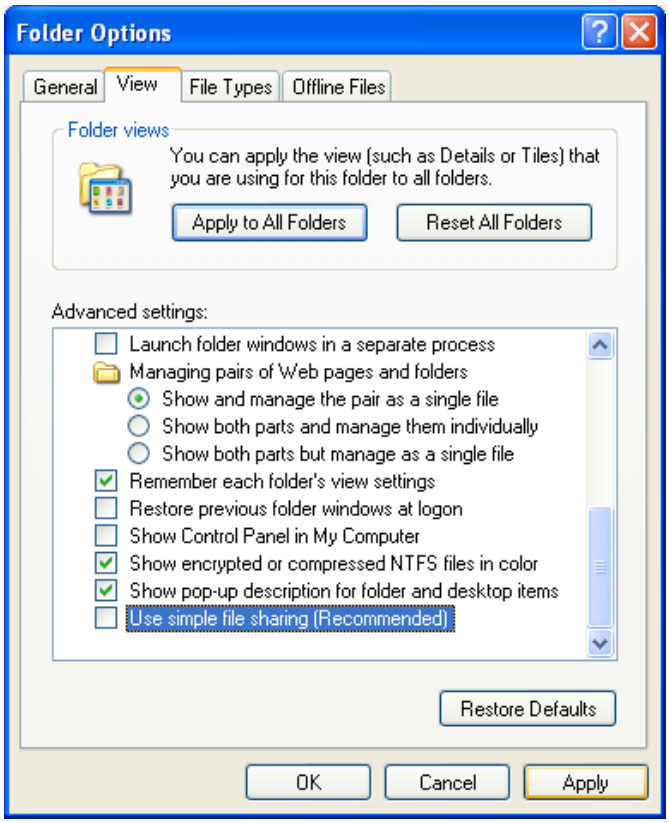
The Windows Firewall is designed to stop any incoming unsolicited communication across the network. In order to achieve successful communication with ease, the Windows Firewall of the RCS IIU is set to **Off** as the default configuration. It may be appropriate to permanently turn off the firewall if the machine is sufficiently protected behind a corporate firewall, however, this should be decided by the IT personnel of the ultimate destination where the IIU will reside.

Note: Once the setup procedure is completed and communication is verified, enable the firewall following the same process as above and selecting **ON (recommended)**. When enabling, certain **Exceptions** will need to be configured on the Windows Firewall. Refer to Appendix 4 for more details.

Note: If a cross-over cable is used to connect to the IIU, then the Windows Firewall may be required to be turned off prior to establishing the connection. Re-enable the firewall after disconnecting from the IIU.

Setup Windows Folder Properties: Disable “Use Simple Sharing” – IIU Default

1. Double click **My Computer** from the desktop or right-click **Start** and select **Explorer.**
2. Click **Tools** → **Folder Options** and select **View** tab (shown below).
3. Uncheck the “Use simple file sharing (Recommended).”
4. Click **Apply** followed by **OK**.

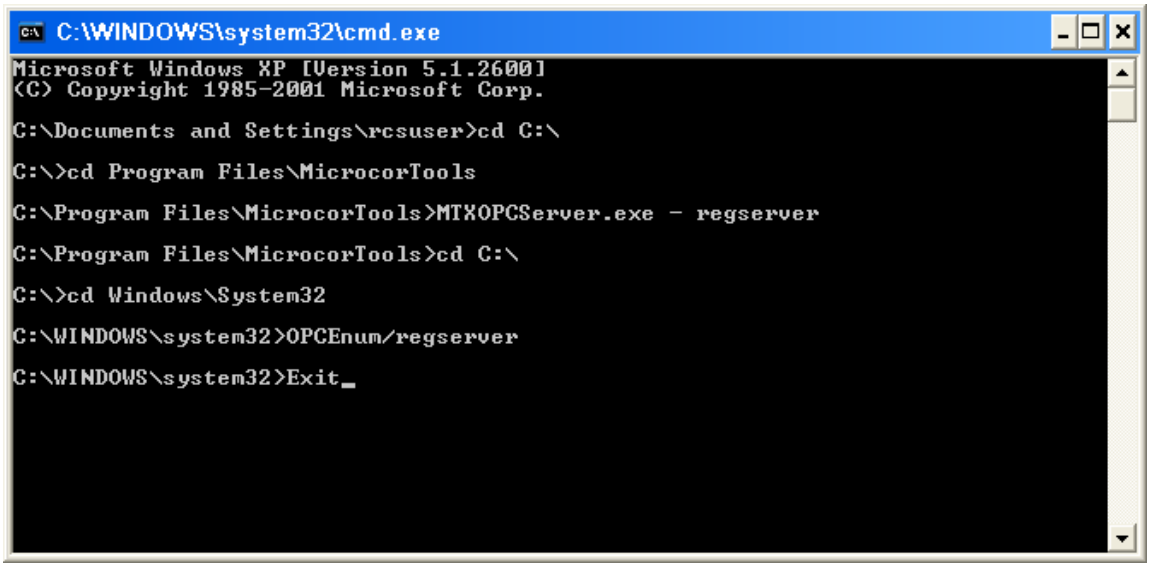


Install Microcor Tools Software and OPC Server Application – IIU Default

Install the Microcor Tools Software from the installation CD. It is important to retain all default options when installing. Once the installation is complete, follow the steps below to register the OPC Server.

1. Click **Start** → **Run**, type cmd and click **OK**.
2. Type **cd C:**
3. Type **cd Program Files\MicrocorTools**
4. Type **MTXOPCServer.exe – regserver**
5. If error messages appear, the registration is unsuccessful; make sure all steps are performed as explained above and that the user has sufficient privileges on the computer. Otherwise Type **cd C:**
6. Type **cd Windows\System32**
7. Type **OPCEnum/regserver**
8. If error messages appear, the registration is unsuccessful; make sure all steps are performed as explained above and that the user has sufficient privileges on the computer. Otherwise Type **Exit** to leave the Command Prompt window (see image below).

9. Install OPC Client Test Utility (Follow all instructions carefully when installing this application. Failure to follow instructions may result in serious damage to the operating system. Consult RCS for more information).

