

**ACCEL500
HONEYWELL APPLICATION SOFTWARE**

Part Number 695111.V12

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Cleveland, Ohio**

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AVTRON INDUSTRIAL AUTOMATION, INC.
Cleveland, Ohio

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**AVTRON ACCEL500
HONEYWELL APPLICATION SOFTWARE
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SECTION I

INTRODUCTION AND GENERAL INFORMATION

The ACCel500 Honeywell software is a specific application created for the Honeywell test stand. It offers the stand to be operated in maintenance or remote mode either as a torque, speed or jet engine start modes. Following is a list of the major software features.

Communications options:

- Ethernet (Modbus)
- CanBus
- System Bus (Fiber)

Reference location options:

- Fixed value
- Analog input
- Communications
- Frequency

Speed reference features:

- Remote or local maintenance speed reference
- 48 point speed vs time table
- Jet engine simulator
- Reverse command
- Ramp with programmable rates and S-curves
- Ramp hold
- Master/Slave
- Speed step input

Speed loop:

- PI regulator
- Inertia compensation
- Current limit control
- Non-linear gains

Torque Reference:

- Slave torque control
- Remote or local torque reference
- 48 point torque vs speed table

Spare operation blocks:

- Variety of logic blocks including , Ands, Ors, Inverts, and latches
- Comparitors
- Switches
- Gains

Firmware Options enabled

- Start Wizard
- Identification (Motor and torque loop tuning)
- Motor control
 - Volt/Hertz
 - Open loop vector
 - Closed loop vector
- Extended speed range above 320 Hz
- Non-linear gains for extended speed range
- Fault FIFO
- Signal analyzer with trigger

IMPORTANT:

Configuration information in this manual is provided to assist users in designing their own operational/functional schemes. It is deemed to be correct, however, if any errors or omissions exist, Avtron and/or Avtron representatives will not be liable to provide “warranty” on-site support. If one is designing his own configuration, or using one of the examples, it is highly recommended to test the operation prior to putting the drive into production.

SECTION II

SELECTING THE CONTROL MODE

The drive can be commanded to run from three distinct locations:

- Remote / local modes (Remote LED on drive keypad is lit)
- Drive keypad (Local LED on drive keypad is lit)
- Computer diagnostic software (Remote and Local LED's flashing on keypad)

The drive out of the box is defaulted to the drive keypad mode. When the mode is changed, it is stored even through power failure (retentive).

The drive is set up so control location can not be switched while the drive is running (*MC Run* is TRUE).

2-1 REMOTE / LOCAL OPERATION

To transfer to remote operation, press the **loc/rem** button on the keypad while the drive is not running. The remote green LED should be on and the display should have the message “I/O term” displayed. If the **loc/rem** button is pressed while running in remote mode, the display will flash “Locked while RUNNING”.

Pressing the **start** button on the keypad will display a message “Keypad Control NOT ACTIVE”

Control Place = 0 in this mode.

NOTE: *** This is the standard mode for the test stand. ***

2-2 LOCAL DRIVE KEYPAD

To transfer to local operation, press the **loc/rem** button on the keypad while the drive is not running. The local green LED should be on and the display should have the message “Keypad” displayed.

If the **loc/rem** button is pressed while running in local mode the display will flash “Locked while RUNNING”.

The **start/stop** buttons will now work and the drive will run at the entered keypad reference setpoint.

Set the keypad control parameters (Keypad Speed Direction, Keypad Speed Reference, Keypad Torque Direction, and Keypad Torque Reference) using menu M3 (Keypad Control).

If keypad communications goes down while in the local mode, the drive will fault (Keypad Comm).

Control Place = 1 in this mode.

NOTE: *** Speed to 1000 rpm only available with this mode. ***

2-3 PC CONTROL (COMPUTER DIAGNOSTIC SOFTWARE ADDaptACC)

The drive must be off before the PC Control check box from the diagnostic software is checked to go into computer control. If the box is checked while running, control will not be transferred until the run is removed and the box is re-checked.

