



MICROFUSION

CONTROL PANEL SOFTWARE

USER'S MANUAL



CONTROL CONCEPTS, INC. 2 YEAR LIMITED WARRANTY

CONTROL CONCEPTS, INC. warrants that the products delivered will be as described in the sales order or contract.

CONTROL CONCEPTS, INC. warrants to the original user that CONTROL CONCEPTS, INC. products will be free from defects in materials and workmanship for a period of two (2) years after the date CONTROL CONCEPTS, INC. ships such products.

If any CONTROL CONCEPTS, INC. product is found to be defective in material or workmanship during the applicable warranty period, CONTROL CONCEPTS, INC.'s entire liability, and purchasers sole and exclusive remedy, shall be the repair or replacement of the defective product at CONTROL CONCEPTS, INC.'s election. CONTROL CONCEPTS, INC. shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or re-installation of any defective product. All shipping and freight costs are the responsibility of the customer. CONTROL CONCEPTS, INC.'s limited warranty shall not be effective or actionable unless there is compliance with all installation and operating instructions furnished by CONTROL CONCEPTS, INC., or if the products have been modified or altered without the written consent of CONTROL CONCEPTS, INC., or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Any warranty claim must be submitted to CONTROL CONCEPTS, INC. in writing within the stated warranty period.

CONTROL CONCEPTS, INC.'s limited warranty is made in lieu of, and CONTROL CONCEPTS, INC. disclaims all other warranties, whether expressed or implied, including but not limited to any IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

CONTROL CONCEPTS, INC. SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict in tort, or any other legal theory, even if CONTROL CONCEPTS, INC. has notice of the possibility of such damages.

By purchasing CONTROL CONCEPTS, INC.'s products, the purchaser agrees to the terms and conditions of this limited warranty.

WARNING: The Control Concepts, Inc. power controllers use power thyristors to switch voltage to the connected load. Line voltage must be assumed at the output terminals at all times, even when the control signal has been removed and the load voltage appears to be off. It has been mandated by the National Electrical Code and the Occupational Safety and Health Act of 1970 that a physical disconnect be opened ahead of all remotely actuated controls before performing any maintenance work on the controller or its connected load.

PROPRIETARY DATA

© Copyright 2014, 10 Control Concepts, Inc. Chanhassen, MN 55317

The information and design disclosed herein are the property of Control Concepts, Inc. and may not be used, reproduced or disclosed in any form except as granted in writing by:

CONTROL CONCEPTS, INC
18760 LAKE DRIVE EAST
CHANHASSEN, MN 55317
PHONE: (952) 474-6200
TOLL FREE: (800) 765-2799
FAX: (952) 474-6070
www.ccipower.com

TABLE OF CONTENTS

1. OVERVIEW	1
2. GETTING STARTED	2
2.1 Minimum PC Requirements	2
2.2 Connecting	2
2.3 Disconnecting	2
3. PROCESSOR & FAULT RESETS	3
4. DEVICE INFO	3
4.1 Connect Button	3
4.2 Interface Options	4
4.3 Save Config File Button	4
4.4 Load Config File Button	4
4.5 Reset Button	4
4.6 Flash Firmware Button	5
4.7 Restore MFG Defaults Button	5
5. THE DASHBOARD	6
5.1 Zone Tab	6
5.1.1 Setpoints	6
5.1.2 Control Loop Data	6
5.2 Controller Status	7
5.3 Command I/O	7
5.4 Module Operating Values	7
5.5 Inhibit Alarms	7
6. TAB SCREEN: SETTINGS	8
6.1 System Tab	8
6.1.1 System Settings	9
6.1.3 SP085 Relay 1 Alarms [SP 85]	14
6.1.2 Tap Change Indication	14
6.1.4 Display Control	15
6.1.5 User Settings	17
6.2 Zone Tab	18
6.2.1 Control Mode	18
6.2.2 Full Scale Settings	21
6.2.3 Limits	22
6.2.4 Zero Cross Transformer Mode (ZCT) Settings	23
6.2.5 SP016 Relay 1 Alarms	24
6.3 Analog Inputs Tab	25
6.4 Analog Output Tab	28
6.4.1 Analog Retransmits	28
6.5 Digital Comm Tab	30
6.5.1 Common Settings	30
6.5.2 TCP/IP Settings	31
6.5.3 RS-485 Communication	32
6.5.4 CCI Link	32
6.7 Hardware Profile Tab	34
6.8 Diagnostics 1 Tab	34
6.8.1 I/O Control	35
6.8.2 System Control	35
6.8.3 MODBUS Interface via USB	36
6.9 Diagnostics 2 Tab	37
6.9.1 AC Line Status [MP 342]	37
6.9.2 Main EEPROM Status [MP 336]	38
6.9.3 Misc Status	39
6.10 OEM Tab (OEM Version Only)	39
6.11 Upgrade Tab	40
6.11.1 Additional Features	40
6.11.2 Enter Upgrade Key	40

7. CHART TAB.....	41
7.1 Recorder	41
7.2 Scope	42
7.2.1 Advanced Settings button	43
8. DATA LOGGER TAB	45

1. OVERVIEW

The Control Panel Software is intended to assist during installation, parameter setup, operation, and troubleshooting through a simple Windows interface.

Note: This manual refers to Build 10 of the Control Panel.

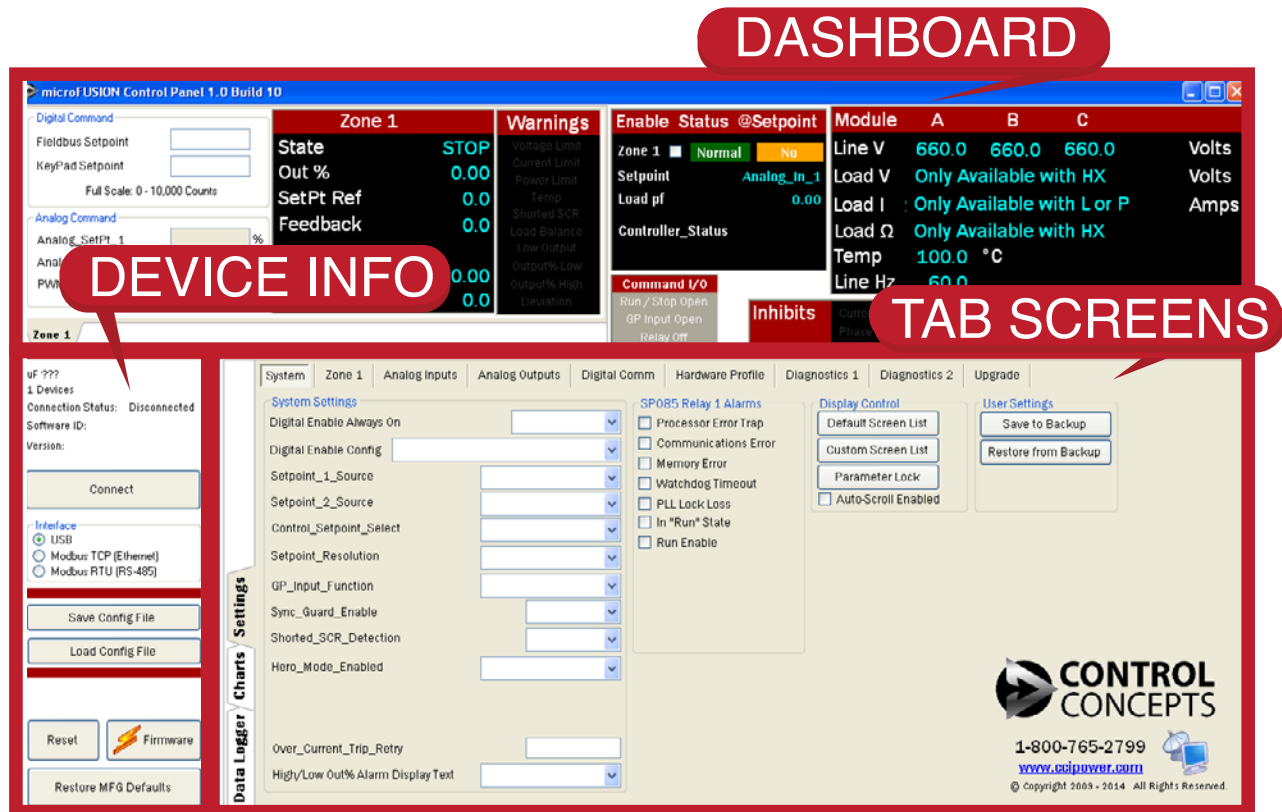


FIGURE 1.00

Configuring the controller is made easier with the software, as multiple things may be viewed at the same time. The screen is broken into 3 main sections: Device Info, Dashboard, and Tab Screens (See Figure 1.00). Each of these will be described in detail within this manual.

Once a controller is set up with desired settings, a configuration file can be saved. This file can then be loaded to other controllers for quick and easy setup.

Connection to the Control Panel Software is accomplished with a USB cable from the controller to a PC.



Warning: Do not use the Power Controller keypad for data entry while connected via USB cable to a computer. Values from the keypad entry will not be updated within the Control Panel unless you click the “Connect” button after changes are made.

2. GETTING STARTED

Load the CD containing the Control Panel software into a PC. Any previous versions of the Control Panel MUST be uninstalled before attempting to install a newer version.



Note: Some features are dependent on hardware configuration and firmware version.

To install, apply +24 Vdc power to the controller. Connect the USB cable from the PC to the controller. Run the software via microFusionSetup.exe.

Follow the on-screen instructions for installation details. Before running the software for the first time, a controller must be connected to the computer.

2.1 Minimum PC Requirements

- Intel® Pentium® Processor
- 32 MB RAM
- 10 MB of available hard disk space
- 1280 x 768 x 60 Hz Compatible Display Adapter
- Microsoft® Windows XP® Service Pack 3
- Microsoft® .NET Framework 4.0 SP1

The Control Panel is compatible with Windows XP, Windows Vista, and Windows 7 and 8, 32-bit and 64-bit operating systems are supported.

2.2 Connecting

The Control Panel software can be utilized once the PC has the software correctly installed, the controller has the +24 Vdc power applied, and the USB cable is connected to the PC and the controller.

With the user interface open, press the *Connect* button in the Device Info & Command Functions section (See Figure 2.00). The USB status will change from Disconnected to Connected and the controller's serial number, software ID, and version number will appear. Once connected, the Dashboard will display readings from the controller, and the tab screens will reflect the parameter values / settings.

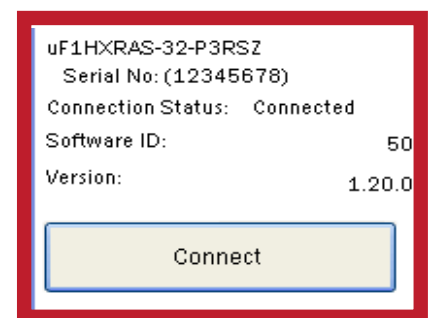


FIGURE 2.00

2.3 Disconnecting

To disconnect the controller simply disconnect the USB cable from the controller or the PC, or close the Control Panel software window. When disconnecting the USB cable, a message will appear stating that the controller has been disconnected.

With the controller disconnected the Dashboard will not update and parameters cannot be changed via the Control Panel software.

3. PROCESSOR & FAULT RESETS

Fault Resets (Three Options)

- Toggle the Run/Reset Input on the P1 Connector
- Disable, then re-enable the Digital System command
- Press the Clear Fault button on the Control Panel software or write to parameter 110. (Note: Controller must be in the Fault Reset state)

Processor Resets (Three Options)

- Using the Control Panel software, press the Processor Reset button
- Cycle the controller power
- Processor Reset Key Sequence via the optional display.
 - 1) Press and hold the Up and Down arrow keys for three seconds.
 - 2) Press enter when the "***SYSTEM RESET**" message displays
 - 3) If the Arrow keys are released, the controller returns to normal operation.
 - 4) When the Enter key is pressed, Line 2 changes to "Release Key"
 - 5) When all keys are released, the Processor resets.