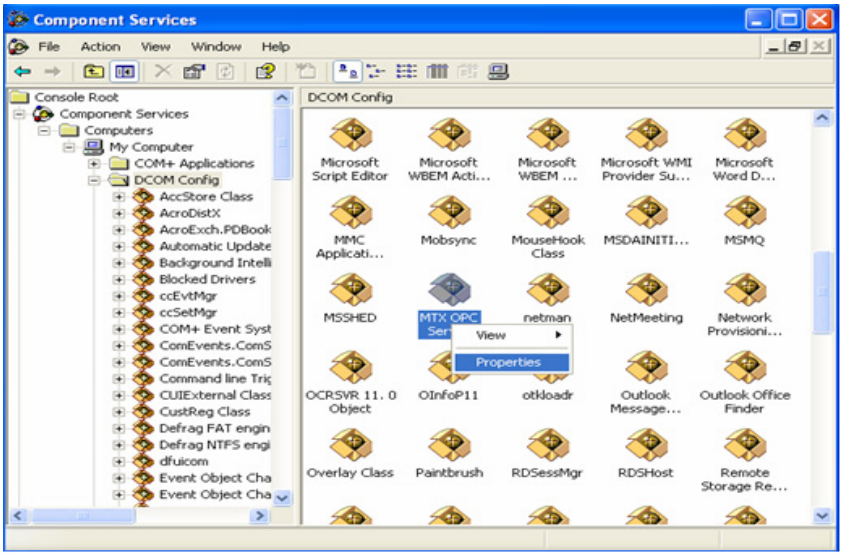


Setting up DCOM Properties (Workgroup Networks Only) – IIU Default

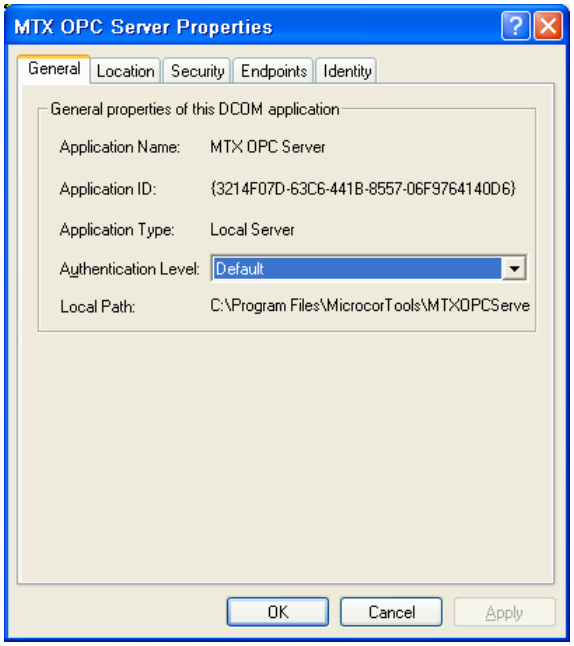
DCOM properties must be configured to assure the communication between the OPC Server and Client when using workgroup networks. Skip to the next section **Launching OPC Server** if using a domain network.

To setup the DCOM properties;

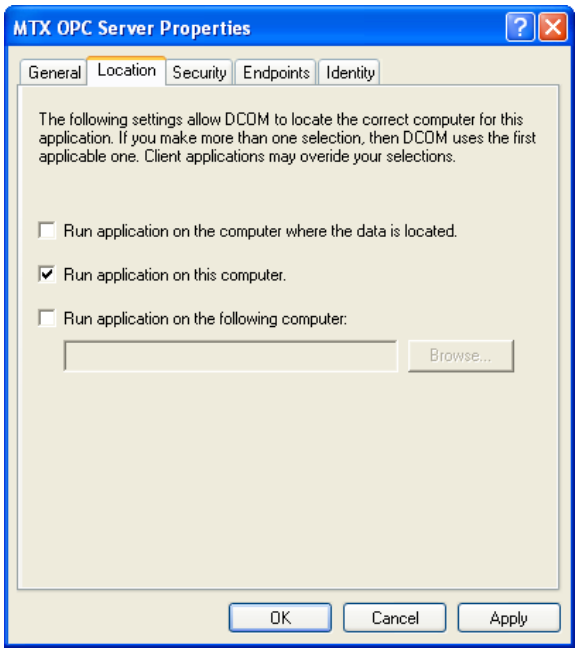
1. Navigate to **Start** → **Control Panel** → **Administrative Tools** → **Component Services.**
2. Expand the **Console Root** by clicking on it.
3. Click on the **Component Services** → **Computers** → **My Computer** → **DCOM Config** (see image below).



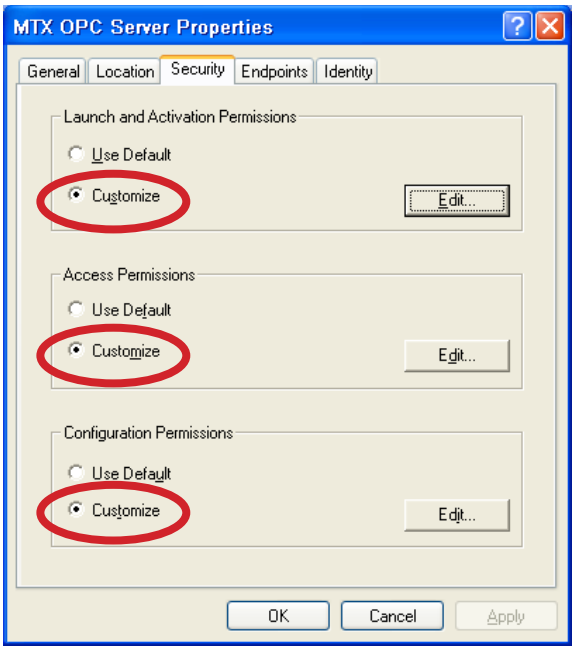
4. Find the **MTX OPC Server** entry.
5. Right-click and choose **Properties** (shown above).
6. Change the **Authentication Level** to **Default** on the **General** tab.



7. Select only the “Run application on this computer” on the **Location** tab and click **Apply** as shown below.

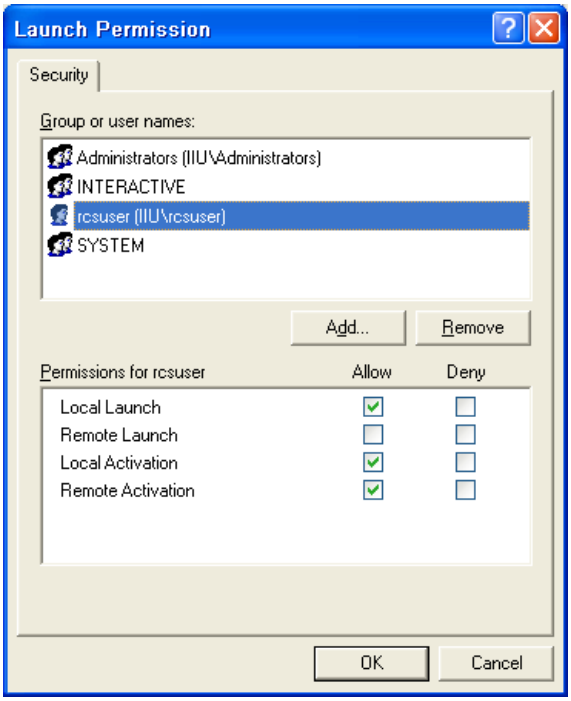


8. Change the **Launch and Activation Permissions, Access Permissions** and **Configuration Permission** to **Customize** in the **Security** tab and click **Apply.**

