CATERPILLAR®

QUICK START GUIDE

EMCP 3 MONITORING SOFTWARE

Version 2.0

1 Introduction

This document provides information necessary to set up a monitoring system for Caterpillar generator sets, using EMCP 3 Monitoring Software v2.0. This software replaces the EMCP 3 Monitoring Software v1.0, which monitors only a single EMCP 3.2 or 3.3. EMCP 3 Monitoring Software v2.0 can be used to monitor individual generator sets or combinations of up to 16 of the following device types: EMCP 3.2 Generator Set Control (GSC), EMCP 3.3 GSC, Caterpillar Automatic Transfer Switch (CAT ATS) model numbers MX150 andMX250, and Caterpillar Uninterruptible Power Supply (CAT UPS) model number UPS300.

1.1 Identify system components

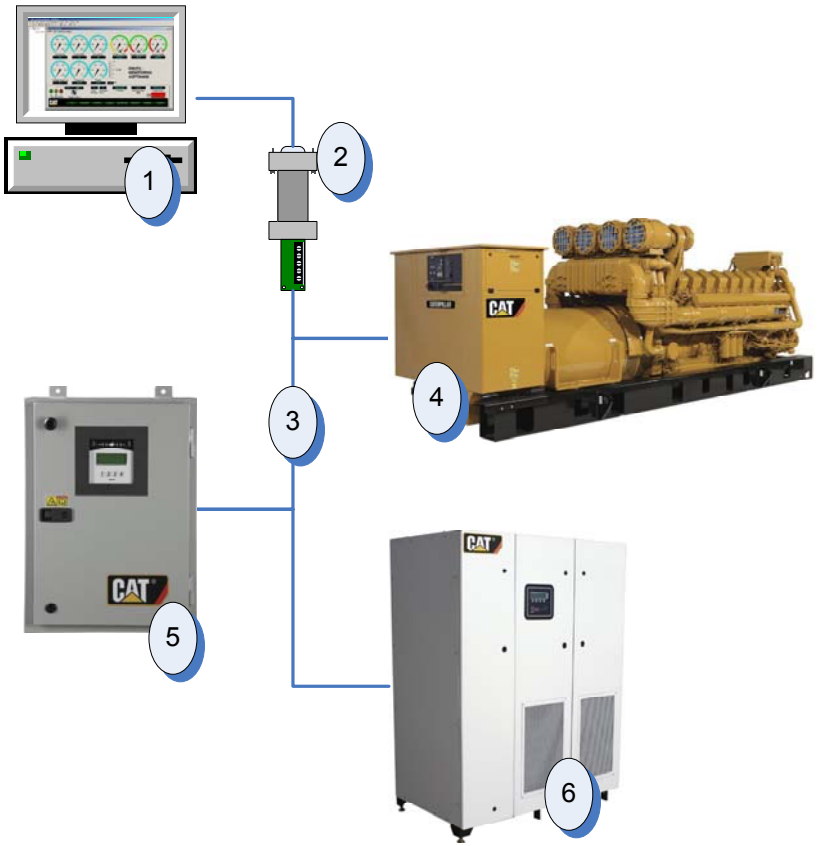


Figure 1: Modbus Network Architecture

Figure 1 shows all of the supported components of a Modbus network system. A maximum of 16 slave devices (GSC, ATS, or UPS) is supported.

1. PC with EMCP 3 Monitoring Software
2. Communication Hardware (e.g. RS485/RS232 converter or Modem)
3. Modbus communication network (RS485 serial multi-drop network)
4. EMCP 3.2/3.3 Generator Set Control (GSC)
5. Caterpillar Automatic Transfer Switch (CAT ATS)-MX150/MX250 controller with Modbus Card
6. Caterpillar Uninterruptible Power Supply (CAT UPS)-UPS300 with Modbus Card

Table 1 - Equipment/Tools Required

	System Component	Part Description	Cat Part Number	Comment
1	PC with EMCP Monitoring Software	PC with Windows 2000/XP	NA	
		EMCP3 Monitoring Software	TBD	See Section 2
2	Communication Hardware	Local-RS232/RS485	270-0476	See Section 1.2
		Remote-Modem	274-1979	
3	Modbus Communication Network	single shielded twisted pair	134-6258	See Section 3
4	EMCP3.2/3.3 Generator Set			See Section 4
5	CAT ATS MX150/250 with Modbus Card	Modbus Card	NA	See Section 5
		ATS Configuration Software	NA	
6	CAT UPS with Modbus Card	Modbus Card(s)		See Section 6
		UPS View	NA	