While in computer control, both the local and remote LEDs will flash along with the two display messages.

If computer communications goes down while in PC control, the drive will fault (Keypad Comm). When the fault is reset, control will revert to the previous control mode (local or remote).

Once in computer control, the drive can be started/stopped by the control buttons.

Control Place = 2 in this mode.

NOTE: *** Speed to 1000 rpm only available with this mode. ***

SECTION III

KEYPAD AND PARAMETER DESCRIPTIONS

3-1 ACCel500 KEYPAD OPERATION

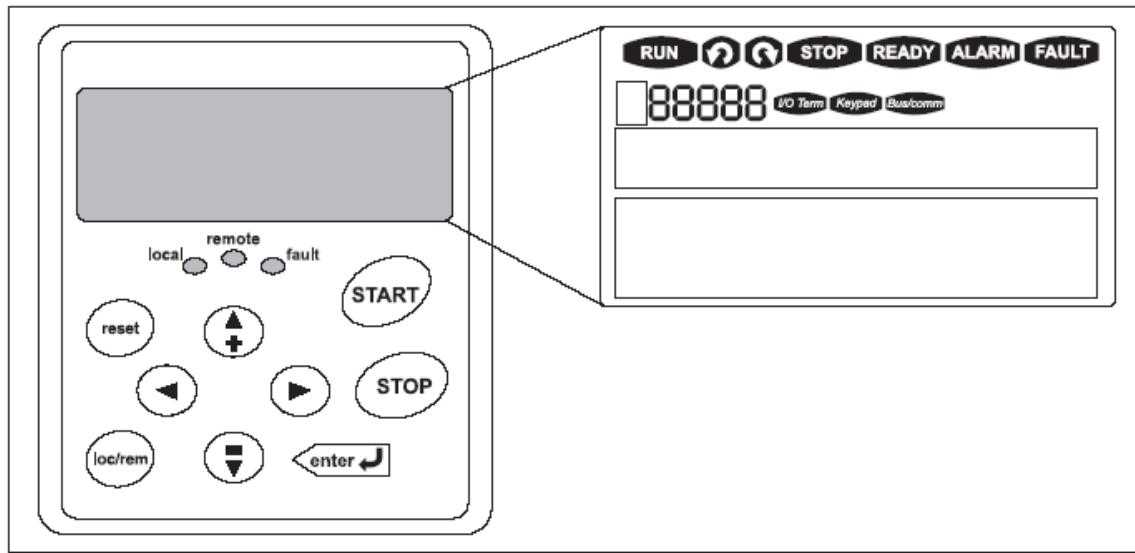


Figure 3-1. Keypad and Display

TABLE 3-1. NAVIGATION BUTTONS

Button	Description
	<p>Start This button operates as the START button for normal operation when “local” is selected as the active control.</p>
	<p>Enter This button is used in the parameter edit mode to save the parameter setting and move to the next parameter ...</p> <ul style="list-style-type: none"> • to reset the Fault History if pressed while in the “Fault History” menu. • to confirm the acceptance of a change. • to change a virtual button status while in the “Button” menu. • to confirm the start-up list at the end of the Start-Up Wizard. • when the “Operate” menu is active, to exit the “Operate” submenu.
	<p>Stop This button has two integrated operations. The button operates as STOP button during normal (local) operation ...</p> <ul style="list-style-type: none"> • motor STOP from the keypad • used to reset the active faults. <p>Note that if the STOP button is depressed for 3 seconds, a Stop Fault will occur in any control mode.</p>
	<p>Reset Resets the active faults.</p>
	<p>Local/Remote Switches between LOCAL and REMOTE control for start, speed reference and reverse functions.</p>
	<p>Left Arrow</p> <ul style="list-style-type: none"> • navigation button, movement to left. • in parameter edit mode, exits mode, backs up one step. • cancels edited parameter (exit from a parameter edit mode). • When in “Operate” menu, will move backward through menu. • At end of “Start-Up Wizard”, repeats the “Start-Up Wizard” setup menu.
	<p>Right Arrow</p> <ul style="list-style-type: none"> • navigation button, movement to right. • enter parameter group mode. • enter parameter mode from group mode.
	<p>Up and Down Arrows</p> <ul style="list-style-type: none"> • move either up or down a menu list to select the desired menu item. • editing a parameter/password, while the active digit/character is scrolled. • increase/decrease the reference value of the selected parameter. • in the “Operate” menu, will cause the display of the current reference source and value and allow its change if the keypad is the active reference source. Used to set the password (if defined) when leaving the “Operate” menu. • scroll through the “Active Faults” menu when the ACCEL500 is stopped.