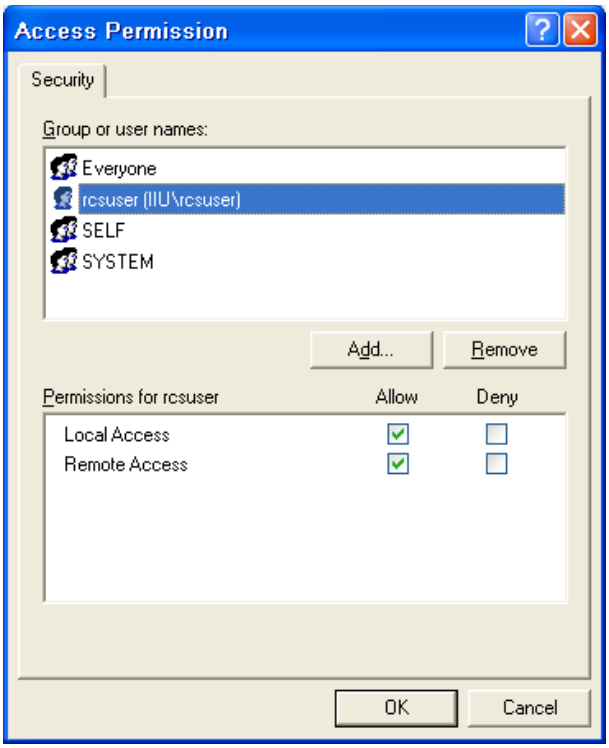


9. Click the **Edit** button under the **Launch and Activation Permissions** and ensure that **rcsuser** (or the appropriate username) is added.

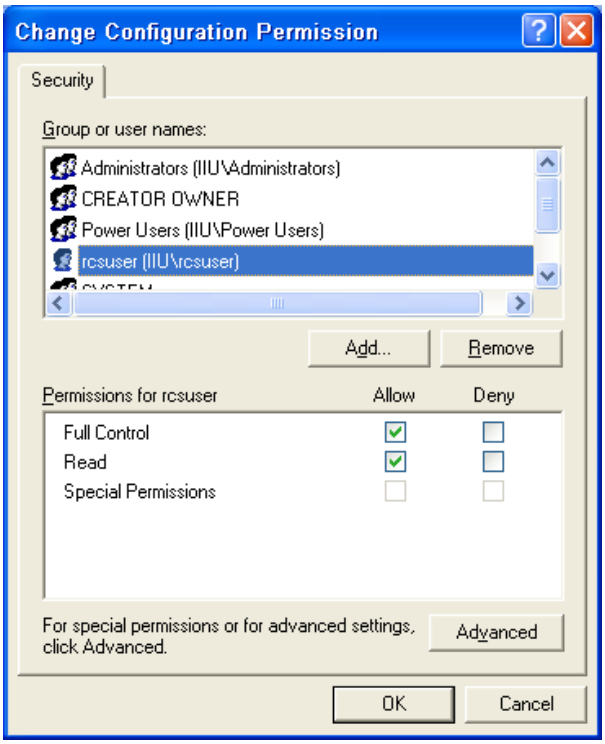
10. Verify that the permissions on all the **Groups or Users** are setup as shown below (note that the **Remote Launch** is disabled on all Groups or Users). Click **OK**.



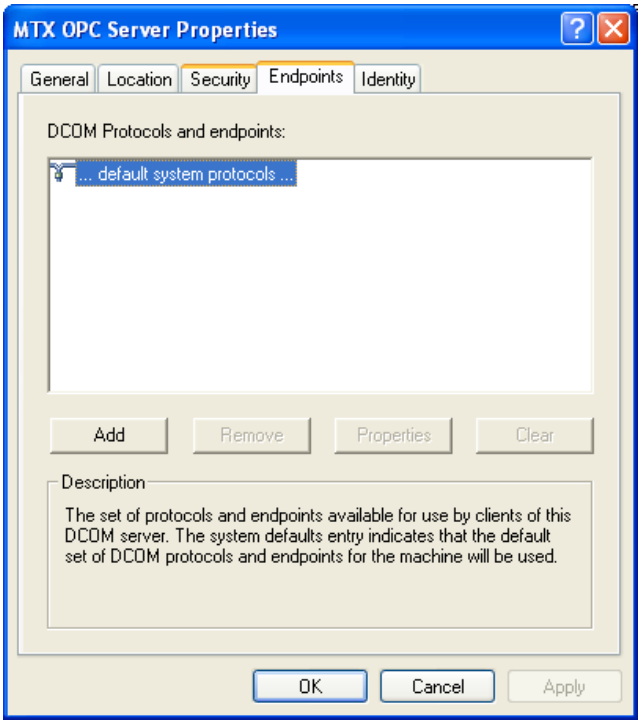
11. Click the **Edit** button under the **Access Permissions** and ensure that **rcsuser** (or the appropriate username) is added and all **Groups and Users** have full permissions allowed as shown below. Click **OK**.



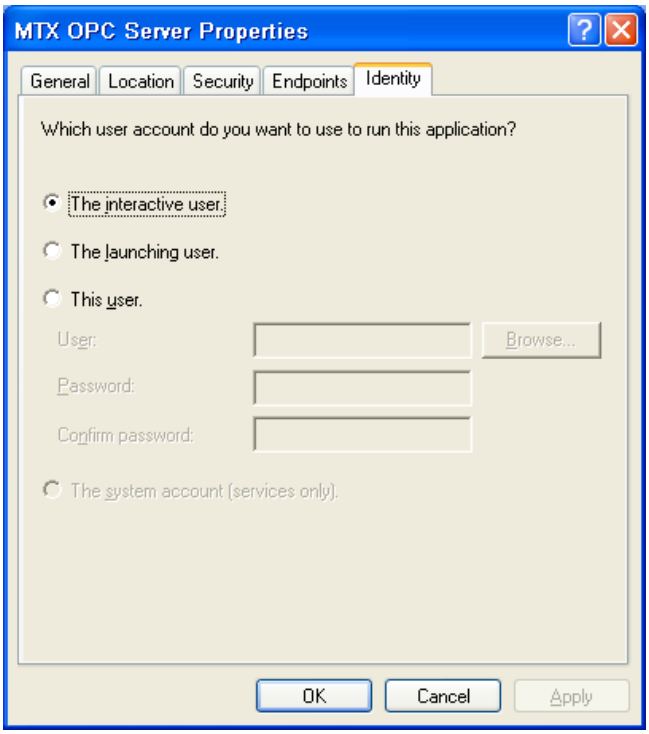
12. Click the **Edit** button under the **Configuration Permissions** and ensure that **rcsuser** (or the appropriate username) is added and all **Groups and Users** have full permissions allowed as shown below. Click **OK**.



13. Click **Apply** on the **Security** tab before moving on to the **Endpoints** tab (no changes made on the **Endpoints** tab, shown below).