1.2 Communication hardware options

There are three communication options supported by the software:

Option #1 - Local communications using point-to-point network connections from the monitored equipment to the user's PC. Use this option if the user's PC is relatively close to the equipment (up to 4000ft). Converter 270-0476

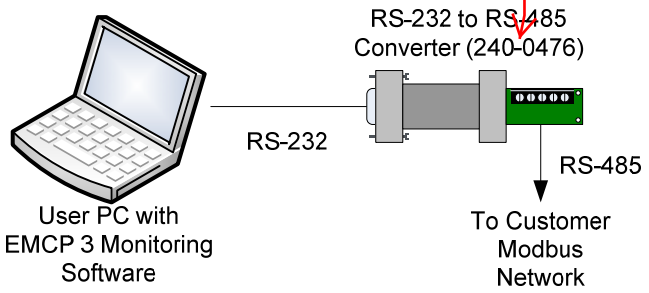


Figure 2-Local Communication Hardware Setup

Option #2 - Remote communications using a modem wired to the Modbus data link and to a phone line which allows the user's PC modem to dial in to the network. Use this option if the user's PC is a long distance from the equipment and phone lines need to be used.

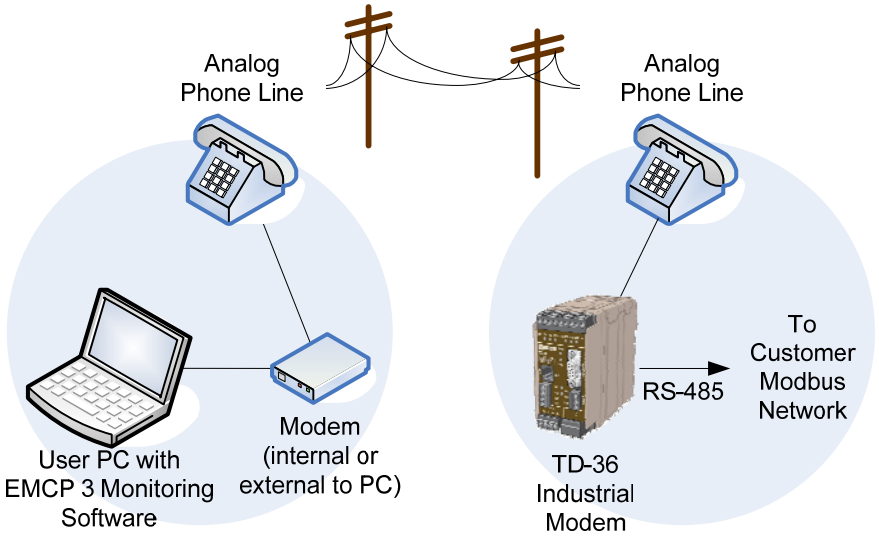


Figure 3-Remote Monitoring over a Phone Line Hardware Setup

Option #3 - Remote communications using a RS-485/Ethernet converter wired to the Modbus data link through a network (or the internet) to the PC. For more details on this option consult the EMCP 3 Monitoring Software Application and Installation Guide.