4. DEVICE INFO

See Figure 4.00. When a controller is connected, this area shows the model number and serial number. The model number and serial number is also displayed on the frame label that is on the side of the controller.

Upon opening the Control Panel, the program will try to locate the controller connected to the PC via a USB cable. *1 Device* or *0 Device* will display under the model number. *1 Device* indicates that a controller is ready to be connected to; *0 Device* indicates that no controller is available. However, note that if a controller is connected or disconnected via USB *after* the Control Panel is open, the status will not change.

Connection status displays if the controller is *Connected* or *Disconnected*. *Software ID* refers to the specific firmware the controller is operating. *Version* refers to the firmware release level the controller is operating.

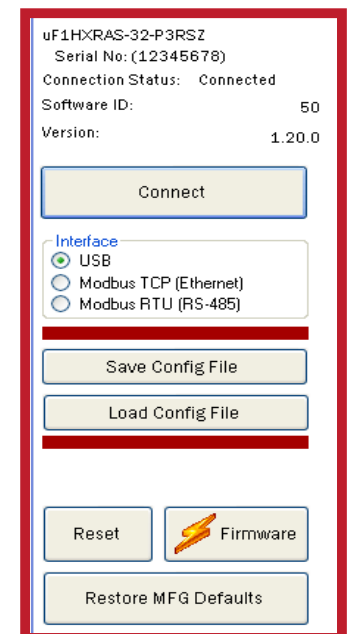


FIGURE 4.00

4.1 Connect Button

This button is used to connect the controller to the Control Panel software. This can only be done with the +24 Vdc power applied to the controller and a USB cable connected from PC to controller.

4.2 Interface Options

The USB radio button must be selected when connecting to the controller via USB. This should be done regardless of whether the controller has a digital communication option installed. After connecting to the controller via USB the digital communication settings can be changed for the desired network under the Digital Comm Tab. See the Digital Comm Tab portion of this manual (Section 6.5) for more details on what can be set up with the Control Panel software.

Each digital communications option has a separate manual for communication structure and setup. Options include Modbus, EtherNet/IP, and PROFINET.

4.3 Save Config File Button

This button saves a copy of all setup parameters and calibration data for the MicroFUSION power controller to a readable xml file. A dialog will appear prompting you to save the .xml file. The default file name is the unit's serial number.

A configuration file should be saved after all parameters are set to the desired values. This file can then be loaded on to other controllers where the same configuration is desired. This will save time when multiple controllers are identical.

Even with one master configuration file that is loaded to multiple units, it is recommended to save individual configuration files for each controller for future reference.

This file can also be sent to the factory in order to assist in troubleshooting purposes. There is no limit to the number of times the file can be saved.

4.4 Load Config File Button

This button loads only the setup parameters within any previously-saved config file. If a MicroFUSION power controller is connected, the setup parameters will be downloaded into the unit. A dialog will appear prompting you to load the .xml file. After loading, select the "Reset" button to make sure all the changes have taken effect.



Warning: Do not attempt to load a config file while the controller is in "RUN" state

4.5 Reset Button

This button resets / reboots the onboard processor when a MicroFUSION power controller is connected.



Warning: Power to the load will be interrupted during the reset!

4.6 Flash Firmware Button

Use this button to load the firmware for the onboard processor of a MicroFUSION power controller into flash memory. Control Concepts pre-programs each power controller at the factory. **Do not load firmware unless directed to do so by Control Concepts Inc. or an authorized representative.**

Flashing Instructions

- 1) Connect your PC to the controller via a USB cable.
- 2) Apply +24 Vdc power to the power controller.
- 3) Start the Control Panel software.
- 4) Select “Flash Firmware”.
- 5) A dialog will open prompting you to select a .hex file.
- 6) Select the .hex file provided by Control Concepts, Inc.



Warning: Do not disconnect the USB cable or control power while flashing is in progress!

Note: Changing the firmware ID requires a password. This will be provided by Control Concepts with the new firmware file.

A progress bar above the Reset and Firmware buttons will indicate the progress of the flash programming operation. Upon completion, the “USB FLASH PROGRAM COMPLETE” message box will appear and the processor will automatically reset. It is necessary to re-connect using the “Connect” command button in order to re-establish communications with the MicroFUSION power controller.

4.7 Restore MFG Defaults Button

Use this button to restore the MicroFUSION power controller setup parameters to the original factory settings. A dialog box will ask you to confirm your intent to overwrite the current settings with factory settings (See Figure 4.01).



Warning: Any changes made to settings will be lost by restoring factory defaults.

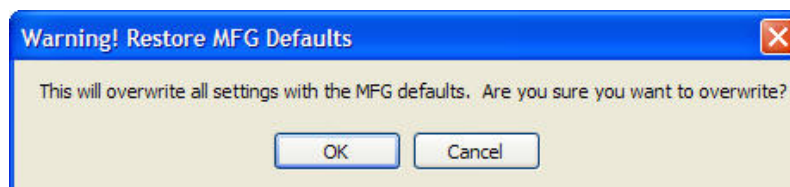


FIGURE 4.01

5. THE DASHBOARD

The dashboard contains runtime operating values for the MicroFUSION power controller. These values are updated every 250 msec whenever a MicroFUSION power controller is connected via the USB cable. The dashboard contains five sections: Zone Tab, Controller Status, Command I/O, Module Operating Values, and Inhibit Alarms.

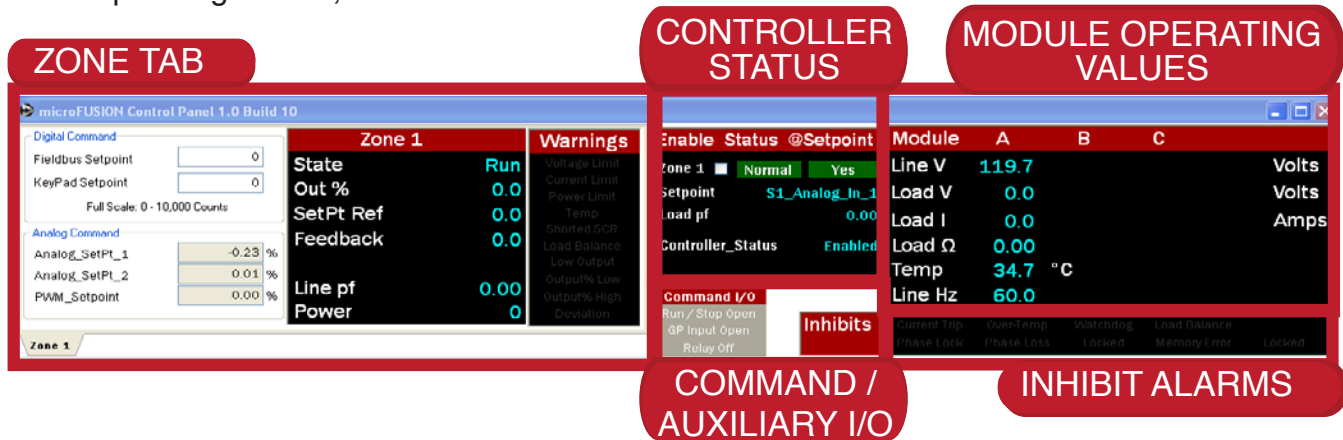


FIGURE 5.00

5.1 Zone Tab

The Zone Tab has a setpoint, control loop data, and warning alarm section.

5.1.1 Setpoints

This area allows you to enter a control loop setpoint via the Fieldbus Setpoint (SP 100) and Keypad Setpoint (SP 101). These values are entered as the count value. This value is based on the value selected for the Setpoint Resolution parameter (SP115). The setting of this value is displayed near the value boxes as “Full Scale: 0 – XX,000 Counts”.

5.1.2 Control Loop Data

This area shows the control loop values for the selected Zone:

State: Run, Stop, Fault, or Fault Reset

Out %: Percent SCR is on for:
 Phase Angle: % on for full conduction
 Zero Cross: % duty cycle

Setpoint Ref: The setpoint in engineering units, based on the feedback selection

Feedback: The engineering units read back, based on feedback selection

Line pf: The line power factor.

Power: Power in Watts delivered to the load

5.1.3 Warning Alarms

The following alarms may register on the Control Panel: Voltage Limit, Current Limit, Power Limit, Temp, Shorted SCR, Load Imbalance, Low Output, Out % Low / Tap Change Down, Out % High / Tap Change Up, Deviation.

5.2 Controller Status

This area shows whether the controller is enabled or disabled, fault conditions, whether it is at setpoint and the load power factor.

The “Digital Enable” check box which is in series with the $\overline{\text{Run}}$ /Stop of the P1 connector.

The @Setpoint column is for monitoring when the controller output is within the deviation band of the desired setpoint. See the Deviation Band (SP 18) section of this manual.



Note: The Digital Enable feature will quickly turn off the controller, but it is limited to communication rates and software timing. It is therefore not as fast as using the hardware-based $\overline{\text{Run}}$ /Stop on the P1 connector. Control Concepts strongly recommends continuing to use the hardware-based $\overline{\text{Run}}$ /Stop for emergency situations.

5.3 Command I/O

This area allows you to view the current state of the digital I/O of the command connectors (P1 and P2.)

5.4 Module Operating Values

This area shows line voltages, load voltages, load currents, load resistance, and temperatures for each phase, and also the line frequency.

5.5 Inhibit Alarms

This area shows any alarms that, when activated, inhibit the controller’s operation and places the controller in a “Stop” or “Fault” state. The most common inhibit alarms are Phase Lock / Phase Loss when line power is not present.

A “Current Trip” and “Over-Temp” alarm requires a fault reset in order to clear the fault. See section 3 for more information on resetting the controller.

6. TAB SCREEN: SETTINGS

There are two different tab controls (horizontal and vertical) in the tab screens section. The vertical section contains *Settings*, *Charts* and *Data Logger*. The *Settings* and the *Charts* tab each contain a horizontal section.

FIGURE 6.00

6.1 System Tab

This tab allows setup of the system level settings, setpoint selections and system alarm mapping to Relay 1.

It also contains contact information along with a link to Control Concepts' webpage. The satellite and monitor icon is a link that can be used for video web conferencing.

6.1.1 System Settings

Digital Enable Always On [XP 3401]

This value is read and applied to Digital $\overline{\text{Run}}$ /Stop (SP 129) only once during power-up / reset initialization.

Setting	Description
Disabled [Default]	This setting will cause Digital $\overline{\text{Run}}$ /Stop (SP 129) to be initially set for STOP (0)
Enabled	This setting will cause Digital $\overline{\text{Run}}$ /Stop (SP 129) to be initially set for RUN (1)

Use the Enabled setting if it is required to have Digital $\overline{\text{Run}}$ /Stop (SP 129) set for Run after power-up.

Enable this when only the $\overline{\text{Run}}$ /Stop from the P1 Connector is desired and the $\overline{\text{Run}}$ /Stop is not going to be used.

Digital Enable Config [XP 3400]

Setting	Description
Analog Use Switch Digital Use Both [Default]	Analog use switch only, Digital use the Digital $\overline{\text{Run}}$ /Stop and switch.
Never Use Digital RUN STOP	Never use Digital $\overline{\text{Run}}$ /Stop, Use the switch only.
Always Use Digital RUN STOP	Always use Digital $\overline{\text{Run}}$ /Stop and switch.

Setpoint 1 Source [SP 102]

This determines the source that is used when Setpoint 1 is selected (SP 104).

Setting	Description
Analog In 1 [Default]	Analog input 1 is used
Analog In 2	Analog input 2 is used
Fieldbus¹	Fieldbus digital input is used
Keypad	Keypad digital setpoint is used
PWM Input	Pulse Width Modulation setpoint is used

¹Note – This is default when Modbus TCP, Ethernet/IP or Profinet option is present.

Setpoint 2 Source [SP 103]

This determines the source that is used when Setpoint 2 is selected (SP 104).

Setting	Description
Analog In 1¹	Analog input 1 is used
Analog In 2 [Default]	Analog input 2 is used
Fieldbus	Fieldbus digital input is used
Keypad²	Keypad digital setpoint is used
PWM Input	Pulse Width Modulation setpoint is used

¹Note – This is default when Modbus TCP, Ethernet/IP or Profinet option is present.