TABLE 3-2. LCD STATUS INDICATORS

Indicator	Description
	Run Indicates that the ACCel500 is running and controlling the load. Blinks when a stop command has been given but the ACCel500 is still ramping down.
	Counterclockwise Operation The output phase rotation is BAC, corresponding to counterclockwise rotation of most motors.
	Clockwise Operation The output phase rotation is ABC, corresponding to clockwise rotation of most motors.
	Stop Indicates that the ACCel500 is stopped and not controlling the load.
	Ready Indicates that the ACCel500 is ready to be started.
	Alarm Indicates that there is one or more active drive alarm(s).
	Fault Indicates that there is one or more active drive fault(s).
	I/O Terminal* Indicates that the I/O terminals have been chosen for control (remote).
	Keypad* Indicates that the keypad has been chosen for control (local).

*Both “I/O Terminal” and “Keypad” will be on and flashing when ADDaptACC is chosen for control.

TABLE 3-3. LED STATUS INDICATORS

Indicator	Description
local	Local* Indicates that the ACCel500 is ready to be started and operated from the Local mode.
remote	Remote* Indicates that the ACCel500 is operating and controlling the load remotely.
fault	Fault Indicates that there are one or more active drive fault(s).

*Both “local” and “remote” will be flashing when ADDaptACC is chosen for control.

3-2 MENU NAVIGATION

3-2.1 NAVIGATION TIPS

- To navigate within one level of a menu, use the up and down arrows.
- To move deeper into the menu structure and back out, use the right and left arrows.
- To edit a parameter, navigate to show that parameter’s value, and press the right arrow button to enter the edit mode. When in edit mode, the parameter value will flash.

- When in edit mode, the parameter value can be changed by pressing the up or down arrow keys.
- When in edit mode, pressing the right arrow a second time will allow you to edit the parameter value digit by digit.
- To confirm the parameter change, you must press the **enter** button. The value will not change unless the **enter** button is pushed.
- Some parameters can not be changed while the ACCEL500 drive is running. The screen will display LOCKED if you attempt to edit these parameters while the drive is running. Stop the drive to edit these parameters.
- Appendix B lists all parameters for the application in menu order.

3-2.2 MAIN MENU

The data on the control keypad are arranged in menus and submenus. The first menu level consists of M1 to M8 and is called the Main Menu. The structure of these menus and their submenus is illustrated in Figure 3-2.