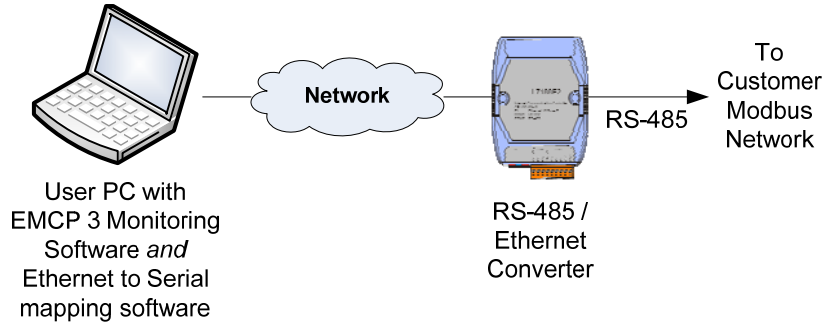


Figure 4- Remote Monitoring over Ethernet Hardware Setup

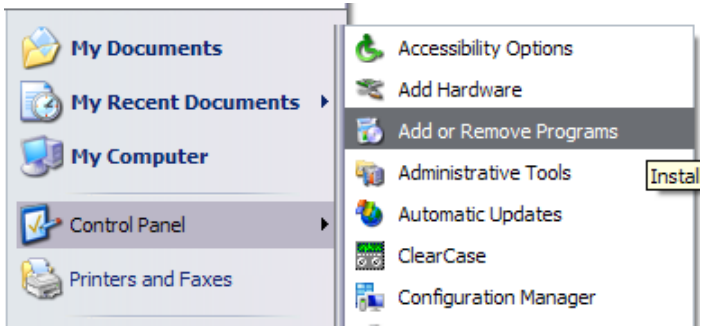
2. EMCP 3 Monitoring Software

2.1 Supported Operating Systems

Windows XP and Vista. (Older versions may work, but are not officially supported.)

2.2 Uninstalling the Software

In order to install the software, old software version must be uninstalled. To uninstall Open the Control Panel, and select "Add or Remove Programs". In the list of Currently Installed Programs, find the program named "EMCP3 Monitoring Software" and click on Change/Remove.



2.3 Installing the Software

1. Save EMCP 3 Monitoring Software.zip.file downloaded from SIS web to computer (i.e C:\temp).
2. Unzip files to the same folder where the zip file is located (typically).
3. Run "setup.exe" that was extracted from zip file, and follow instructions in the installation program.

2.4 Starting the Software

Start the application using the EMCP 3 Monitoring Software desktop icon or the Start Menu option.

Logging In

Click on the drop down box to select the login names then type in the password.

LOGIN NAME	PASSWORD (default)
administrator	**admin**
poweruser	**power**
normaluser	**normal**

Administrator has all privileges and is able to configure screens/settings, change all passwords and read/write data. *Poweruser* has the same privileges as *Administrator*, except is not allowed to configure user accounts or change user passwords.
Normaluser is allowed only to use preconfigured screens to read and write all data. The *Normaluser* cannot make configurations changes and cannot change passwords.

2.5 Software Online Configuration

To set up the EMCP 3 Monitoring Software for a local monitoring connection (see Option#1) follow these steps:

1. Run the EMCP 3 Monitoring Software.
2. Use the "Administrator" login name and the password "admin".
3. To use the default configuration file select File > Open and browse to folder *C:\Documents and Settings\All Users\Application Data\Caterpillar\EMCP3 Monitoring Software\Data* and open the “default.pvc” configuration file
4. Open the "Online Configuration" dialog under the "Network" menu.
5. Verify that "Enable Remote Dialing" is NOT selected.
6. Select the communications port that the RS-485/RS-232 Converter is connected to and select **19200** for Baud Rate and **None** for Parity.
7. Click "OK" to close the "Online Configuration" dialog.
8. Open the "Network" menu and click "Go Online" to connect.

3. Modbus Communication Network

The EMCP 3 Monitoring Software connects to the network devices (EMCP 3.2/3.3, CAT ATS, CAT UPS) through a half-duplex RS-485 serial link using Modbus protocol.