²Note – This is default if the Analog setpoint 2 feature is not enabled.

Control Setpoint Select [SP 104]

Setting	Description
Setpoint 1 [Default]	Uses the setpoint that is selected in Setpoint 1 Source (SP 102)
Setpoint 2	Uses the setpoint that is selected in Setpoint 2 Source (SP 103)

This determines which setpoint is used to control the output of the controller.

Setpoint Resolution [SP 115]

Setting	Description
Counts 10000 [Default]	The digital setpoints have a range of 0 – 10,000 counts
Counts 64000¹	The digital setpoints have a range of 0 – 64,000 counts

¹ Note: Only available on HX models.

GP Input Function [SP 133]

Setting	Description
None [Default]	The General Purpose input has no function
Control Setpoint Select	Allows the ability to toggle the Control Setpoint Select value (SP 104) between Setpoint 1 and Setpoint 2.
Open Closed Loop	Allows the ability to toggle the Control Loop value (SP 3) between Open Loop and Closed Loop feedback.

This feature is only available for controllers where the GP input has been ordered. Other functions are available upon customer requests. Contact Factory for more information on adding a function/feature to the GP input.

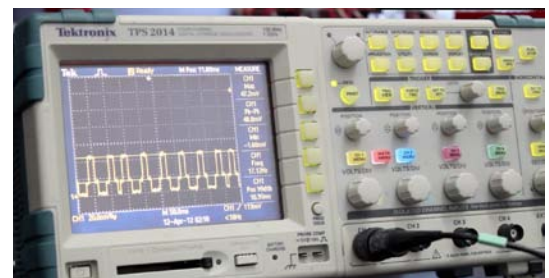
SYNC-GUARD™ OVERVIEW

SYNC-GUARD™ is a feature for zero-cross controllers only. It reduces the possibility of synchronous operation of two or more zero cross controllers. When using only one controller this feature is not used.

When using this feature all controllers should have SYNC-GUARD™ enabled.

To learn more about the advantages and applications of SYNC-GUARD™, see the Operator Manual.

FOR MORE INFORMATION:



SYNC-GUARD™

Check our **Youtube channel** (ControlConceptsInc) and watch our SYNC-GUARD™ overview video!

SYNC-GUARD™ Enable [SP 131]

Setting	Description
Disabled [Default]	SYNC-GUARD™ is disabled
Enabled	SYNC-GUARD™ is enabled

When using this feature all controllers should have the SYNC-GUARD™ enabled.

Shorted SCR Detection [SP 132]

Setting	Description
Disabled	Shorted SCR Detection is disabled
Enabled [Default]	Shorted SCR Detection is enabled

A shorted SCR can occur when excessive voltage and/or current passes through the SCR in a short period of time. The limit and trip features are intended to prevent damage to the controller/SCR but may not respond fast enough in every scenario. To determine if the SCR has a short, make sure that the line and the load has been disconnected from the controller. With a multimeter measure the resistance from the line connection to the load connection. This measurement typically measures greater than 300kΩ. If this measures less, the SCR is likely to have a short and in need of repair.

With the use of some particular load types, the controller will detect false Shorted SCRs and trigger the alarm. By disabling Shorted SCR Detection, the controller will no longer trigger an alarm.

A false Shorted SCR warning can also happen if the controller does not have the settings in the Zone Tab correctly set up. Check the Full Scale settings (SP 8, SP 9 & SP 10). If nuisance alarms are continuing to happen or if a Shorted SCR is thought to be present, consult with Control Concepts, Inc.

Hero Mode Enabled [SP 84]

Setting	Description
Disabled [Default]	Hero Mode is disabled
Enabled	Hero Mode is enabled

Note: Controller warranty is voided when Hero Mode is Enabled **AND** an over-temperature condition occurs. When the controller is operating within proper environment and specifications it is extremely rare that the SCR would exhibit an over- temperature condition. Contact factory for details about this feature.

If Hero Mode is enabled, the over-temperature inhibit alarm will be disabled. The over-temp alarm is designed to shut the controller down when the SCR temperature exceeds its safety ratings. This is designed in for customers that need to keep their process in operation, even if it may damage the SCR power controller.

When enabled and an over temp condition occurs, Inhibit Alarm (MP 210) will still indicate the over-temp condition. If a relay mask (SP 16) has “Heatsink Over Temp” Selected, the relay will energize. Meanwhile the controller will stay in the Run State. The display, if present, will register “Warning Alarm Heatsink Temp” and the Alarm LED on the front lid of the controller will flash orange. The over-temp indications will clear when the temperature drops below the over-temp limit threshold.

Over-Current Trip Retry [SP 20]

Default value: 0 (Don't retry)

Set this value to have the controller automatically restart after a current trip fault event occurs. Example: a value of 2 will have the controller restart up to 2 more times after a current trip event therefore allowing 3 current trip events before remaining in the fault shutdown state.

High/Low Out% Alarm Display Text Select [XP 3410]

Setting	Description
Out% High/Low [Default]	Upon a High Out% Alarm due to an output % greater than the High Threshold Setting, the display will indicate the alarm with “OUT% HIGH.” Likewise, upon a Low Out% Alarm due to an output % lower than the Low Threshold Setting, the display will indicate the alarm with “OUT% LOW”
Tap Change Up/Down	Same as above except High = “TAP CHANGE UP” and Low = “TAP CHANGE DOWN”

6.1.2 Tap Change Indication

Certain types of loads change resistance over their lifespan, which can affect the power factor when controlled with a phase angle power controller to achieve a constant output power. To improve power factor, a transformer with multiple voltage taps may be used. The tap change indication signals the user when to change these voltage taps to a higher or lower setting to achieve the user's desired output. This feature uses the controller's output percent along with the thresholds set by the user to determine the indication. These indications can be mapped to the dry contact relays, read on the user display, or read digitally via the warning alarm monitor parameter.

To enable Tap Change indication set the High/Low Out % Alarm Display Text (XP 3410) selection on the System Tab. To set the High/Low thresholds, set parameters Tap Change Up Threshold (XP 3402) and Tap Change Down Threshold (XP 3403) on the Zone 1 Tab.

When enabling the Tap Change indicator there are a few visual changes to the Control Panel:

1. Warning alarms in the Dashboard section: Out% High/Low change to Tap Change Up/Down.
2. Zone 1 Tab: Output High/Low Alarm Threshold change to Tap Change Up/Down Threshold.
3. Zone 1 Tab: SP016 Relay 1 Alarm, Output% High/Low change to Tap Change Up/Down.

6.1.3 SP085 Relay 1 Alarms [SP 85]

Click on the checkbox next to the particular alarm/function to energize the relay if the condition is met. The relay can be mapped to any number of conditions. See the Operator's Manual for wiring and ratings. The relay outputs work in conjunction with (SP 16) for Relay 1.

Processor Error Trap¹

These are rare types of errors where the controller will not be functioning. Errors that are included are: flash program error, stack over flow error, math error, address error, and DMA conflict. To clear these errors follow the message(s) on the display, or connect to Control Panel software. For further assistance contact Control Concepts, Inc.

Communications Error

A communication problem when using digital communications only.

Memory Error¹

EEPROM check failure (MP 210 bit 6). See the Diagnostics 2 tab for errors.

Watchdog Timeout¹

Specific processor error trap (MP 210 bit 7).

PLL Lock Loss¹

Phase Locked Loop lost its lock on the AC line (MP 210 bit 2).

In "Run" State

When the Controller State (MP 248) is in Run.

¹The controller will have an inhibit alarm present.

Run Enable

The Run/Stop switch is set to the run position on the P1 Connector.

6.1.4 Display Control

Default Screen List

Pressing the Default Screen List button will return the controller's screen list to the manufacturing defaults.

Custom Screen List

Pressing the Custom Screen List button opens a new window (See Figure 6.01). From here you can customize what data appears on your controller's display, rank the screens in order of relevance, or create custom text.

The controller can display a maximum of 50 screens. Each screen contains up to two lines of text.

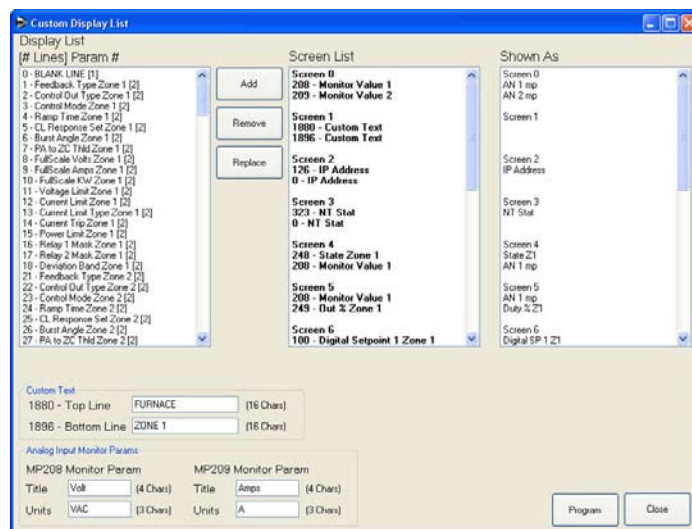


FIGURE 6.01

To add a parameter to the Screen List, select a parameter in the Screen List just below where you wish to add in the new parameter, then select the parameter you wish to add from the Display List and select the Add button.

To remove a parameter from the Screen List, select the parameter in the Screen List and select the Remove button.

To replace a parameter in the Screen List, select the parameter you wish to replace in the Screen List and the parameter you wish to replace it with from the Display List, and select the Replace button.

Custom text may be useful for naming a controller or giving instructions specific to your task. Enter the text you wish to display in the Custom Text fields, (maximum of 16 characters) highlight "Custom Text" from the Display list and choose "Add" or "Replace."

Under "Analog Input Monitor Params" there are options to specify titles and units for Monitor parameters, MP-208 and MP-209.

- Program Button - sends the custom screen list to the controller
- Select the close button to close the custom display list window

Parameter Lock

Many parameters can be accessed and edited from the controller's display keypad. Parameter lock prevents users from changing specific parameters unless they enter the right password.

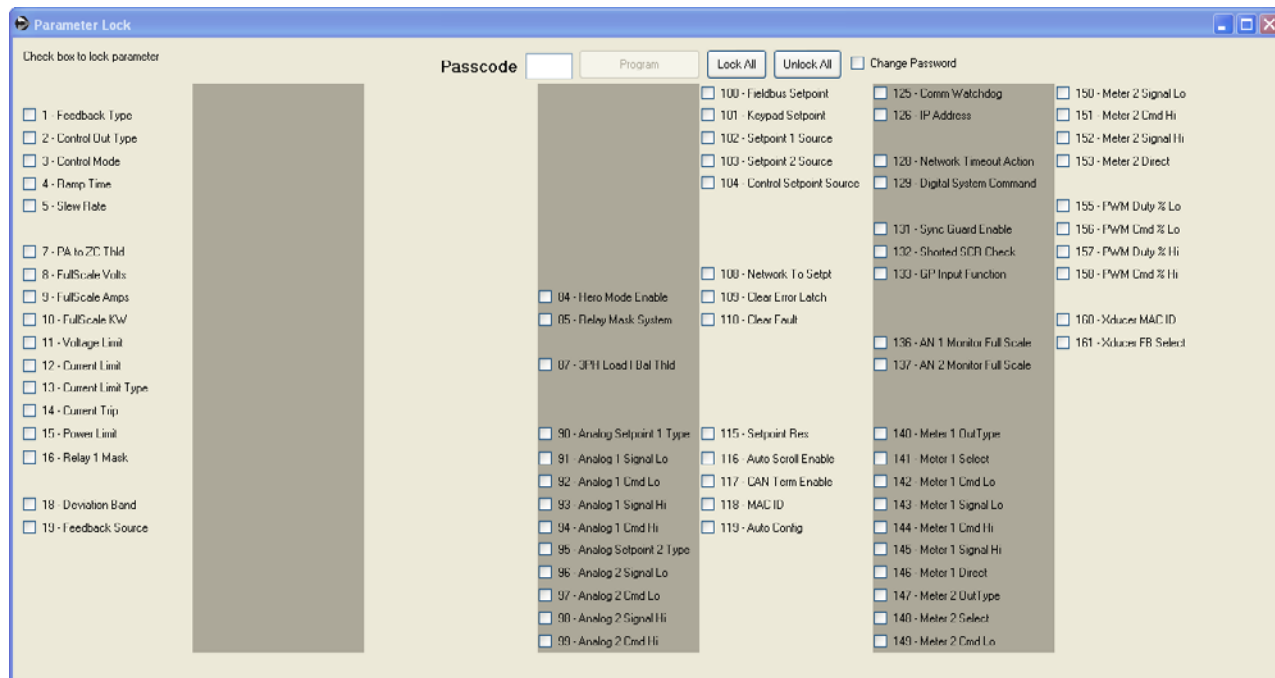


FIGURE 6.02

By default, the password is “4000.” Once the initial password is entered, you may also change the password by selecting the Change Password checkbox and entering a new 4-number combination into the field.