14. Select the "**The Interactive User**" on the **Identity** tab and click **Apply**.



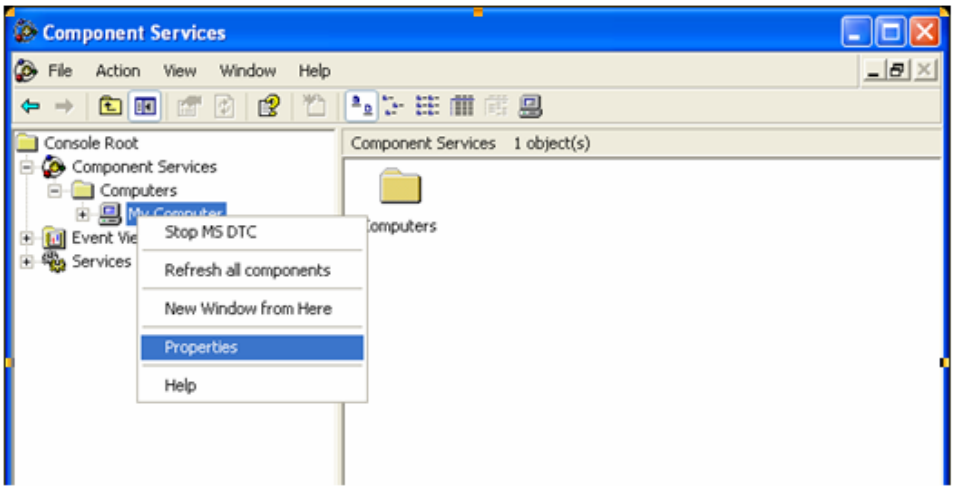
The OPC Server is now ready to be launched for the Workstation Network setup.

Setting up COM Security Properties – IIU Default

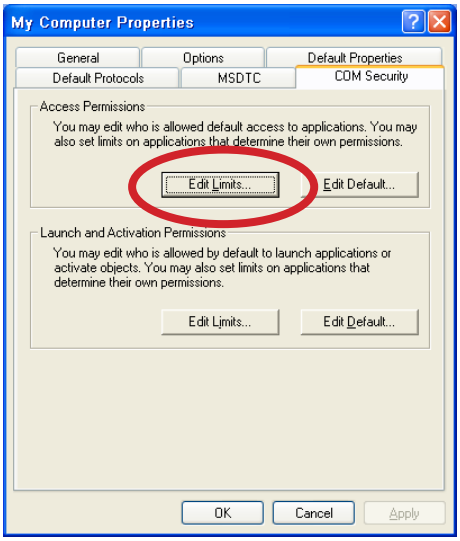
It is necessary to **Edit Limits** of the **My Computer Properties** of DCOM **COM Security** to allow **Everyone** full privileges. See below for step-by-step directions:

> **Note:** Since **Everyone** includes all authenticated users, it is often desirable to add these permissions to a smaller subset of users once all communications are verified. One suggested method by OPC Foundation to accomplish this is to use a group name such as “RCSOPC Users” and add all user accounts to this group that will execute any OPC Server or Client. Then substitute “RCSOPC Users” everywhere that **Everyone** appears in these configuration dialogs. RCS uses **Everyone** as a starting point since it is the most unrestricted and simple method to establish and verify connection. Refer to OPC Foundation website for best practices.

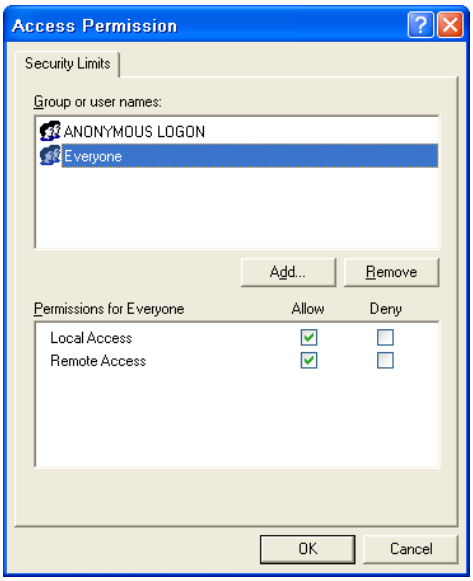
1. Navigate to **Start** → **Control Panel** → **Administrative Tools** → **Component Services.**
2. Expand the **Console Root** by clicking on it.
3. Click on the **Component Services** → **Computers** and right-click the **My Computer** icon and select **Properties** to enter the **My Computer Properties** (see image below).



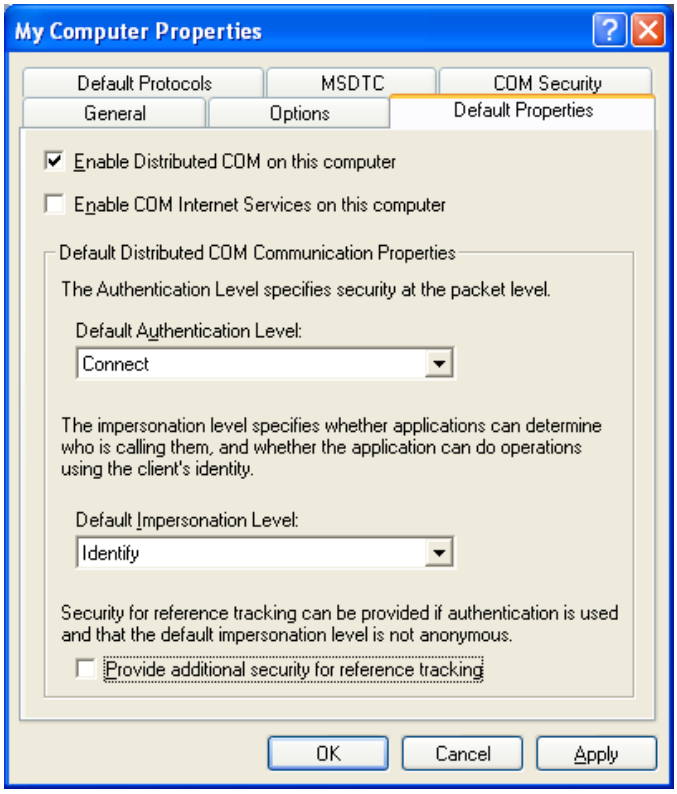
4. On the **My Computer Properties**, click the **Com Security** tab and click the **Edit Limits** button under the **Access Permissions** area. Image shown below:



5. Make sure **Everyone** is added under the **Group or User Names** and both **Local Access** and **Remote Access** are set to **Allow** for both **Everyone** and **ANONYMOUS LOGON**.



6. Click on the **Default Properties** tab.
   a. Check the “Enable Distributed COM on this computer.”
   b. Uncheck “Enable COM Internet Services on this computer.”
   c. Select **Connect** on the Default Authentication Level.
   d. Select **Identity** on the Default Impersonation Level.