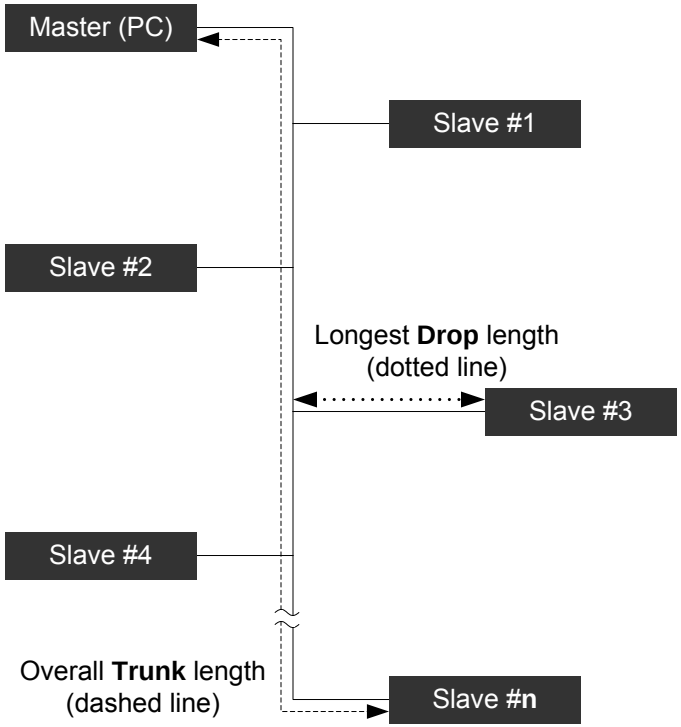


Figure 5: Modbus Network Constraints

Maximum Trunk length: 4000 ft (1200m)
Maximum Drop length: 32 ft (10m)
Maximum number (n) of Slave devices: 16

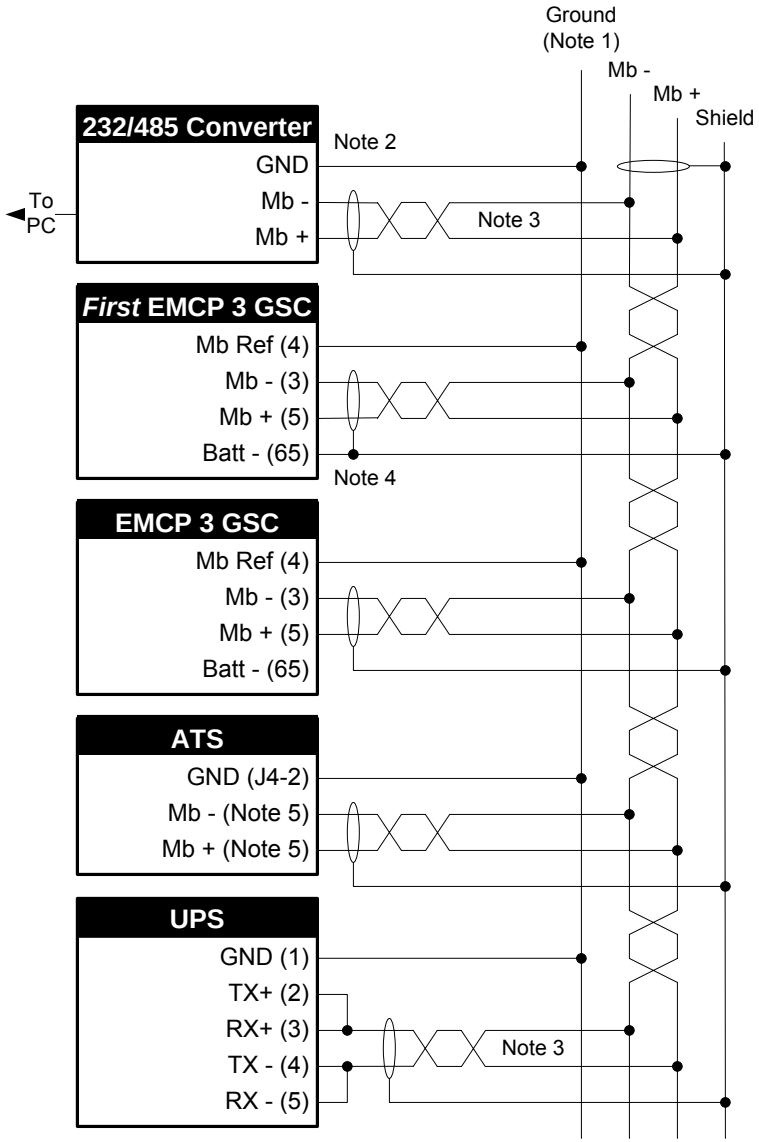


Figure 6: Modbus Network Wiring Schematic

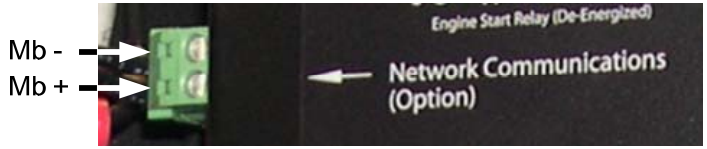
Note 1: If CAT5 or other four-conductor cabling is used, One pair may be shorted together and used for the Ground signal.

Note 2: Pin numbers for converter depend on the specific converter used.

Note 3: Long networks, over 2000ft (600m), may require two termination resistors between the Mb - and Mb + lines at the two extreme ends of the network. The value of the resistors will depend on the characteristic impedance of the cable, which is typically between 100Ω and 120Ω.