You may select the check boxes of parameters you wish to lock, or use the Lock All or Unlock All buttons to select/deselect all available parameters.

An editable parameter will appear on the controller display with a dot preceding the text. Pressing the green checkmark key will allow you to edit the parameter value. When the parameter is locked, an asterisk (*) appears instead, and the green checkmark key will prompt you to enter the password. Use the arrow keys to enter the correct combination, pressing the green key to move forward to the next number. If the correct password is entered, all parameters are unlocked and can be locked again by pressing and holding the plus sign (+) key.



FIGURE 6.03

Auto-Scroll Enable [SP 116]

If the “Auto-Scroll Enabled” checkbox is selected, the controller display will cycle through the approved parameters. Auto-scroll also resumes after ten minutes of inactivity, and can be manually resumed via the controller display keypad by pressing and holding the Up Arrow key.

6.1.5 User Settings

Save to Backup button

This saves all of the user settable parameter (SP) values from the main user table to the user SP back up table in the EEPROM. If any of the SP values are setup incorrectly or differently in the future, this back up table can be used to restore all of the SP values. This is similar to the Save/Load config file with the exception that only the SP values are saved in the EEPROM instead of the computer. This can only be used to restore values that are stored in the backup table.

Note: This does not save the screen list.

Restore from Backup button

Writes the stored SP values from the user setpoint backup table in the EEPROM to the main user table.

6.1.6 Heater Bakeout

When Heater Bakeout is enabled (SP-24) and the controller is switched into run state, it will ramp up at a linear rate, phase angle firing, to full-on over the set time (SP-21). During heater bakeout the control loop will run in open loop. When the controller's output reaches full-on, heater bakeout will terminate at the end of the set time. Then the controller will transition into normal run state with the selected firing mode and follow the selected setpoint command.

Heater Bakeout Time [SP 21]

The time period heater bakeout will use to ramp the output.

Heater Bakeout Voltage Limit [SP 22]

If, at any time during the heater bakeout ramp-up, the load voltage reaches the voltage limit, the output will be limited at the voltage limit setting (SP-22). The controller will continue to output at the limit until the heater bakeout time (SP-21) expires.

Heater Bakeout Current Trip [SP 23]

The controller will use the over current trip retry setting (SP-20) in order to retry for the specified number of times before transitioning into FAULT state. If, at any time during the heater bakeout ramp-up, an over-current trip fault event occurs, the controller will immediately transition into fault state shutting down the output. When a current trip fault event occurs, the ramp will be reset and heater bakeout will remain enabled. The user may change the current trip setting and restart, or simply restart. Restarting from fault state requires the run/stop switch or the digital run enable (SP-129) to be toggled (to stop then back to run again).

Heater Bakeout Time Remaining [MP 371]

The amount of time remaining for the controller to ramp its output using heater bakeout.

Enabling Heater Bakeout

Heater bakeout can be enabled a number of different ways. It can be enabled by setting Heater Bakeout Enable (SP-24) to enable (1), with the general purpose digital input (SP-133), or it can be set to be enabled with a power cycle (SP-25). To use the general purpose input, set (SP-133) GP Digital Input function to (3) Heater Bakeout Enable. Then connecting the general purpose input terminal to common will enable heater bakeout. Disconnecting it from common will disable heater bakeout.

If it's desirable to have heater bakeout enabled after a power-cycle then set (SP-25) Heater Bakeout Enable with Power Cycle to (1) Enable heater Bakeout at power-up.

Heater bakeout may be enabled while in RUN state during normal operation. However, the heater bakeout ramp-up operation will not become active until the controller is stopped and restarted. Putting the controller into STOP state will reset the heater bakeout ramp, but not disable heater bakeout. If heater bakeout is disabled during a heater bakeout ramp-up cycle, the heater bakeout operation will continue until complete.

6.2 Zone Tab

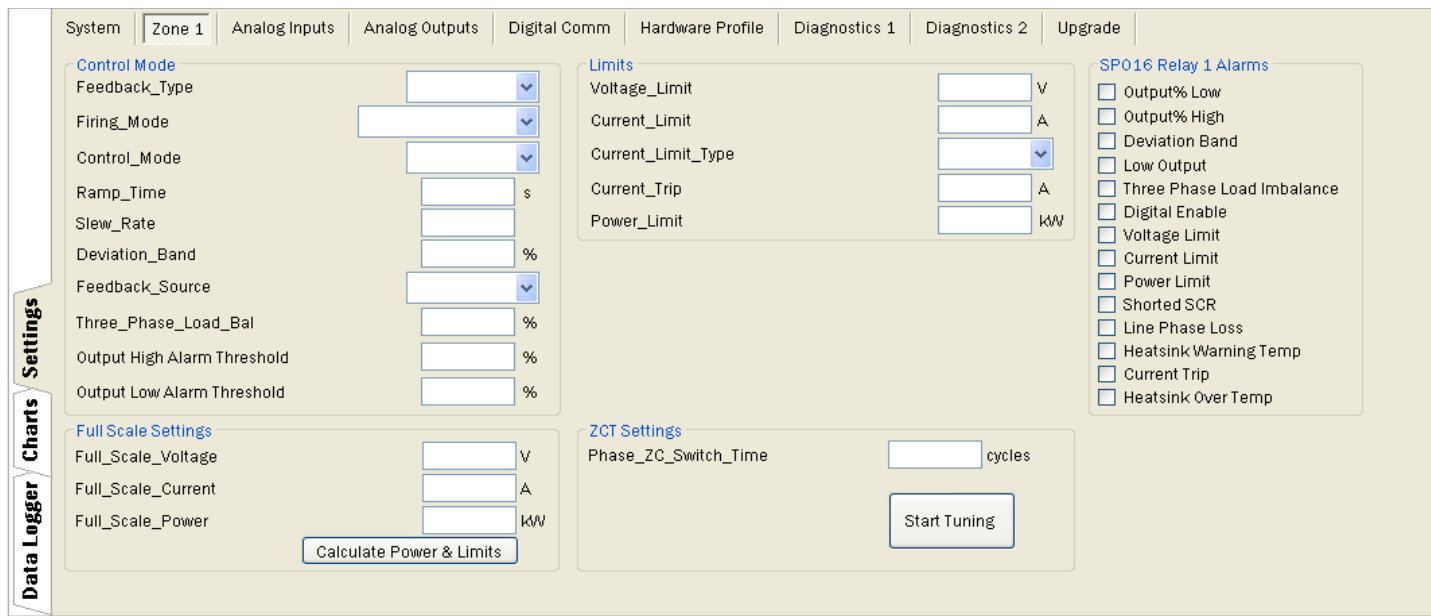


FIGURE 6.04

6.2.1 Control Mode

Feedback Type [SP 1]

Setting	Description
FF Voltage [Default]	Use voltage feedforward as the control loop feedback.
RMS Voltage¹	Use RMS voltage as the control loop feedback
AVG Voltage	Use average voltage as the control loop feedback
RMS Current	Use RMS current as the control loop feedback
AVG Current	Use average current as the control loop feedback
Real Power	Use real power as the control loop feedback
Apparent Power	Use apparent power as the control loop feedback

¹ Note: Default for HX controllers

Firing Mode [SP 2]

Setting	Description
Zero Cross ¹	The load power is turned ON for a number of complete electrical half-cycles and then turned OFF for a number of complete half-cycles.
Phase Angle [Default]	The SCR is on for a variable portion of the half-cycle.
Zero Cross Transformer Mode	Zero Cross firing method specifically for firing into a transformer. This uses Phase ZC Switch Time (SP7) for determining the number of soft start cycles before switching to Zero Cross firing.

¹ Note: Default for 3 Phase 2 Leg Controllers

Control Mode [SP 3]

Setting	Description
Open Loop	The output percentage is directly proportional to the setpoint. Feedback is not used.
Closed Loop [Default]	The output is adjusted so that the feedback equals the setpoint.

Ramp Time [SP 4]

Default value: 0 seconds.

This parameter allows the user to set a maximum ramp time (in seconds) for the controller to reach the full scale value from 0% output. The ramp time is not used if the setpoint is changed from something other than 0% output.

Example: If the controller is set for Voltage Feedback and the Full Scale Voltage is set to 100 Volts and the Ramp Time is set for 10 seconds, when a setpoint is applied the output will rise at 10 volts a second. So if the setpoint is set to 40% the ramp time will be 4 seconds.

Slew Rate Factor [SP 5]

Default value: 10

The slew rate controls how aggressively or slowly the system will respond to a change in feedback. A smaller number will make the system respond faster and more aggressively. A larger number will make the system respond slower. It is important that the full scale settings are set appropriately in order for the default value to work correctly.

Deviation Band [SP 18]

Default value: 100 %

Sets an error band around the setpoint so that when the feedback is outside this band the controller will indicate a *deviation alarm* (MP 256 Warning Alarm status, bit 9) and *not at setpoint* (MP344 Zone Status, bit 4)

Example: Deviation Band is set to 2% and the setpoint is set to 80%. While the controller is approaching the setpoint the Zone Status parameter will read 0 until the controller reaches 78%. As long as the feedback remains within +/- 2% of the setpoint, the Zone Status bit will read 1, indicating that the zone is at setpoint.

Feedback Source [SP 19]

Setting	Description
Internal [Default]	Use the internal feedback signal (Voltage, Current or Power)
Analog in 1	Use Analog Setpoint 1
Analog in 2	Use Analog Setpoint 2
Transducer 1	Uses feedback provided by the Control Concepts Transducer card using the CCI Link.

Three Phase Load Balance [SP 87]

Default value: 0 % (Disabled)

This sets the percent difference threshold, for the phase currents, used to indicate a load imbalance.

If any phase current is different than another phase current by the percentage set in SP 87, then a "Load Imbalance" is indicated.

Output% High Alarm Threshold [XP 3402]

Default value: 100%

Sets a threshold in % so that when the controller output % is above this value it will indicate a HIGH OUTPUT % Alarm or TAP CHANGE ALARM Alarm.

Output% Low Alarm Threshold [XP 3403]

Default value: 0%

Sets a threshold in % so that when the controller output % is below this value it will indicate a LOW OUTPUT % Alarm or TAP CHANGE DOWN Alarm.

6.2.2 Full Scale Settings

Feedback type selects the signal you desire to control. These settings deal directly with the full scale settings (Full Scale Voltage, Full Scale Current, Full Scale Power). When using one of the voltage feedback settings, the setpoint will be proportional to the full scale voltage. Likewise if using one of the current feedback settings the setpoint will correspond to full scale current. Power works in the same way.

The full scale settings are used throughout the system for command input scaling, limits, and control loop response. It is also used for retransmits. These values may be set within the range of the allowable limits for the parameters (see Parameter List Manual for limits).

The controller has limit parameters that prohibit the controller from reaching values that are too large for the controller. For example a 80 Amp controller can have the Full Scale Current set to 1000 Amps but limit parameters will prevent the controller from exceeding 105% (105 Amps) of the frame rating of 80 Amps. It is required that the full scale settings should not be set to more than 2X the actual full load operating value.