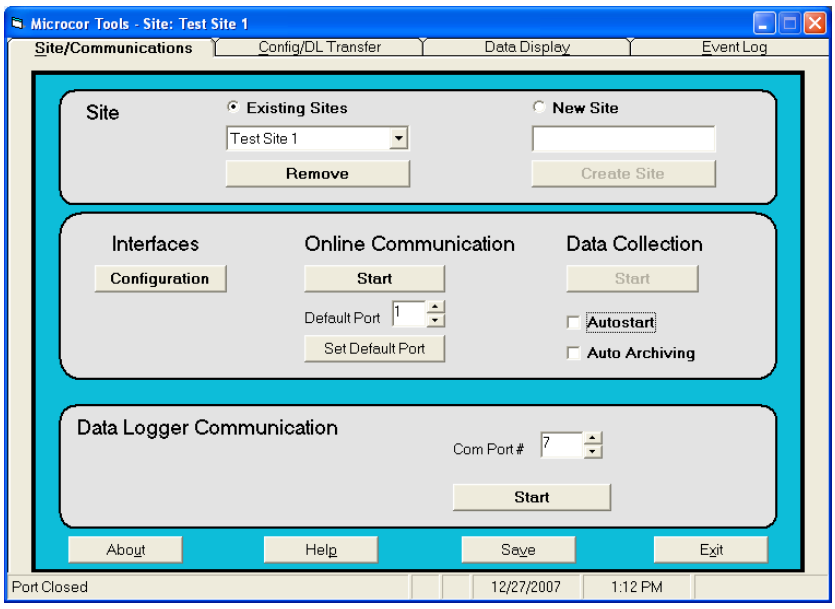


Launching the Microcor Tools OPC Server

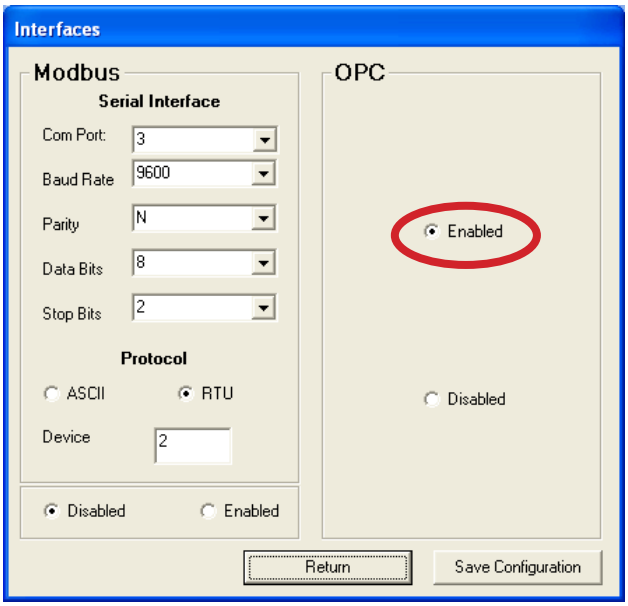
The Microcor Tools Software is configured to automatically launch when the IIU is started. If it is necessary to manually run the software, perform the following steps:

1. Run the Microcor Tools Software application from **Start** → **All Programs** → **RCS** → **Microcor Tools.**

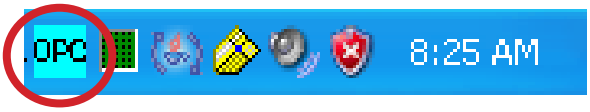
2. Create a **New Site** or choose an **Existing Site** to enable the Online Communication Area.



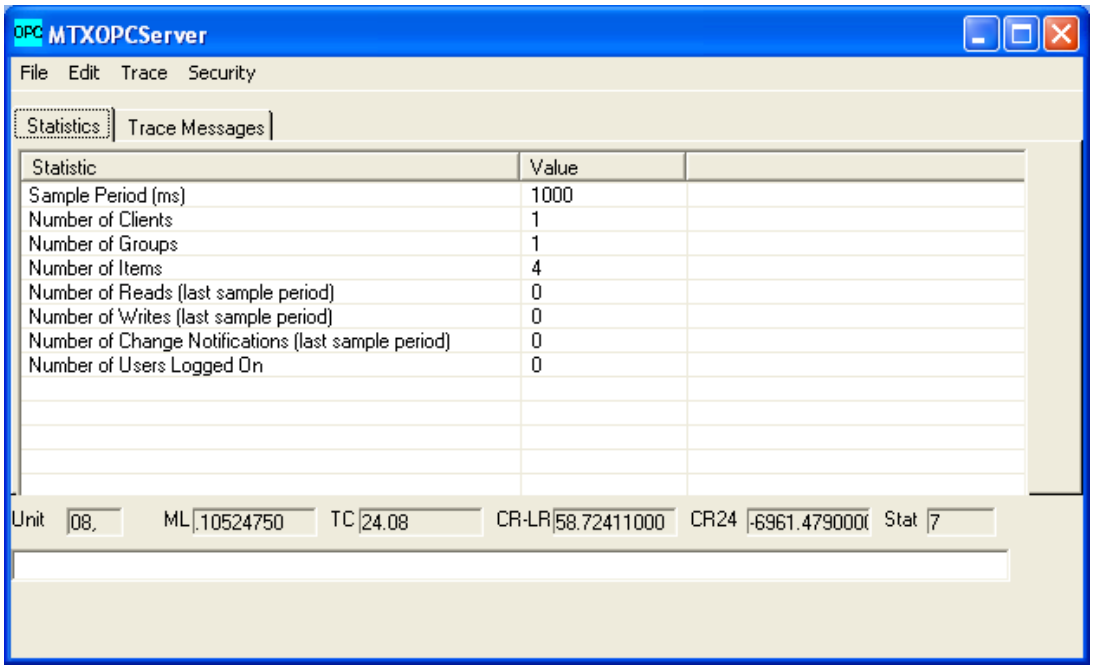
3. Click on the **Interfaces Configuration** button to open the **Interfaces** screen. On the **OPC** area, select **Enabled** and **Save Configuration** and **Return**.



4. When the **Enabled** selection is made, **OPC** icon will appear on the Windows Status bar as shown below:



5. Double-click on the **OPC** icon show above to open the OPC Server status screen. Users may monitor the connections from this screen. The values for statistics will dynamically change as clients log on and off of the OPC Server.



Note: It is important to note that the OPC Server shows values (Unit, ML, TC, CR-LR, CR24 and Stat) on the status bar. These values will only be present if the data are transferring correctly; otherwise the values will be blank. This means that either the **Online Communication - Interfaces** area is not properly configured or that the OPC Server was invoked by the OPC Client Test Utility installed on the computer and that Microcor Tools -Output Interfaces is not running (OPC Client Test Utility is preinstalled only on computers provided by RCS), see the **Troubleshooting** section below for more details.