Note 4: Only the first EMCP 3 GSC on the Modbus network should have Battery (-) connected to the cable shield. If an EMCP 3 GSC is not present on the network, any single chassis ground may be used. There must be one and only one connection to the cable shield.

Note 5: The Modbus terminals are not individually labeled on the ATS controller. There is a green 2-terminal block indicated by the “Network Communications (option)” marking (see image below).



4. EMCP 3.2/3.3 Modbus Wiring and Configuration

4.1 EMCP 3.2/3.3 Modbus Communication Wiring

Modbus communication wires are brought out of the EMCP 3 GSC as part of the 70-pin AMP connector.

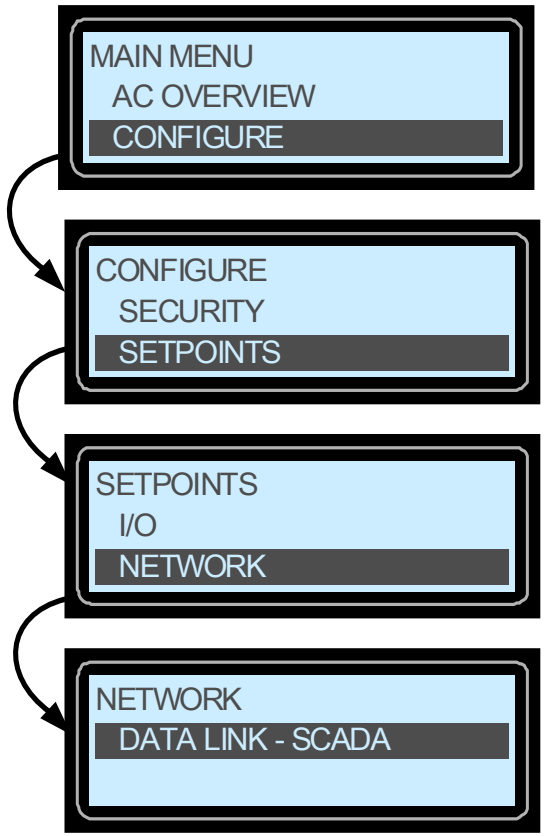
Table 2 - EMCP Modbus Wiring

	Point	Description
Generator controls enclosure	Modbus -	Optically isolated half-duplex differential(-)
	Modbus Ref	Half-duplex RS-485 Reference for Modbus
	Modbus +	Optically isolated half-duplex differential (+)

4.2 EMCP 3.2/3.3 Modbus Configuration

The EMCP 3 network settings must be configured to match the settings of the EMCP 3 Monitoring Software. Use the EMCP 3 display menus to configure the following network settings:
Baud: **19200**
Parity: **None**
Slave Address: **1**
Connect Timeout: **30 sec**
RS-485 bias resistor enable status: **Enabled**

Note: If different Baud Rate and Parity settings are needed, make certain to change settings on both the EMCP 3 and the EMCP 3 Monitoring Software.



5. CAT ATS Modbus Wiring and Configuration

5.1 ATS Modbus Communication Wiring

Connect to ATS Network plug connector (See Figure 6-Note 5 or ATS Operations and Maintenance Manual 71R-2200)

5.2 ATS Modbus Configuration

Default settings for ATS Modbus are Slave Address 1, RTU mode, 9600 Baud, No Parity and 2 Stop Bits. These settings might need to be changed to match network baud rate, parity, stop bits. Also each slave needs to have a unique address.

The user configures these settings using the Modbus Configuration application (GE Zenith Part # 50P-1111).

Instruction to download & install Modbus Configuration Software (50P-1111)
14-Sept-2007 O-4082 Rev B Page 1 of 1
Enter following link into an Internet Browser:
http://www.geindustrial.com/publibrary/checkout/Software|50P-1111|generic

Note: All characters in the link are case sensitive!

Note: Be sure to enter the 2 (two) symbols correctly. These are vertical bars '|' and not forward nor back slashes

Use the following procedure for configuring the ATS Modbus configuration settings.