Full Scale Voltage [SP 8]

Default value: 480 Volts

The voltage that will be applied when the load is at full capacity. The closer the full scale voltage is to the actual voltage the more accurate the controller will be. Setting this slightly higher than the actual voltage is common. This should not be set to more than 2X the expected maximum voltage.

Full Scale Current [SP 9]

Default value: Frame Rating for controller in Amps.

The current that will be applied when the load is at full capacity. The closer the full scale current is to the actual current, the more accurate the controller will be. Setting this slightly higher than actual current is common. This should not be set to more than 2X the expected maximum current.

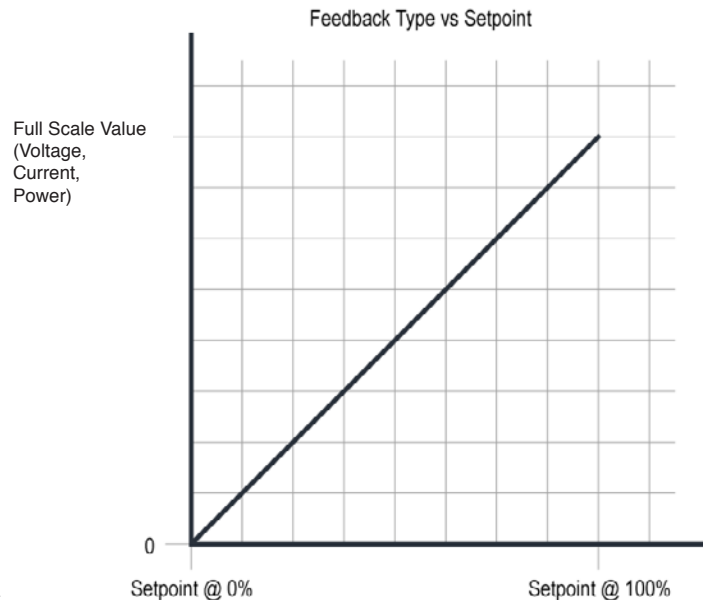


FIGURE 6.05

This figure shows how the setpoint corresponds to the full scale value.

Full Scale Power [SP 10]

The power in kilowatts that will be applied when the load is at full capacity. This should not be set to more than 2X the expected maximum power.

The default value is calculated from the following:

For 1 Phase AC:

Full Scale Voltage X Full Scale Current

For 3 Phase AC with Delta, 3 or 4 wire wye loads:

Full Scale Voltage X Full Scale Current X $\sqrt{3}$

For 3 Phase AC with Inside Delta load or 4 wire wye loads:

Full Scale Voltage X Full Scale Current X 3

After setting up the Full Scale Voltage and Full Scale Current, the Calculate Power & Limits button can be used to set the Full Scale Power.

Calculate Power & Limits button

By pressing this button the Full Scale Power, Current Limit, Current Trip and Power Limit is calculated and set. The software will automatically detect the controller type and uses the Full Scale Voltage and Full Scale Current to calculate the correct settings.

6.2.3 Limits

Voltage Limit [SP 11]

Default: 600 Volts

Limits the load voltage to prevent the controller from exceeding this value. If the voltage reaches the limit value, a Warning Alarm will be triggered indicating that the Voltage Limit has been achieved.

Current Limit [SP 12]

Default: 105% Frame Rating of the controller in Amps.

Limits the load current, to prevent the controller from exceeding this value. If the current reaches the limit value, a Warning Alarm will be triggered indicating that the Current Limit has been achieved. The maximum value for this is 105% of the frame rating.

Current Limit Type [SP 13]

Setting	Description
RMS [Default]	Use RMS current as the type of current for limiting
AVG	Use Average current as the type of current for limiting

Current Trip [SP 14]

Default for Phase Angle controllers: 175% Frame Rating for controller in Amps.

Default for Zero Cross controllers: 400% Frame Rating for controller in Amps.

If the current reaches this setting the controller will exhibit an Inhibit Alarm with a message indicating that the controller has experienced a Current Trip. Current Trip responds faster than the Current Limit and protects the controller from experiencing surge currents that could damage it. A fault message will be recorded in the fault history.

After a current trip, the fault must be reset. See Section 3 for ways to reset the fault condition.

Power Limit

Default: 105% Full Scale Power setting

Limits the load power to prevent the controller from exceeding this setting. If the power reaches the limit value, a Warning Alarm will be triggered indicating that the Power Limit has been achieved.

6.2.4 Zero Cross Transformer Mode (ZCT) Settings

Phase ZC Switch Time [SP 7]

Only applies when Zero Cross Transformer is selected as the Firing Mode.

Default value: 20 Cycles

This determines the number of cycles before switching to Zero Cross firing. The Phase Angle Start Tuning button is helpful in determining the value for this parameter.

Phase Angle Start Tuning button

Only applies when Zero Cross Transformer is selected as the Firing Mode.

The controller should be in RUN state with a 10% setpoint. This sets up the trigger for the DataTrace feature of the Control Panel Software which helps determine the recommended number of cycles for Phase ZC Switch Time (SP 7). Observe the DataTrace waveforms for indication of saturation of the transformer.

6.2.5 SP016 Relay Alarm

Default for Relay Alarms: Current Trip, Heatsink Over Temp

Select the checkbox next to the particular alarm/function that you wish to energize the relay if the alarm condition is met. Any number of conditions may be mapped to the relay. The relay outputs correspond with (SP 85) for the relay.

Low Output

The controller is at 100% output and the Set Point Reference (or command signal) is higher than the Feedback. In other words the controller is being asked to provide a higher output than the load is capable of.

Load Imbalance

If the Three Phase Load Balance (SP 87) has been enabled, and a load imbalance has been detected, the relay will energize.

Digital Enable

If the bit for the Digital System Command (SP 129) is set to run, the relay will energize.

Voltage Limit

If Voltage Limit is present the relay will energize.

Current Limit

If Current Limit is present the relay will energize.

Power Limit

If Power Limit is present the relay will energize.

Shorted SCR

If a Shorted SCR is present the relay will energize.

Line Phase Loss*

If a phase loss is detected the relay will energize.

Heatsink Warning Temp

If the heatsink temperature reaches within 5°C of the over-temperature alarm the relay will energize.

Current Trip*

If a Current Trip occurs the relay will energize. This will keep the relay energized until the fault condition is reset. See section 3 on resetting the fault condition.

Heatsink Over Temp*

If the heatsink temperature reaches the over-temperature alarm the relay will energize. When the temperature drops into a safe range, the relay will automatically de-energize. However, the controller will remain in a fault state.

*The controller will have an inhibit alarm present.

6.3 Analog Inputs Tab

FIGURE 6.06

Analog SP1 Type [SP 90]

Setting	Description
Voltage	Voltage input scalable from 0 – 10 Vdc
Current [Default]	Current input scalable from 0 – 20 mA (default 4-20mA)

This selects the input signal type for Analog Setpoint 1. The wiring diagram for the inputs can be found in the Installation and Maintenance manual.

Analog SP1 Lo Cmd [SP 91]

Default value: **4.00** mA

This is paired with Analog SP1 Lo Out (SP 92). This parameter is the signal value at the percent displayed in (SP 92). This is typically your lowest possible signal value that can be achieved.

Analog SP1 Lo Out [SP 92]

Default value: **0.00** %

This is paired with Analog SP1 Lo Cmd (SP 91). This parameter is the percentage at the signal value displayed in (SP 91).

FOR MORE INFORMATION:



ANALOG INPUT SCALING

An analog setpoint tutorial can be found **on our Youtube channel.**

Search "ControlConceptsInc."

Note: The tutorial was created for the FUSION Control Panel; now the Analog Tab is available as a separate tab.

Analog SP1 Hi Cmd [SP 93]

Default value: **20.00** mA

This is paired with Analog SP1 Hi Out (SP 94). This parameter is the signal value at the percent displayed in (SP 94). This is typically the highest possible signal value that can be achieved.

Analog SP1 Hi Out [SP 94]

Default value: **100.00** %

This is paired with Analog SP1 Hi Cmd (SP 93). This parameter is the percentage at the signal value displayed in (SP 93).

Analog SP1 Monitor Full Scale [SP 136]

Default value: **1000**

This is for scaling the Analog Setpoint 1 - Monitor Value (MP 208). This value can be scaled for any type of user input. If this value is desired to be monitored on the Display, it can be viewed by adding (MP 208) to the custom screen list. On the custom screen list window a four-character title can be edited and up to three characters may be entered for units to be displayed with MP-208.

Analog SP2 Type [SP 95]

Setting	Description
Voltage [Default]	Voltage input scalable from 0 – 10 Vdc (default 0 – 5 Vdc)
Current	Current input scalable from 0 – 20 mA

This selects the input signal type for Analog Setpoint 2. The wiring diagram for the input can be found in the Installation and Maintenance manual.

Analog SP2 Lo Cmd [SP 96]

Default value: **0.00** V

This is paired with Analog SP2 Lo Out (SP 97). This parameter is the signal value at the percent displayed in (SP 97). This is typically your lowest possible signal value that can be achieved.

Analog SP2 Lo Out [SP 97]

Default value: **0.00** %

This is paired with Analog SP2 Lo Cmd (SP 96). This parameter is the percentage at the signal value displayed in (SP 96).

Analog SP2 Hi Cmd [SP 98]

Default value: **5.00 V**

This is paired with Analog SP2 Hi Out (SP 99). This parameter is the signal value at the percent displayed in (SP 99). This is typically your highest possible signal value that can be achieved.

Analog SP2 Hi Out [SP 99]

Default value: **100.00 %**

This is paired with Analog SP2 Hi Cmd (SP 98). This parameter is the percentage at the signal value displayed in (SP 98).

Analog SP2 Monitor Full Scale [SP 137]

Default value: **1000**

This is for scaling the Analog Setpoint 2 - Monitor Value (MP 209). This value can be scaled for any type of user input. If this value is desired to be monitored on the Display, it can be viewed by adding (MP 209) to the custom screen list. On the custom screen list window a four-character title can be edited and up to three characters may be entered for units to be displayed with MP 209.

PWM Input LO Duty Cycle [SP 155]

Default value: **0 %**

This is paired with PWM Input LO Command (SP 156). This parameter is percentage at the signal value displayed in (SP 156).

PWM Input LO Command [SP 156]

Default value: **0 %**

This is paired with PWM Input LO Duty Cycle (SP 155). This parameter is the signal value at the percent displayed in (SP 155). This is typically your lowest possible signal value that can be achieved.

PWM Input HI Duty Cycle [SP 157]

Default value: **100 %**

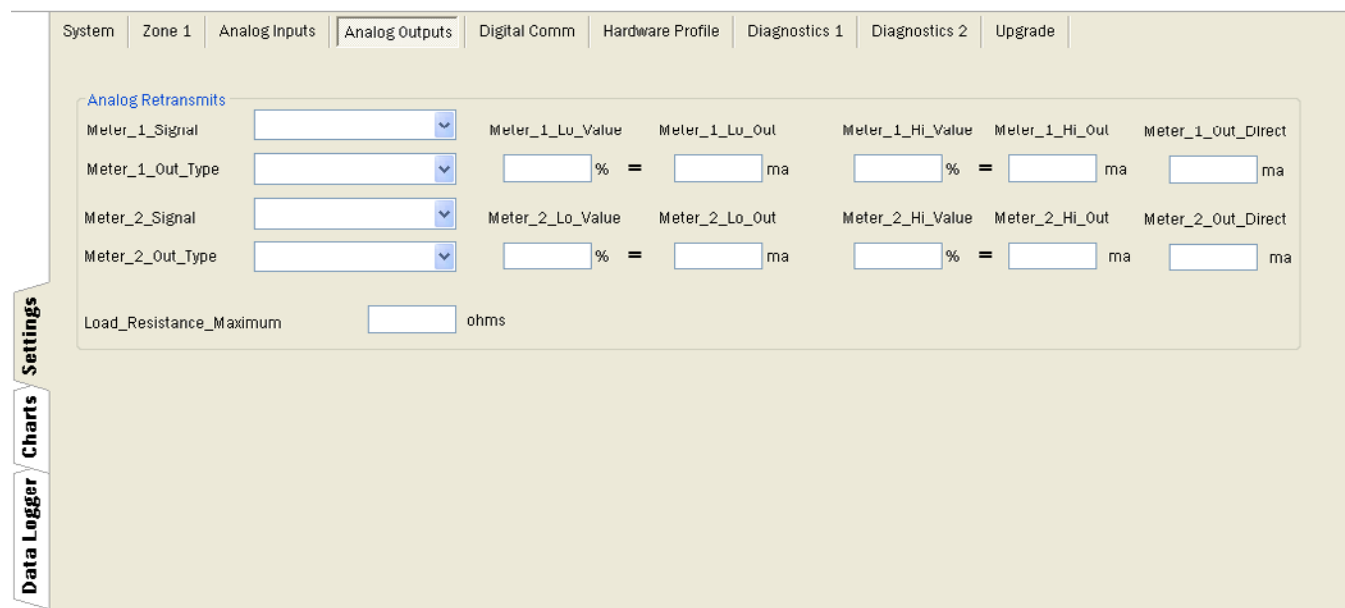
This is paired with PWM Input HI Command (SP 158). This parameter is percentage at the signal value displayed in (SP 158).