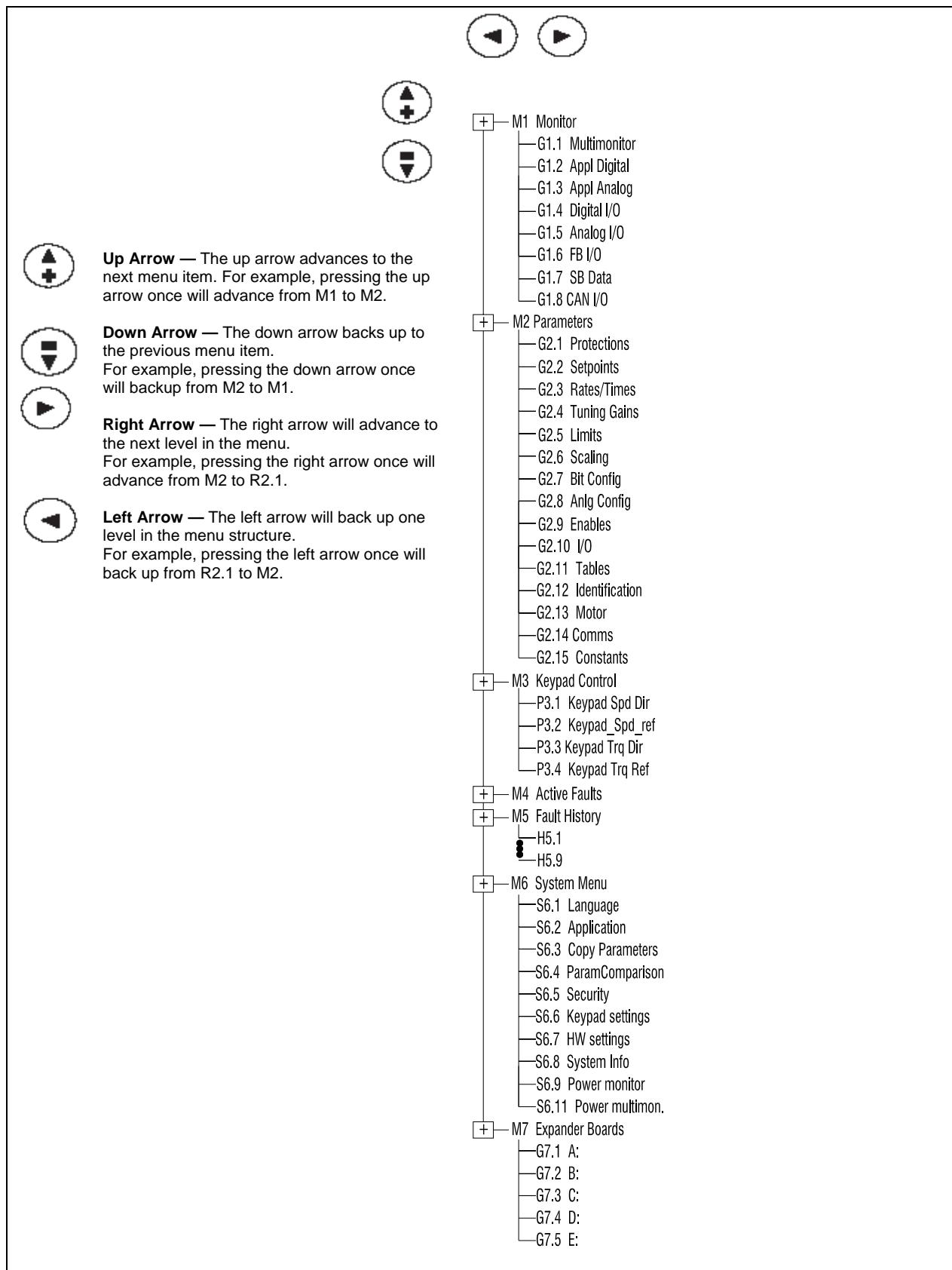


Figure 3-2. Main Menu Navigation

3-2.3 MONITOR MENU (M1)

The Monitoring Menu items are meant for viewing parameter values during operation. Monitored values are updated every 0.3 sec. Monitored items are identified by item numbers V1.1 to V1.xx, where “xx” varies by application.

Monitored parameters are not editable from this menu (See Parameter Menu [M2] to change parameter values).