To change ATS Modbus configuration settings:

1. Disconnect the two Engine Start wires from the PRelay(s), if applicable. Apply electrical tape over the exposed ends of both wires.
2. Obtain a grounding wrist strap and put the elastic end of the strap on your wrist. Attach the alligator clip end to the controller chassis, or an equivalent earth ground.
3. Remove the J5 plug from the controller (located on bottom of board) to shut off power. (If controller is equipped for external battery, also remove the J4 connector from the side of the controller.)
4. Unscrew the black metal cover from the back of the controller.
5. Install the J4 jumper on the back of the Modbus Card
6. Connect the RS232/485 converter to the PC that has the Configuration
7. Application Software Installed.
7. Connect a twisted pair cable between the RS485 connector of the Modbus Card and the RS485 connector of the RS232/485 converter.
8. Reconnect the J5 plug to restore power to the controller.
9. Start up the **Modbus Configuration Software** on the PC.
10. Click on the "READ" button to read the device's current configuration.
11. Click on the "MODIFY" button to enable parameter changing.

12. Make necessary changes to the communication settings.
13. Click on the “WRITE” button to send the new configuration to the Modbus Card.
14. Verify that the configuration was written by clicking the “READ” button, and verify the settings.
15. Remove the J5 plug from the controller.
16. Remove the J4 jumper from the Modbus Card.
17. Screw the black metal cover back on the controller.
18. Reconnect the J5 plug to the controller. (If controller is equipped for external battery, also reconnect the J4 connector on the side of the controller.)
19. Reconnect the two Engine Start wires to the P-Relay(s), if applicable.

6. CAT UPS Modbus Wiring and Configuration

6.1 UPS Modbus Communication Wiring

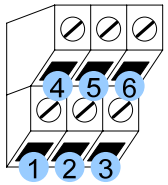
NOTE: The Modbus Option requires SIOD / 30126-2 board.

NOTE: The Modbus Enable operating parameter must be set at Factory for any of the Modbus configurations. To verify Modbus is enabled look at the Show Configuration page on the LCD display or type CTRL-N from UPS View. If the system is not enabled contact Active Power Field Service. Number **1-800-288-5081**.

Table 3-SIOD J1 Pinout

J1 Pinout:	Modbus TCP/2W/4W settings:
1: RS485 Ground	1: Modbus/RTU, Half-duplex
2 & 3: RS485 TX/RX +	
4 & 5: RS485 TX/RX -	
6: RS485 Ground	

SIOD J1 connector



NOTE:

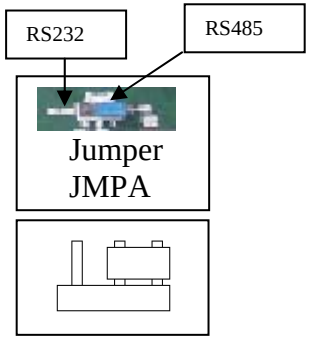
Connect terminal 1 and/or 6 to the ground of the monitoring terminal or network

Connect a jumper wire between terminals 2&3.

Connect terminals 2&3 to the (+) terminal of the monitoring equipment or Modbus Network

Connect a jumper wire between terminals 4&5.

On SIOD, put jumper JMPA to the “RS485” position on SIOD connector J1

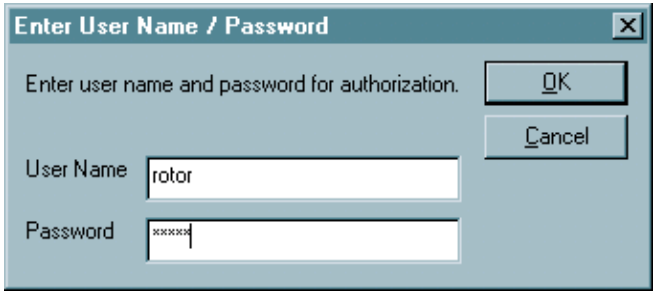


6.2 UPS Modbus Configuration

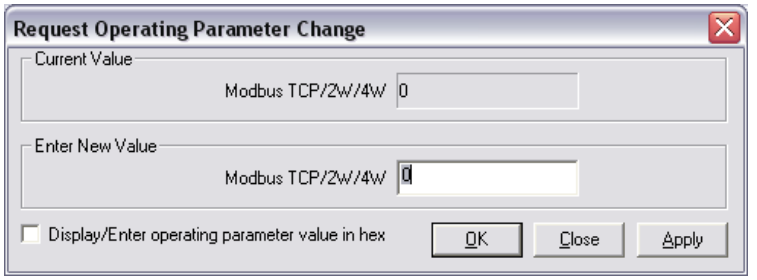
Changing UPS Modbus Settings requires UPS View.
Use UPS View to configure the following network settings:
Type of Modbus wiring: Half Duplex or Full Duplex, Baud Rate, Slave Address.