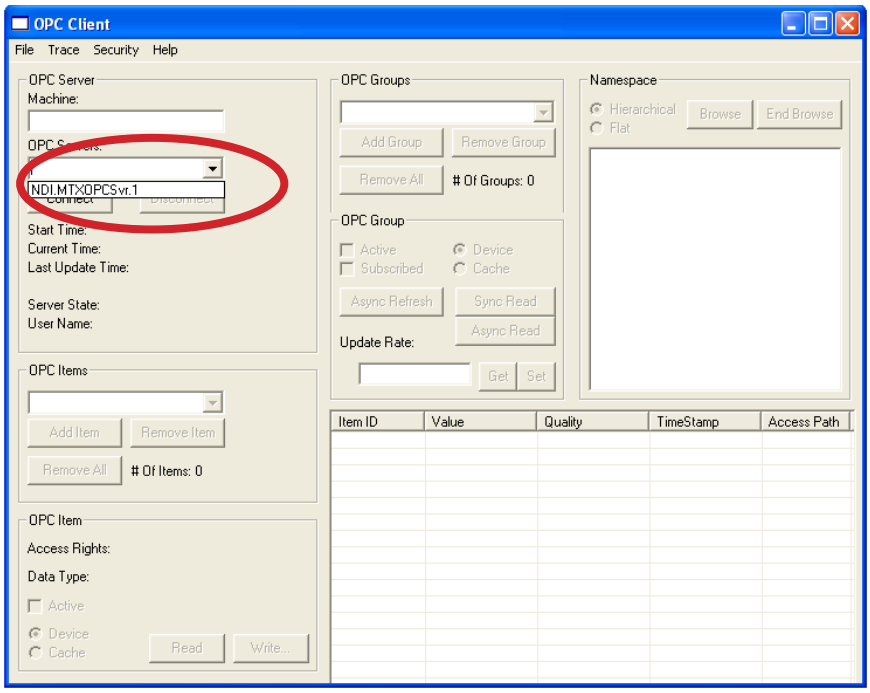
6. The OPC Server is now set to transfer data. Make sure to **Start** the **Online Communication** and **Data Collection** (shown below); the OPC Client computer will now receive the data being transferred (make sure to use the same credentials on the OPC Client computer as used on the OPC Server computer for Workgroup networks).

Using the Preinstalled OPC Client Test Utility on RCS IIU to Test the OPC Server

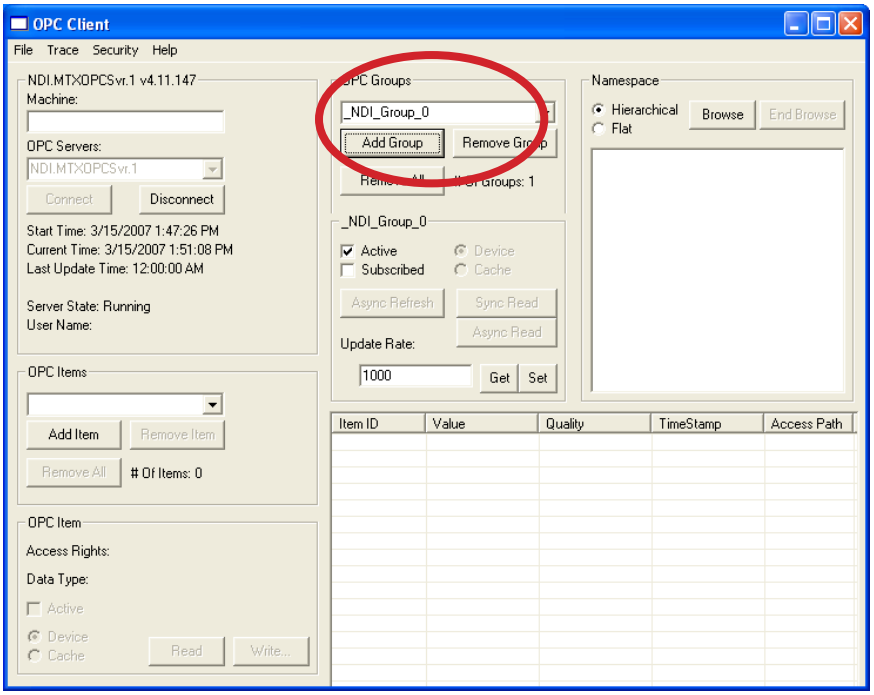
If the IIU is configured and shipped by RCS, an OPC Client Test Utility application will also be installed just to verify the functionality of the OPC Server. This OPC Client Test Utility can be run by following the steps below:

1. Run the OPC Client Test Utility application from **Start** → **All Programs** → **VB6Client**

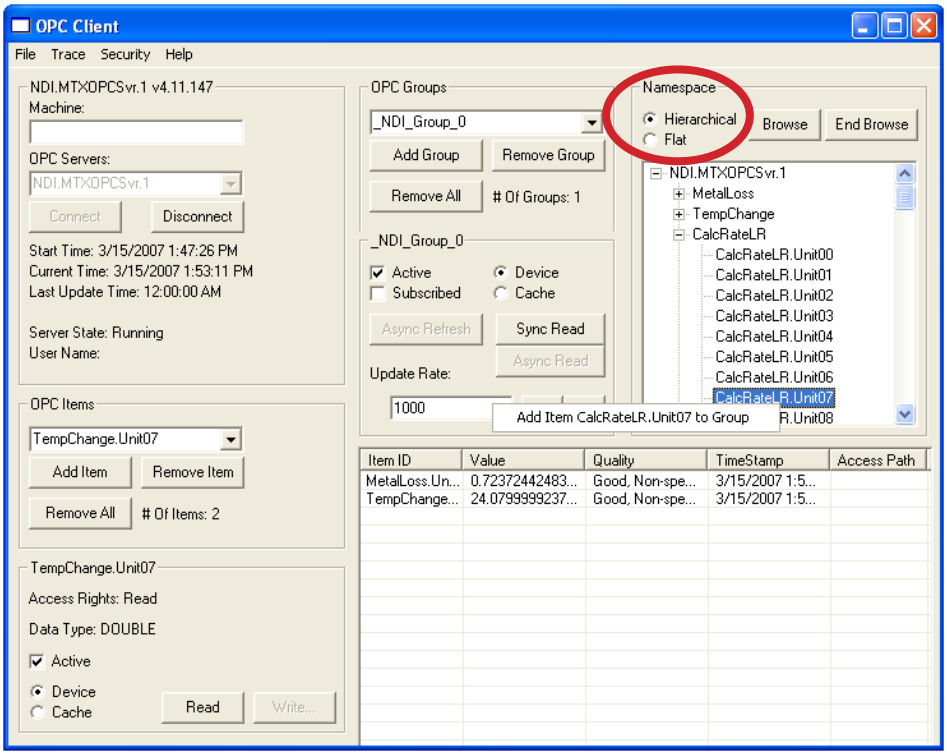
2. Normally, in order for a client to see a server, the OPC Server PC name or the IP address must be typed in; however in this case since both the server and the client reside on the same machine, click on the drop-down arrow of the OPC Servers: to automatically browse and find the **OPC Server**. When the Server is found, click on it to make the selection and then click on the **Connect** button.



3. Click on the **Add Group** button of the **OPC Groups** area. This will browse, find and enter the group to the text box.



4. Click on the **Browse** button of the **Namespace** area. This will browse, find and enter the **Namespace** group on the text area. Expand the selection by clicking on the plus (+) sign to show the detailed listing. Click the plus (+) sign as required to see the individual selections. **Right-click** on each selection and **left-click** to select and view the data.