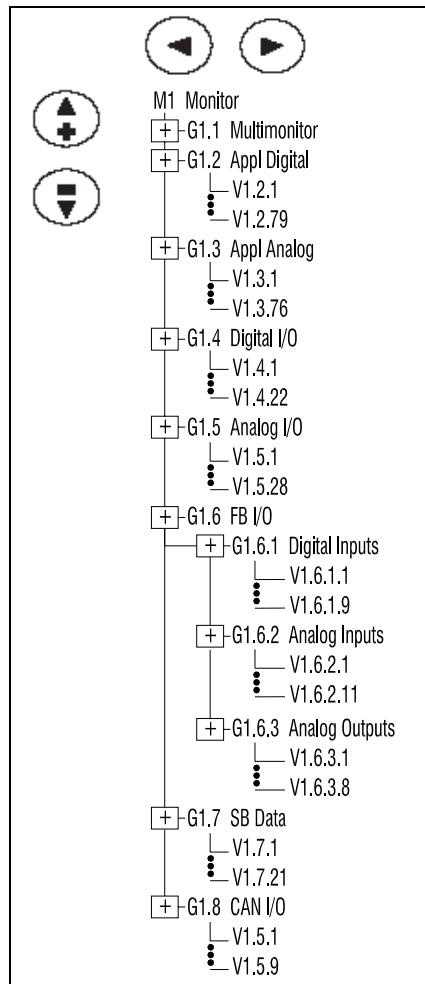


Figure 3-3. Monitor Menu Structure Example

Multimonitor (G1.1)

This parameter allows the viewing and selection (if allowed by System menu item, S6.11) of three simultaneously monitored items from the Monitored Menu Items. Use the right arrow key to select the item to be modified and then the up or down arrow keys to select the new item. Press the **enter** key to accept the change.

3-2.4 PARAMETER MENU (M2)

The Parameter Menu is a single or multi-level menu dependent upon the application in use, arranged by the parameter group items. See Figure 3-4. Parameters and parameter groups are explained in further detail in the ACCEL500 Application Manual.