Change UPS View Modbus Settings following the steps:

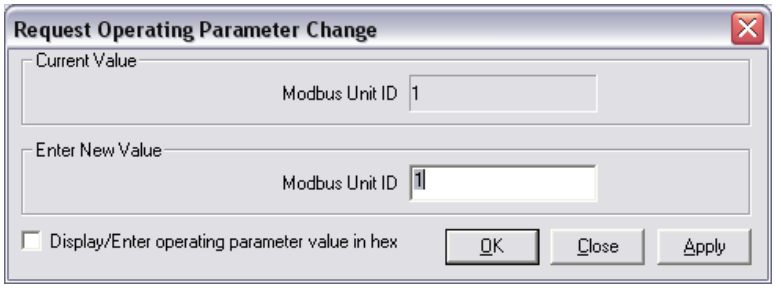
1. Run UPS View
2. Select Password from Main Menu. Enter User Name and Password.



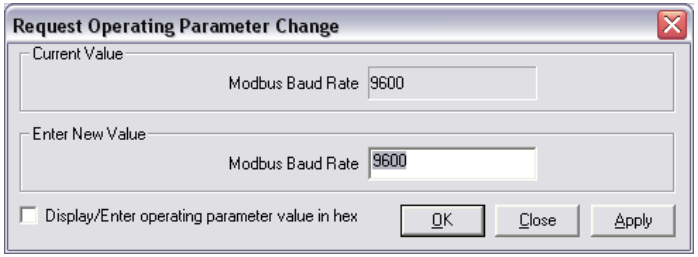
3. To set Modbus wiring to half duplex: Select from Menu Bar: **Op. Params > Op. Group 5: Communications > Modbus TCP/2w/4w**. Set Modbus TCP/2w/4w to 1 for 2 wire operation (half duplex):



To set "Modbus Unit ID" (1-247): Select from Menu Bar: **Op. Params > Op. Group 5: Communications > Modbus Unit ID.** Set the address to a unique value in the Modbus network.



To set "Modbus Baud Rate" to 9600 or 19200 baud: Select from Menu Bar: **Op. Params > Op. Group 5: Communications >Modbus Baud Rate.** Set the baud rate to Modbus network baud rate.



7. Software Basics

Using Preconfigured Screens

The software allows the user to create new screens by selecting which parameters to display and in what format (circular gauge, numeric display, etc.) then save the configuration to a file.

A “default” configuration file has been created by Caterpillar which has basic screens with standard parameters already built. The user can modify the file and save as a new file if desired. Refer to the user manual for configuring the software.

Open Default Configuration File

To use the “default” configuration file, do the following:

1. After login, select “OPEN” from “FILE” menu
2. Browse to folder *C:\Program Files\Caterpillar\EMCP3 Monitoring Software\Data*
3. Open file “default.pvc”

This file is optimized for a generator rating of up to 1000V, 50/60Hz, up to 5000A, up to 2000kW. The language is English and units are Imperial (Inch, pounds, gallons).