PWM Input HI Command [SP 158]

Default value: **100 %**

This is paired with PWM Input HI Duty Cycle (SP 157). This parameter is the signal value at the percent displayed in (SP 157). This is typically your highest possible signal value that can be achieved.

6.4 Analog Output Tab



System | Zone 1 | Analog Inputs | **Analog Outputs** | Digital Comm | Hardware Profile | Diagnostics 1 | Diagnostics 2 | Upgrade

Analog Retrasmits

Meter	Signal	Out Type	Lo Value	Lo Out	Hi Value	Hi Out	Out Direct
Meter_1	[Dropdown]	[Dropdown]	[Text] %	[Text] ma	[Text] %	[Text] ma	[Text] ma
Meter_2	[Dropdown]	[Dropdown]	[Text] %	[Text] ma	[Text] %	[Text] ma	[Text] ma

Load_Resistance_Maximum [Text] ohms

Settings
Charts
Data Logger

FIGURE 6.07

6.4.1 Analog Retrasmits

The outputs are configured similarly to the analog inputs. The two retrasmits can be configured independently as either a current source (0 – 20 mA) or as a voltage source (0 – 10 Vdc).

Meter 1 Signal [SP 141] / Meter 2 Signal [SP 148]

Setting	Description
Load Voltage A [Meter 1 Default]	The load voltage for phase A
Load Current A [Meter 2 Default]	The load current for phase A
Load Voltage B	The load voltage for phase B
Load Current B	The load current for phase B
Load Voltage C	The load voltage for phase C
Load Current C	The load current for phase C
Real Power	The real power
Apparent Power	The apparent power
Direct Out	Use Meter 1 Out Direct (SP 146) or Meter 2 Out Direct (SP 153) to set the value of the output.
Load Resistance A	The load resistance for Phase A
Load Resistance B	The load resistance for Phase B
Load Resistance C	The load resistance for Phase C

Meter 1 Out Type [SP 140] / Meter 2 Out Type [SP 147]

Setting	Description
Voltage [Default]	Voltage output scalable from 0 – 10 Vdc (Default 0 – 5 Vdc)
Current	Current output scalable from 0 – 20 mA

Meter 1 Lo Value [SP 142] / Meter 2 Lo Value [SP 149]

Default value: 0.00 %

These are paired with Meter 1 Lo Out (SP 143) / Meter 2 Lo Out (SP 150). These parameters are the percentage at the signal value displayed in (SP 143 / SP 150).

Meter 1 Lo Out [SP 143] / Meter 2 Lo Out [SP 150]

Default value: 0.00 V

These are paired with Meter 1 Lo Value (SP 142) / Meter 2 Lo Value (SP 149). These parameters are the signal value at the percent displayed in (SP 142 / SP 149). This is typically your lowest possible signal value that is the desired output.

Meter 1 Hi Value [SP 144] / Meter 2 Hi Value [SP 151]

Default value: 100.00 %

These are paired with Meter 1 Hi Out (SP 145) / Meter 2 Hi Out (SP 152). These parameters are the percentage at the signal value displayed in (SP 145 / SP 152).

Meter 1 Hi Out [SP 145] / Meter 2 Hi Out [SP 152]

Default value: 5.00 V

These are paired with Meter 1 Out Direct (SP 146) / Meter 2 Out Direct (SP 153). These parameters are the signal value at the percent displayed in (SP 146 / SP 153). This is typically your lowest possible signal value that is the desired output.

Meter 1 Out Direct [SP 146] / Meter 2 Out Direct [SP 153]

Default value: 0.00 V

This is only used when Meter 1 Signal (SP 141) / Meter 2 Signal (SP 148) is set to *Direct Out*. This will give a constant output signal at the level specified in these parameters.

Load Resistance Maximum [SP 154]

Default value: **50 Ohms**

When using the retransmit function, set to load resistance, set this value to the resistance value that is expected.

6.5 Digital Comm Tab

The screen appearance changes depending on the type of communication option.

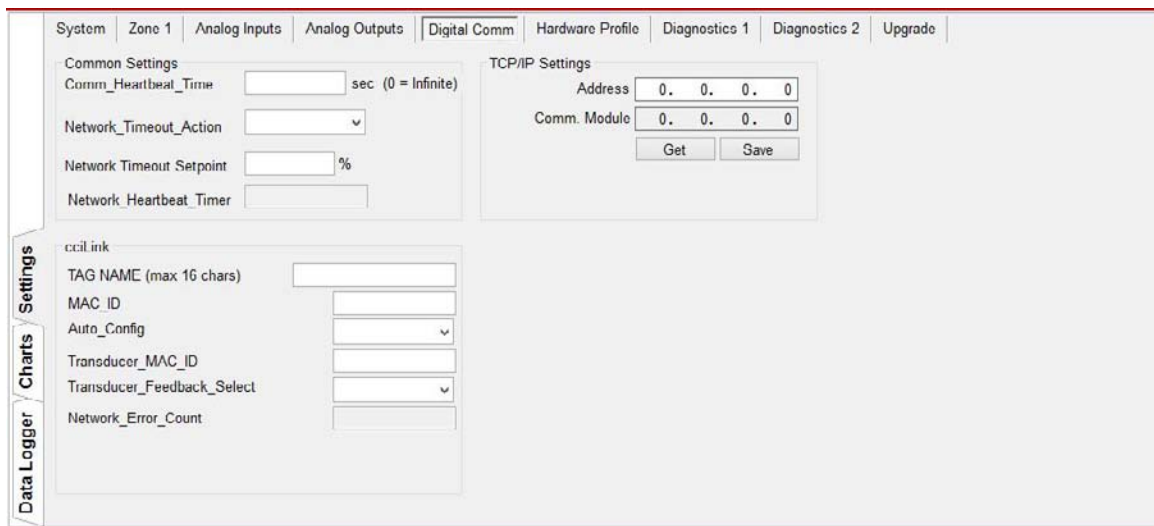


FIGURE 6.08

6.5.1 Common Settings

Communications Heartbeat Timer [SP 125]

Default value: 0 s

When the first message to the controller's address is received the heartbeat timer starts. Subsequent messages reset the timer. If the heartbeat timer expires the Network Timeout Action (SP 128 bit 0) is executed. A notification of a communication timeout will be indicated on the display of the controller. When the timer is timed out, the next valid message will reset the timer. When the heartbeat time is set to 0 seconds the timer will never expire.

See Network Timeout Action (SP 128 bit 0) for more details for what happens when a timeout occurs.

Network Heartbeat Timer [MP 370]

Timer value used for controller-integrated Modbus TCP, EtherNet/IP, and PROFINET.

Network Timeout Action [SP 128]

Setting	Description
Continue [Default]	Continue without fault
Shutdown	Communication fault with controller shut down
Timeout Setpoint	The network timeout setpoint (SP 108) is used

This is the action for when the heartbeat timer expires.

When *Continue* is selected and the timer expires the controller continues to operate without a communications fault occurring. *Stop* will cause a communications fault and the controller will shut down. When a communication fault is present the next valid message will reset the heartbeat timer but the fault also needs to be reset.

Network Timeout Setpoint [SP 108]

Default value: 0%

The setpoint that is used upon a network timeout, when the network timeout action (SP 128) is set to timeout setpoint.

6.5.2 TCP/IP Settings

Address [SP 126 – SP 127]

Default value: 255.255.255.255

This is the address of the controller on the network.

Comm Module

This is the IP address local to the communications module. If the Comm Module address differs from the Controller address, please contact CCI support.

Get button

This reads the address from the communications module of the controller.

Save Button

This sets the address to the communications module of the controller.

Comm Watchdog [SP 125]

Default value: 0

Modbus TCP only. When this is set to 0 the timer is disabled. See Communications Heartbeat Timer (SP 125) on previous page.

When this timer expires, the communication modules configuration is interrogated by the controller to verify proper operation.

6.5.4 CCI Link

TAG NAME

This is a 16-character alpha-numeric identifier.

MAC ID [SP 118]

Default Value: 63

The device's address on the CCI Link network. Each drive must have a unique MAC ID between 1-63.

Auto-Config [SP 119]

Setting	Description
Disabled [Default]	Auto-Configuration disabled
Enabled	Auto-Configuration enabled

This allows the CCI Connect module (sold separately) to automatically configure the MicroFUSION unit based on a previously stored device and system configuration.

Transducer MAC ID [SP 160]

Default Value: 0

Sets the MAC ID of a transducer card server node on CCI Link, causing the MicroFUSION controller to become a client node with respect to the specified transducer card.

Transducer Feedback Select [SP 161]

Setting	Description
V1 [Default]	Channel 1 Voltage
I1	Channel 1 Current
V2	Channel 2 Voltage
I2	Channel 2 Current
V3	Channel 3 Voltage
I3	Channel 3 Current
P1	Channel 1 Power
P2	Channel 2 Power
P3	Channel 3 Power
POW 3PH	Three Phase Power

Note: All from the transducer card server node on CCI Link when feedback source is set to transducer card.

Network Error Count [MP 348]

The number of CCI Link message errors detected.

6.7 Hardware Profile Tab

System

Zone 1

Analog Inputs

Analog Outputs

Digital Comm

Hardware Profile

Diagnostics 1

Diagnostics 2

Upgrade

System

Phase

Type

Terminal

Frame_Size

Option_Board

AMP_Size

Performance

IO_Option

Retransmits

SyncGuard

ZCTMode

Fuse_Option

Custom_Config

Special_Product

PCB_Serial_Number

PCB_Lot_Number

MFG_Date

PCB_Assy_Rev

Serial_Number

FIGURE 6.09

The tab describes the physical hardware within the MicroFUSION Power Controller. From this tab, the board serial number, lot number, assembly revision, and manufacturing data can be obtained. These parameters are set at the factory and cannot be changed by the user.

6.8 Diagnostics 1 Tab

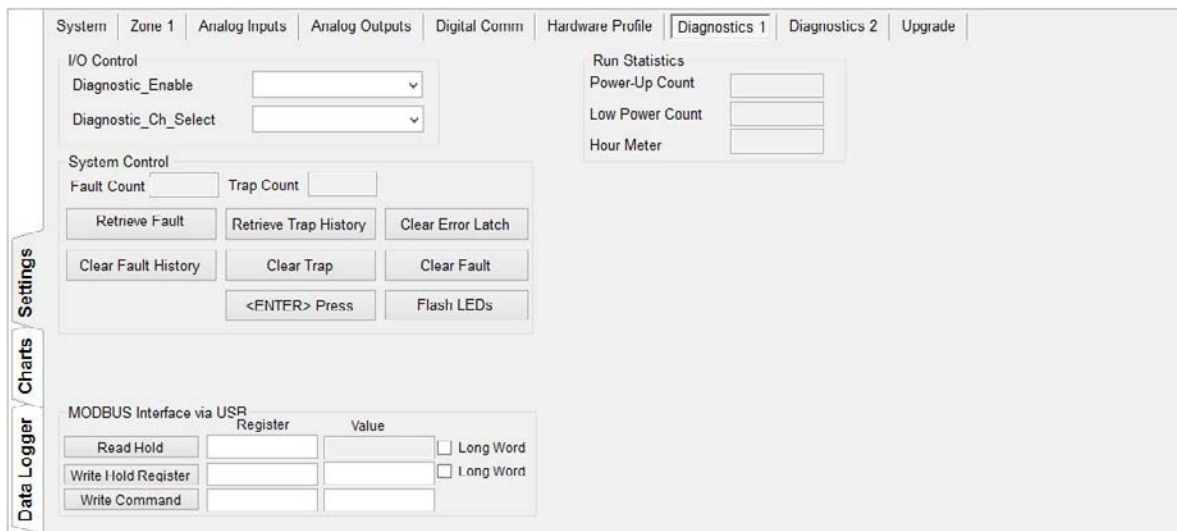


FIGURE 6.10

This diagnostics tab provides a way to test controllers' hardware and software, and check controller history. This tab should not be used unless directed to by Control Concepts.