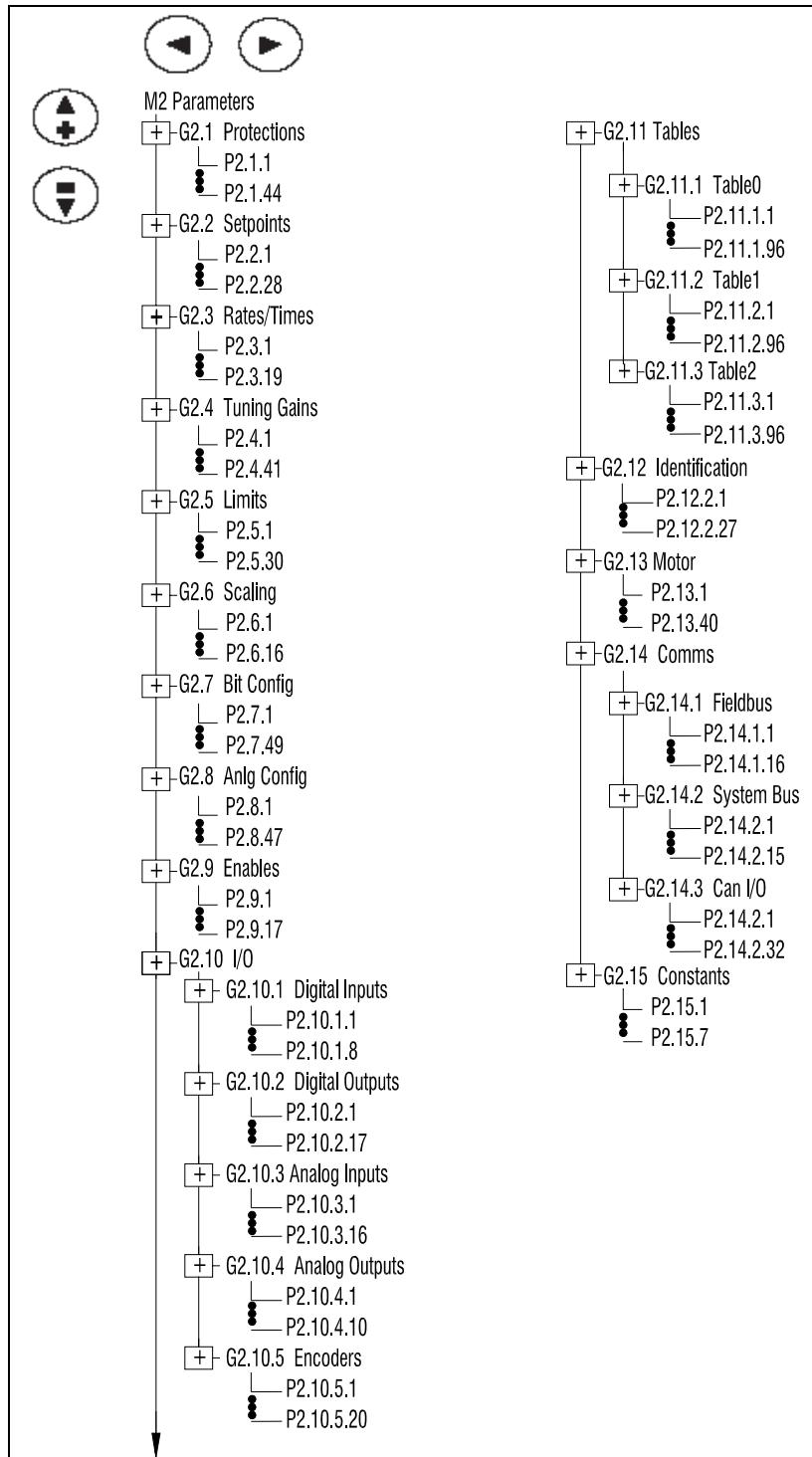


Figure 3-4. Parameter Menu

3-2.5 KEYPAD CONTROL MENU (M3)

In the Keypad Control Menu, you can set the frequency reference, choose the motor direction for keypad operation when “local” mode is in operation. See Figure 3-5.

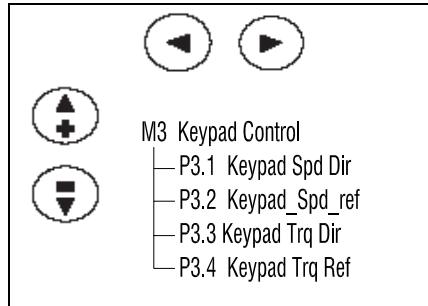


Figure 3-5. Keypad Control Menu

P3.1 Range: Forward, Reverse
Keypad Spd Dir

This allows the operator to change the rotation direction of the motor. This setting will not influence the rotation direction of the motor unless the keypad has been selected as the active control place.

P3.2 Range: 0.00 to 60.00
Keypad_Spd_ref Units: Hertz (Hz)

P3.3 Range: Forward, Reverse
Keypad Trq Dir

P3.4 Range: 0.0 to 100.0
Keypad Trq Ref Units: Percent (%)

3-2.6 ACTIVE FAULTS MENU (M4)

When a fault occurs, the ACCEL500 drive stops. The sequence indication F1, the fault code, a short description of the fault and the fault type symbol will appear on the display. In addition, the indication FAULT or ALARM is displayed and, in case of a FAULT, the red LED on the keypad starts to blink. If several faults occur simultaneously, the sequence of active faults can be browsed with the Browser buttons. See Figure 3-6.

The active faults memory can store the maximum of 10 faults in the sequential order of appearance. The fault remains active until it is cleared with either the STOP or reset buttons or with a reset signal from the I/O terminal. Upon fault reset the display will be cleared and will return to the same state it was before the fault trip.