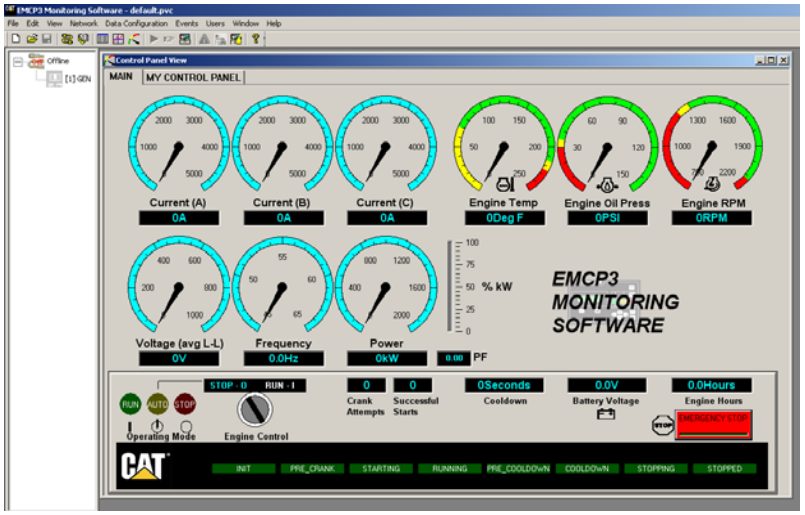


Figure 7-Control Panel View

View parameters by selecting different views

- Select “GRID DATA” from “VIEW” menu to read & write data in a tabular format
- Select “CHART DATA” from “VIEW” menu to view data in chart view (the default shows gen kW output)
- Select “CONTROL PANEL DATA” from “VIEW” menu for monitoring & control using gauges, button, switches, etc.
- Select “EVENTS” from “VIEW” menu (must be online first) to view warning, shutdown, and status events from the EMCP 3 event log.

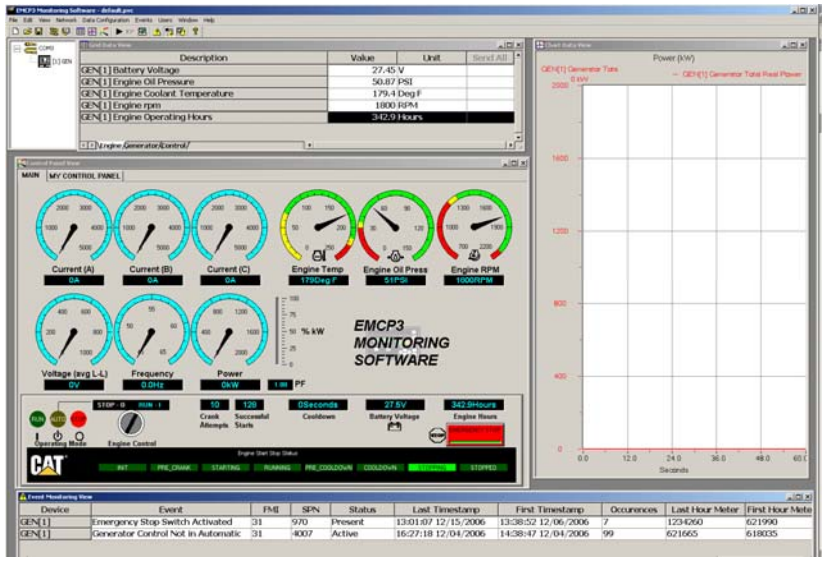


Figure 8-Control Panel, Grid, Chart, Event Views

View Summary Warning and Shutdown Indicators

Note: Must be ONLINE.

Summary WARNING (amber LED) and summary SHUTDOWN (red LED) indicators are viewed in the Device Configuration Window, on the left side of each device. The yellow indicator appears whenever the amber WARNING LED for any device is lit.

The red indicator appears whenever the red SHUTDOWN LED on any device is lit.

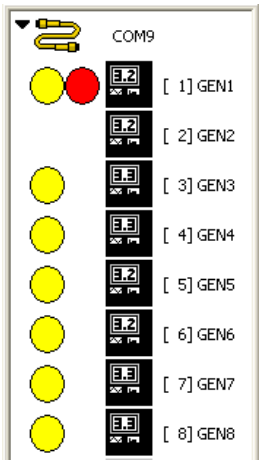


Figure 9-Warning and Shutdown Indicators

Starting/Stopping the Engine

Note: Must be ONLINE.

1. Select “CONTROL PANEL DATA” from “VIEW” menu
2. Verify that EMCP 3 is in the AUTO mode by viewing the AUTO indicator in the lower left corner of the screen is lit.

Refer to Figure 10. Using the “engine control” selector switch (1), click on RUN to start the engine & click on STOP to stop the engine. When engine is running and STOP is selected, the cooldown cycle begins (if cooldown setpoint is greater than zero), and Cooldown time remaining is displayed (2).

Figure 10: Engine Control using Control Panel

Note: A Default System Configuration File was created for application with multiple units (gensets, ATS, UPS). See EMCP Monitoring Software A&I Guide.

Other product specific information and data is available from a variety of sources. For more information contact to the Caterpillar dealer or dealer TC nearest you.

To visit Cat® Power Net: **https://engines.cat.com/**

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