6.8.1 I/O Control

Diagnostic Enable [CAL 395]

Setting	Description
Disabled [Default]	Disable diagnostic mode Do not change unless directed to do so

Diagnostic Ch Select [CAL 396]

Setting	Description
Diag Bits OFF [Default]	The diagnostic bits are OFF Do not change unless directed to do so

6.8.2 System Control

Retrieve Fault History button

Fault Count = Number of fault records. Every time the controller experiences a fault, the fault information is recorded. This button retrieves the fault information and saves it to a text (.txt) file with the controller's serial number. Upon saving this file, a text file will open and display the Error Index, Error Time, Error Code and Error String. This file can be useful when determining unknown fault states

Retrieve Trap History button

Trap Count = Number of processor trap occurrences. Every time the controller experiences an error trap, the trap record is saved. This button retrieves the trap history.

Clear Error Latch button

Clears that error latch register (MP 345).

Clear Fault History button

This clears the fault history record in the controller.

Clear Trap button

This clears the processor error trap records.

Clear Fault button

This clears the fault in the controller.

<Enter> Press button

Use this button when enter key is required by the Misc Status bit on Diagnostic 2 tab.

Flash LEDs

Flashes all the LEDs on the MicroFUSION controller for 10 seconds.

Used to identify the physical controller.

Run Statistics

Power-Up Count - The number of times the controller has been powered on/off.

Low Power Count - The number of times the processor has had insufficient power.

Hour Meter - The number of hours the devices has been powered on.

6.8.3 MODBUS Interface via USB

Read Hold Register button

Enter the number of the parameter you wish to read into the *Register* box next to the *Read Hold Register* button. Selecting this button will read the parameter's value and display it in the *Value* box.

Write Hold Register button

Enter the number of the parameter into the *Register* box and the value that you wish to write into the *Value* box next to the *Write Hold Register* button. Selecting this button will write the value to the parameter.

NOTE: Some values require a high and low word and therefore have a high and low parameter associated with them. Check the *Long Word* checkbox to read or write both of these parameters. When *Long Word* is checked enter only the parameter number for the high word. The high word parameter is designated in the parameter list by HI (MSW) in the title.

Write Command button

Writes special commands to the controller. Do not use unless under direct support from Control Concepts.

6.9 Diagnostics 2 Tab



FIGURE 6.11

In the event that the Control Concepts Customer Service Department is needed to assist with the controller, this diagnostics tab provides a quick, useful picture of the internal settings of the controller.

In general, disregard this tab and do not be concerned with the status colors, as hardware presence can dictate that status color.

6.9.1 AC Line Status [MP 342]

Bit Definition: Bit 7 = ADC Timing
 Bit 6 = Control Timing
 Bit 5 = Phase Rotation
 Bit 4 = Phase Rotation
 Bit 3 = Not Used
 Bit 2 = Phase C
 Bit 1 = Phase B
 Bit 0 = Phase A

Status Color:

(Red)	(Green)
Not OK	OK
Not OK	OK
1-2-3 (Blue)	3-2-1
TBD	OK
Absent	Present
Absent	Present
Absent	Present

Phase A [MP 342 bit 0] Absent / Present

Indicates if the AC line is present for Phase A

Phase B [MP 342 bit 1] Absent / Present

Indicates if the AC line is present for Phase B

Phase C [MP 342 bit 2] Absent / Present

Indicates if the AC line is present for Phase A

Phase Rotation [MP 342 bit 4] TBD / OK

Indicates if the phase rotation has been determined.

Phase Rotation [MP 342 bit 5] 1-2-3 / 3-2-1

Indicates the phase rotation.

Control Timing [MP 342 bit 6] Blank / OK

The timing for SCR firing. This must be OK in order for the SCR to turn ON.

ADC Timing [MP 342 bit 7] Blank / OK

The timing for feedback data collection synchronization.

6.9.2 Main EEPROM Status [MP 336]

		Status Color:	
		(Red)	(Green)
Bit Definition:	Bit 15 = TBD		
	14 = TBD		
	13 = EE SP Def	Update Req	OK
	12 = EE Write Protected	Not Protected	Protected
	11 = User SP Backup	Fail	OK
	10 = DC Current Backup	Fail	OK
	9 = DC Current Comp	Fail	OK
	Table		
	8 = Repair Record Table	Fail	OK
	7 = Error Record Table	Fail	OK
	6 = MFG Table	Fail	OK
	5 = Cal Table	Fail	OK
	4 = Cal V Table	Fail	OK
	3 = MFG SP V Table	Fail	OK
	2 = User SP V Table	Fail	OK
	1 = Initialized	Init Required	Initialized
	Bit 0 = Read/Write	Fail	OK

Read / Write [MP 336 bit 0] OK/Fail

During power up, checks to see if the EEPROM is functional.

Initialized / Init Required [MP 336 bit 1]

The EEPROM has been initialized.

User SP V Table [MP 336 bit 2] OK/Fail

Status of the user setup parameter table.

MFG SP V Table [MP 336 bit 3] OK/Fail

Status of the manufacturing setup parameter table.

Cal V Table [MP 336 bit 4] OK/Fail

Status of the calibration setup parameter table.

Cal Table [MP 336 bit 5] OK/Fail

Status of the calibration data table.

MFG Table [MP 336 bit 6] OK/Fail

Status of manufacturing data table.

Error Record Table [MP 336 bit 7] OK/Fail

Status of the error record table.

Repair Record Table [MP 336 bit 8] OK/Fail

Status of the repair record table.

DC Current Comp Table [MP 336 bit 9] OK/Fail

Status of the DC current compensation table.

DC Current Backup [MP 336 bit 10] OK/Fail

Status of the backup DC current compensation table.

User SP Backup [MP 336 bit 11] OK/Fail

Status of the backup user setup parameter table.

EE Write Protected / EE Not Write Protected [MP 336 bit 12]

The status of the EEPROM write protection.

EE SP Def / EE SP Def Update Req [MP 336 bit 13]

The status of the setup parameter definition table.

6.9.3 Misc Status

Waiting for Enter Key [MP 335 bit 3]

The controller has halted during initialization. Press the “<Enter> Press” button on the Diagnostic 1 tab.

6.10 OEM Tab (OEM Version Only)

Custom tabs are available if specific settings do not meet a customers’ needs. The contents of the OEM tab will vary based on the collaboration between Control Concepts and the individual customer.

Contact Control Concepts for more information about Custom/OEM controllers or for examples of previous models.

6.11 Upgrade Tab

System | Zone 1 | Analog Inputs | Analog Outputs | Digital Comm | Hardware Profile | Diagnostics 1 | Diagnostics 2 | **Upgrade**

Additional Features

Performance

Adjustable Current Limit

✓ High Performance

✓ Alarm Relay **Enabled**

✓ General Purpose Input **Enabled**

✗ SYNC-GUARD Connectivity **Disabled**

✓ Zero Cross Transformer (ZCT) Firing Mode **Enabled**

✓ Retransmit (RTX) **Enabled**

Enter Upgrade Key

Call Control Concepts at 1-800-765-2799 for an upgrade key.

Format: xxxxxx-xxxxxx-xxxxxx-xxxxxx-xx

Upgrade

The upgrade tab lists additional features that can be enabled in the field with an Upgrade Key provided by Control Concepts.

6.11.1 Additional Features

The following features can be enabled:

- Alarm Relay
- General Purpose Input
- SYNC-GUARD Connectivity
- Zero Cross Transformer (ZCT) Firing Mode
- Retransmit (RTX)

A green checkmark indicates that the feature is Enabled.

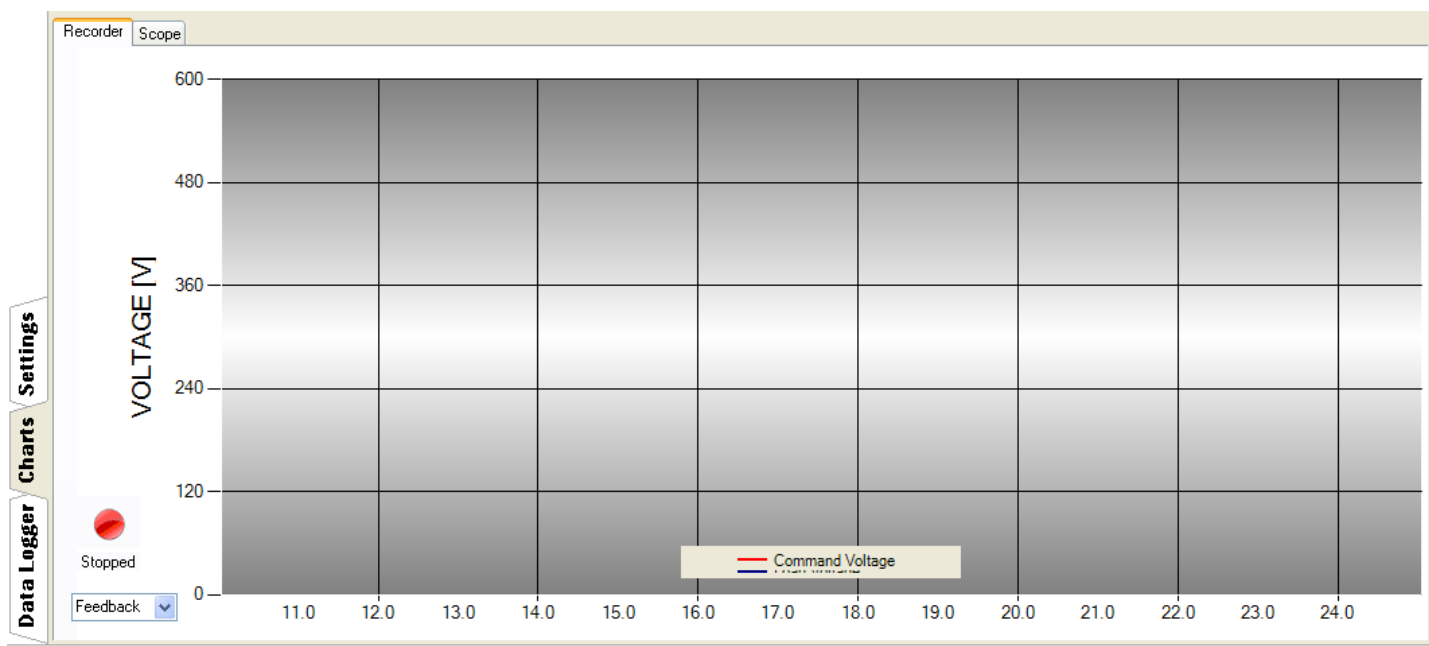
A red “X” indicates that the feature is Disabled

6.11.2 Enter Upgrade Key

Contact Control Concepts at 1 (800) 765-2799 for an upgrade key. Enter the key in the field and select the “Upgrade” button to activate the key.