Troubleshooting

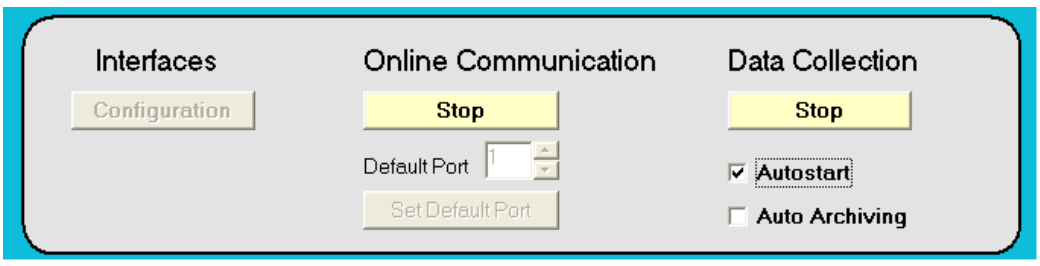
1. OPC Server is started and the OPC Client Test Utility on the same computer can connect, but the Remote OPC Client computer cannot connect.

    - Disable the Windows Firewall temporarily on both computers until the connection is established. See Appendix 4 for details on setting the Windows Firewall.

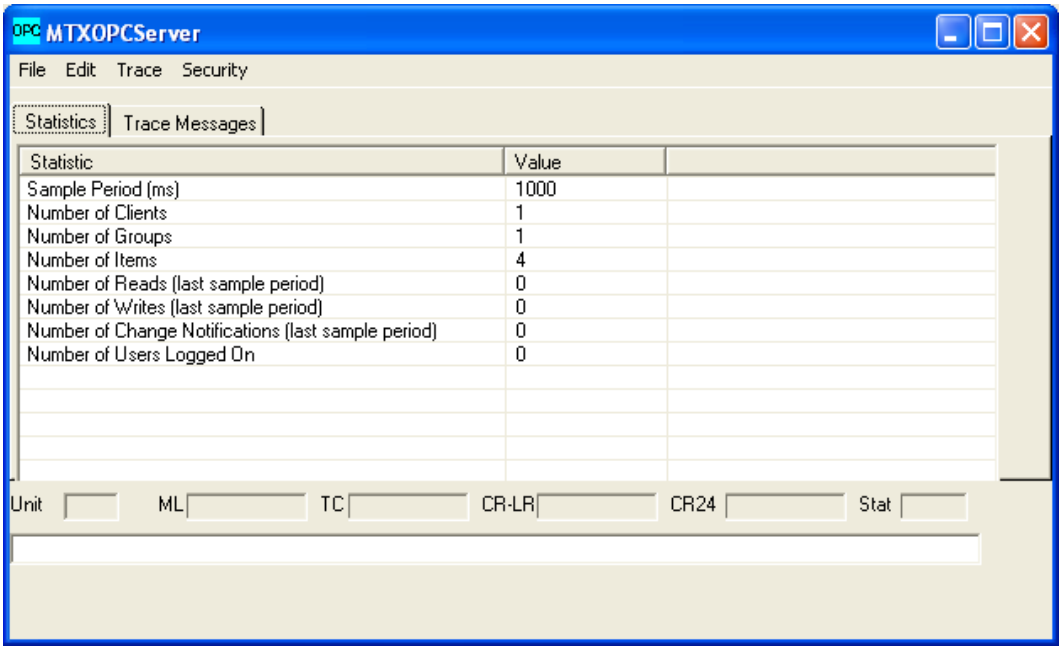
    - Ensure the IP Addresses are correct and the connection cables are secure on the IIU and the OPC Client computer.

2. OPC Server is started and the Client is connected but Client shows 0 for transferred values.

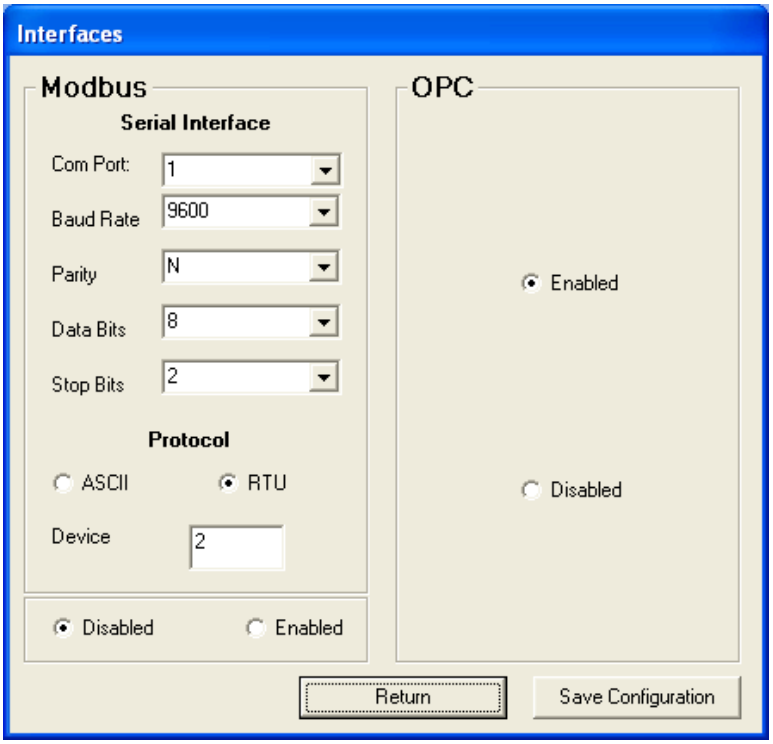
    - Ensure that the **Start** buttons are activated on the **Online Communication** and **Data Collection** as shown below on the on the **Site/Communications** screen.



- Check the OPC Server status by clicking on the OPC icon on the computer status bar. If the OPC Server does not show values (Unit, ML, TC, CR-LR, CR24 and Stat) on the application status bar then check the **Interfaces Configuration** of the **Online Communication** area to ensure the OPC interface has been **Enabled** (see the following images).



If the Status bar shows no activity as shown above then the OPC Server is not transferring data. **Enable** the OPC Interface and **Save Configuration** as shown below:



3. OPC Client computer does not receive data after the IIU reboot.

   - Ensure the OPC Server is started and running.

   - Ensure the Autostart is checked on the **Online Communication** area, shown below:

   - If the **Autostart** was selected, click **Stop** to enable the **Interfaces Configuration** button. Click the **Interfaces Configuration** button and make sure the **Enabled** is selected on the OPC area; **Save Configuration** and **Return** and try again.

4. OPC Server is started and the RCS provided OPC Client Test Utility on the same computer and Remote computer can connect, but other OPC Client(s) cannot connect.

   - Ensure that the **OPCEnum** is registered.

   - Verify that the **COM Security** is configured to allow **Everyone** or the **User** full privileges.