7. CHART TAB

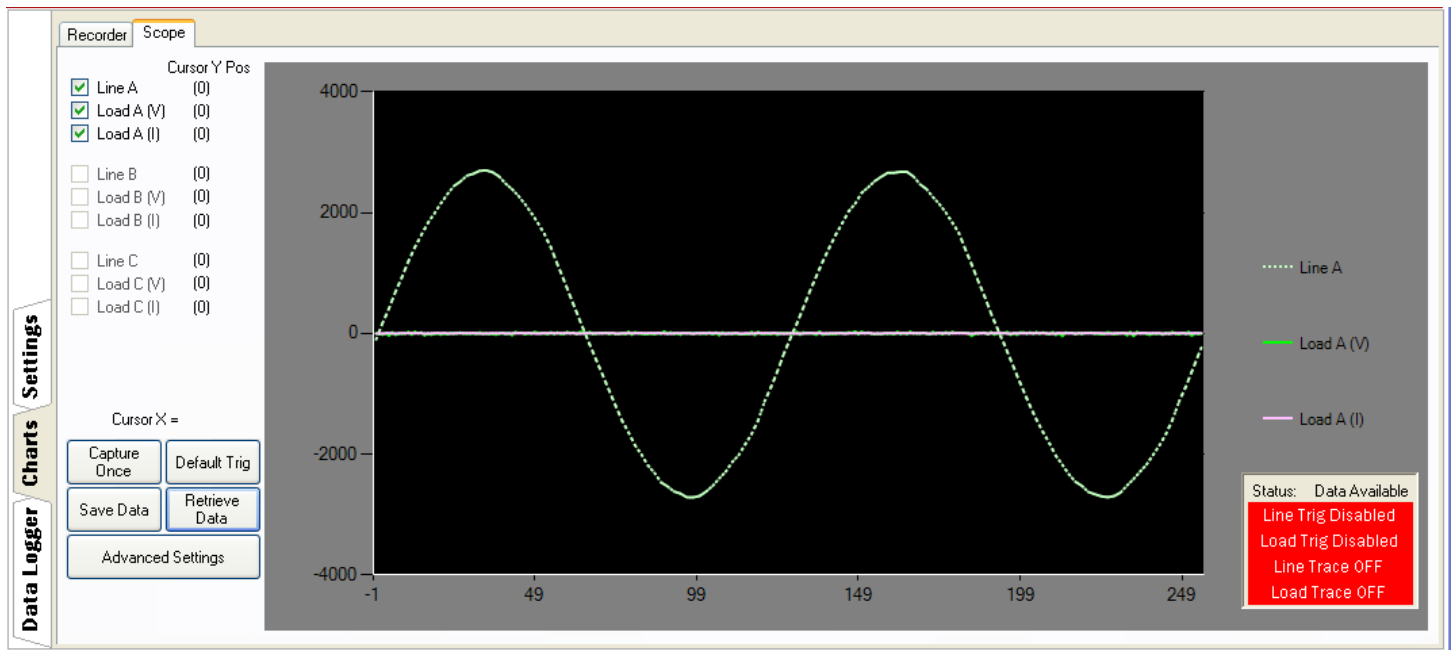
7.1 Recorder



This tool charts the command value of the control loop against the feedback for voltage current or power. Start the tool by clicking the red button. Stop the chart tool by clicking the red button again. Select the signal you would like to chart in the lower left drop down box.

You can select the signal using the selection box in the lower left corner of the screen. The timescale is fixed. However you can zoom in by click-and-dragging a vertical window region. Undo the zoom using the newly presented “-” symbol on the vertical scroll bar.

7.2 Scope



The scope feature records the line voltages, load voltages and current waveforms for a period of 2 cycles. This data can then be viewed on the graph. The checkboxes beside the graph can turn ON/OFF the desired waveform for viewing.

The graph has zooming capability by clicking-and-dragging a vertical window region. Undo the zoom using the newly presented “-” symbol on the horizontal and vertical scroll bar.

There is a status box on the lower right corner.

Status	
Data Available	Data has been collected and is ready to be retrieved
Waiting for Trigger	The trigger event has not occurred yet.
No Data	No data has been collected.
Line / Load Trigger	
Enabled	Trace is Enabled, waiting for trigger
Disabled	Trace is Disabled
Line / Load Trace	
ON	Trace is ON, collecting Data
OFF	Trace is OFF

Snapshot/Capture Once button

Collects 2 cycles worth of data and displays the information on the graph.

Default Trig button

The controller is constantly collecting data. Over Current Trip is, by default, the active trigger. After an Over Current Trip the controller stops collecting data and saves the last 2 cycles of data. The default trigger button resets the trigger so the controller will continually collect data again.

Save Data button

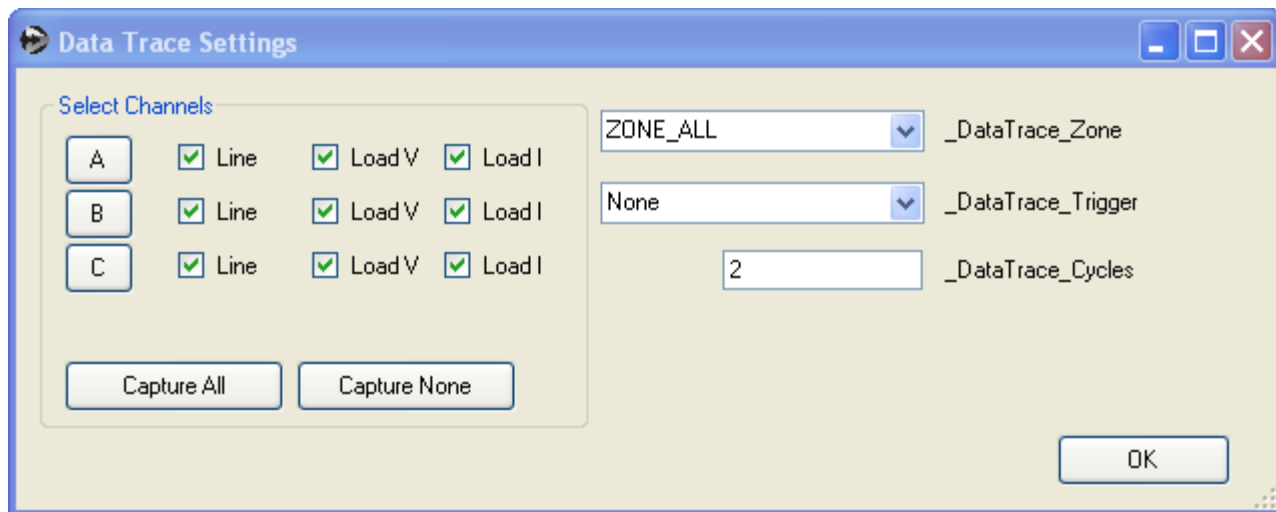
This saves the data that is displayed to a .csv file which can be imported into a spreadsheet program.

Retrieve Data button

As long as the Status indicator on the lower right corner indicates “Data Available”, data can be retrieved from the controller and displayed on the graph.

7.2.1 Advanced Settings button

When the Advanced Setting button is pressed, a new window appears.



Select Channels

Pick the channels that are desired to be saved.

Data Trace Zone Drop box

Choose which zone the trigger will be active for. If Zone All is used, the data will be saved for the first zone to trigger the event.

Data Trace Trigger Drop box

Setting	Description
None	Starts on the next AC line, positive half cycle
Run	When controller is in Run state
Zero Cross	Next Zero Cross fire pulse
Zero Cross Positive	Next Zero Cross fire pulse on the positive half cycle
Zero Cross Negative	Next Zero Cross fire pulse on the negative half cycle
Limit	Any limit (Voltage, Current, Power)
Shorted SCR	Shorted SCR event
Over Current Trip	Over Current Trip event

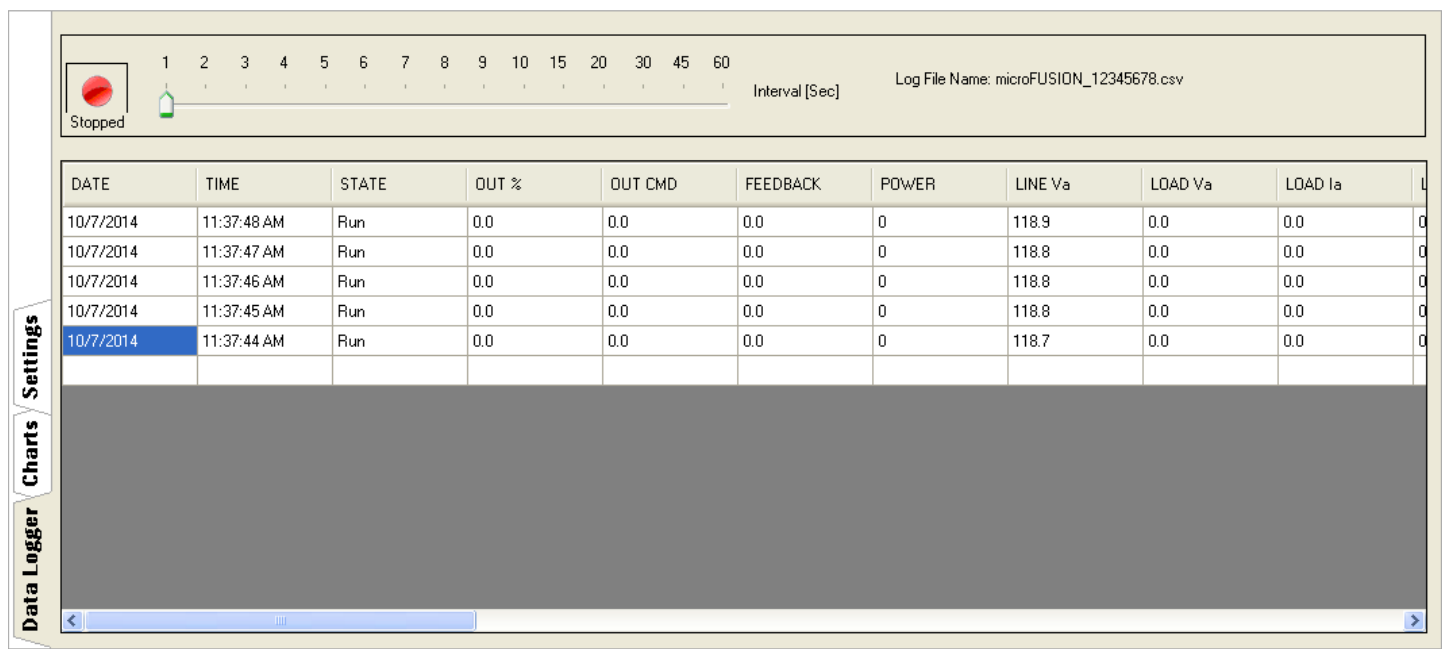
Data Trace Cycles

Range: 0 – 100 Cycles (0 = continuous)

After trigger, data is collected until the set number of cycles, then the trace stops and holds data for the last two cycles collected.

For example: If Data Trace Cycles = 10, 10 cycles of data will be collected and the last 2 cycles will be saved for viewing.

8. DATA LOGGER TAB



DATE	TIME	STATE	OUT %	OUT CMD	FEEDBACK	POWER	LINE Va	LOAD Va	LOAD Ia
10/7/2014	11:37:48 AM	Run	0.0	0.0	0.0	0	118.9	0.0	0.0
10/7/2014	11:37:47 AM	Run	0.0	0.0	0.0	0	118.8	0.0	0.0
10/7/2014	11:37:46 AM	Run	0.0	0.0	0.0	0	118.8	0.0	0.0
10/7/2014	11:37:45 AM	Run	0.0	0.0	0.0	0	118.8	0.0	0.0
10/7/2014	11:37:44 AM	Run	0.0	0.0	0.0	0	118.7	0.0	0.0

The Datalogger Tab is a vertical tab found to the left of the active tab screen. This tool logs the runtime data for the MicroFUSION power controller to a .csv file which can be imported into a spreadsheet program. The tool is useful for logging process cycles and machine start-ups.

Start the logger by first selecting the log interval in seconds and then click the red button. You will be prompted for the name and location to save the file. The logger will log the data to the file at the selected interval as long as the program remains running and the USB communications remain intact. Select the red button again to stop the logging.