Windows Firewall Configuration

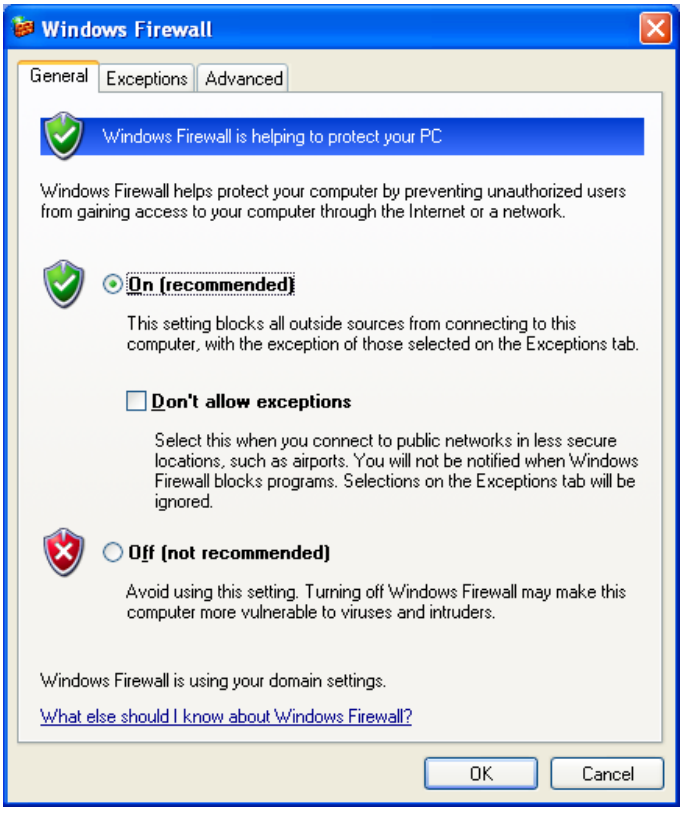
Appendix D

The Windows Firewall is designed to stop any incoming unsolicited communication across the network. This firewall is **Exception** based; therefore, rules can be put in place to handle unsolicited requests. Administrator can specify applications and ports that are exceptions to the rule. Following changes are required to make any OPC client/server application work via DCOM.

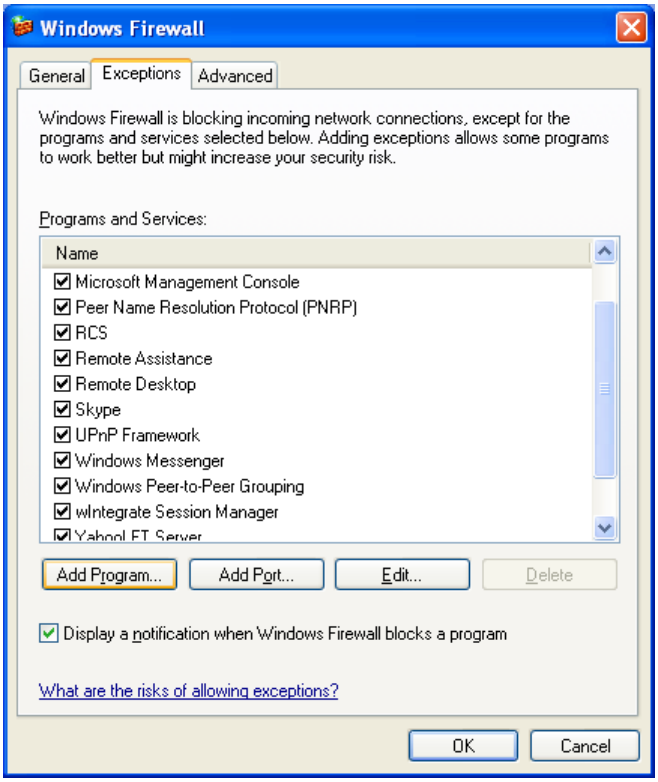
Configuring the Windows Firewall Exceptions and Ports

1. Navigate to **Start** → **Control Panel** → **Windows Firewall** (shown below).

2. Set the firewall to **On** position. This is the recommended setting by Microsoft, OPC and RCS to give the computer the highest possible protection. Turning off the firewall is recommended only when troubleshooting an issue.



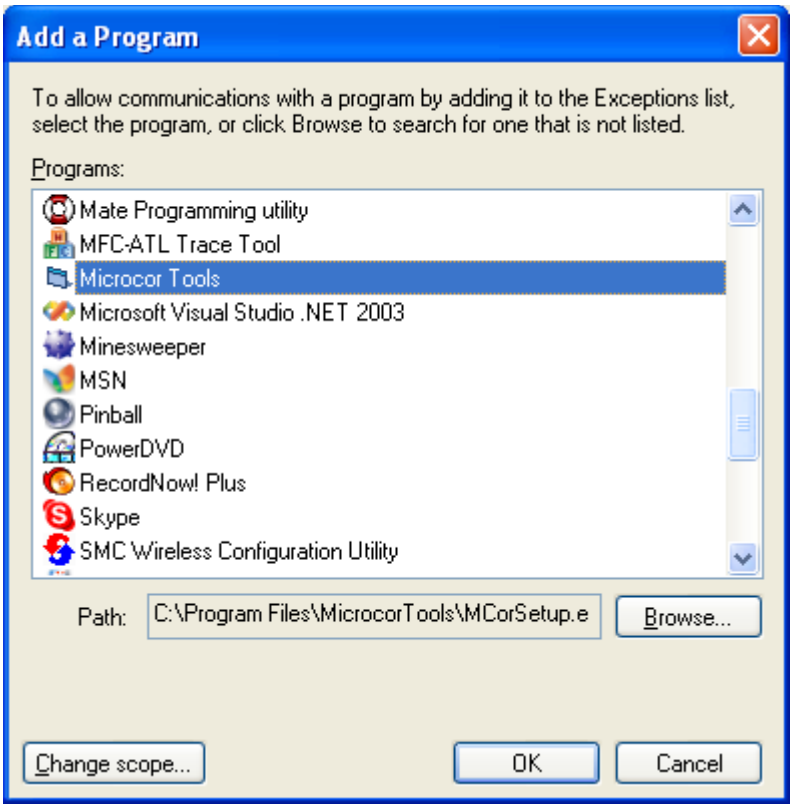
3. Select the **Exceptions** tab (shown below).



4. Select (check) the **Microsoft Management Console.** If this is unavailable as a selection, perform the following:
   a. Click **Add Program.**
   b. Click **Browse** button.
   c. Navigate to **C:\WINDOWS\SYSTEM32\MMC.EXE** and click **Open.**
   d. Click **OK** to add MMC to the Exceptions.

5. Add any OPC Clients and Servers by scrolling through the selection.

6. Click on the **Add Program** button and add **Microcor Tools, MTXOPCServer.exe and OPCEnum.exe** to the list. If these are not on the list, they can be found by using the **Browse** button and navigating to:
   a. C:\Program Files\MicrocorTools\ MCorSetup.exe for Microcor Tools
   b. C:\Program Files\MicrocorTools\MTXOPCServer.exe for MTXOPCServer
   c. C:\Windows\System32 for OPCEnum



7. Click the **Add Port** button under the **Exceptions** tab. Fill in the information as follows on the **Add a Port** dialogue box;

   Name: **DCOM**
   Port number: **135**
   Protocol: **TCP**