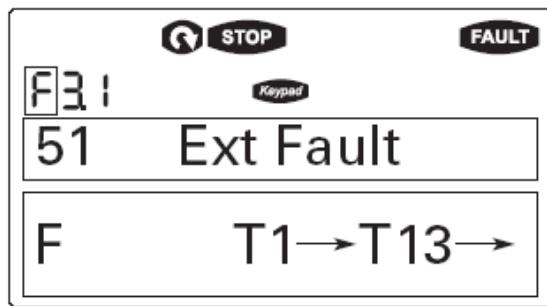


Figure 3-6. Active Fault Display Example

W A R N I N G

Remove any External Start signals or permissives before resetting the fault to prevent an unintentional restart of the ACCEL500, which could result in personal injury or equipment damage.

Fault Type Range: A, F, AR, FT

There are four different types of faults. See Table 3-4.

TABLE 3-4. FAULT TYPES

Fault Type	Fault Name	Description
A	Alarm	This type of fault is a sign of an unusual operating condition. It does not cause the drive to stop, nor does it require any special actions. The “A fault” remains in the display for about 30 seconds.
F	Fault	An “F fault” is a kind of fault that makes the drive stop. Actions need to be taken in order to restart the drive.
AR	Auto-Restart Fault	If an “AR fault” occurs the drive will also stop immediately. The fault is reset automatically and the drive tries to restart the motor. If the restart is not successful, a fault trip (FT) occurs.
FT	Fault Trip	If the drive is unable to restart the motor after an AR fault, an FT fault occurs. The effect of the “FT fault” is the same as that of the F fault — the drive is stopped.

Fault Code Range: 1 – 54

Fault codes indicate the cause of the fault. A list of fault codes, their descriptions, and possible solutions can be found in Appendix E — Application-Specific Faults.

Fault Time Range: T.1 – T.13

Data Record In this menu, important data recorded at the time the fault is available. This feature is intended to help the user or the service person to determine the cause of fault. Table 3-5 indicates the information that is recorded.

TABLE 3-5. FAULT TIME DATA

Data	Units	Description
T.1 ¹	D	Counted operation days (Fault 43: Additional code)
T.2 ¹	hh:mm:ss (d)	Counted operation hours (Fault 43: Counted operation days)
T.3	Hz hh:mm:ss	Output frequency (Fault 43: Counted operation hours)
T.4	A	Motor current
T.5	V	Motor voltage
T.6	%	Motor power
T.7	%	Motor torque
T.8	V	DC bus voltage
T.9	°C	Unit temperature
T.10	—	Run status
T.11	—	Direction
T.12	—	Warnings
T.13	—	Zero speed

¹Real time record.

3-2.7 FAULT HISTORY MENU (M5)

All faults are stored in the Fault History Menu, which can be viewed by using the Browser buttons. Additionally, the Fault time data record pages are accessible for each fault as in the Active Faults Menu described above. See Figure 3-7.

The ACCEL500 drive's memory can store a maximum of 30 faults, in the order of appearance. If there are 30 uncleared faults in the memory, the next occurring fault will erase the oldest fault from the memory.

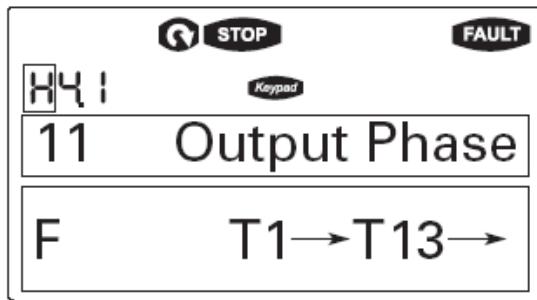


Figure 3-7. Sample Fault History Display

3-2.8 SYSTEM MENU (M6)

The controls associated with the general use of the drive, such as application selection, customized parameter sets or information about the hardware and software are located in the System Menu. Password protection can be activated by parameter P6.5.1.

Descriptions of the system menu parameters are illustrated in Figure 3-8.

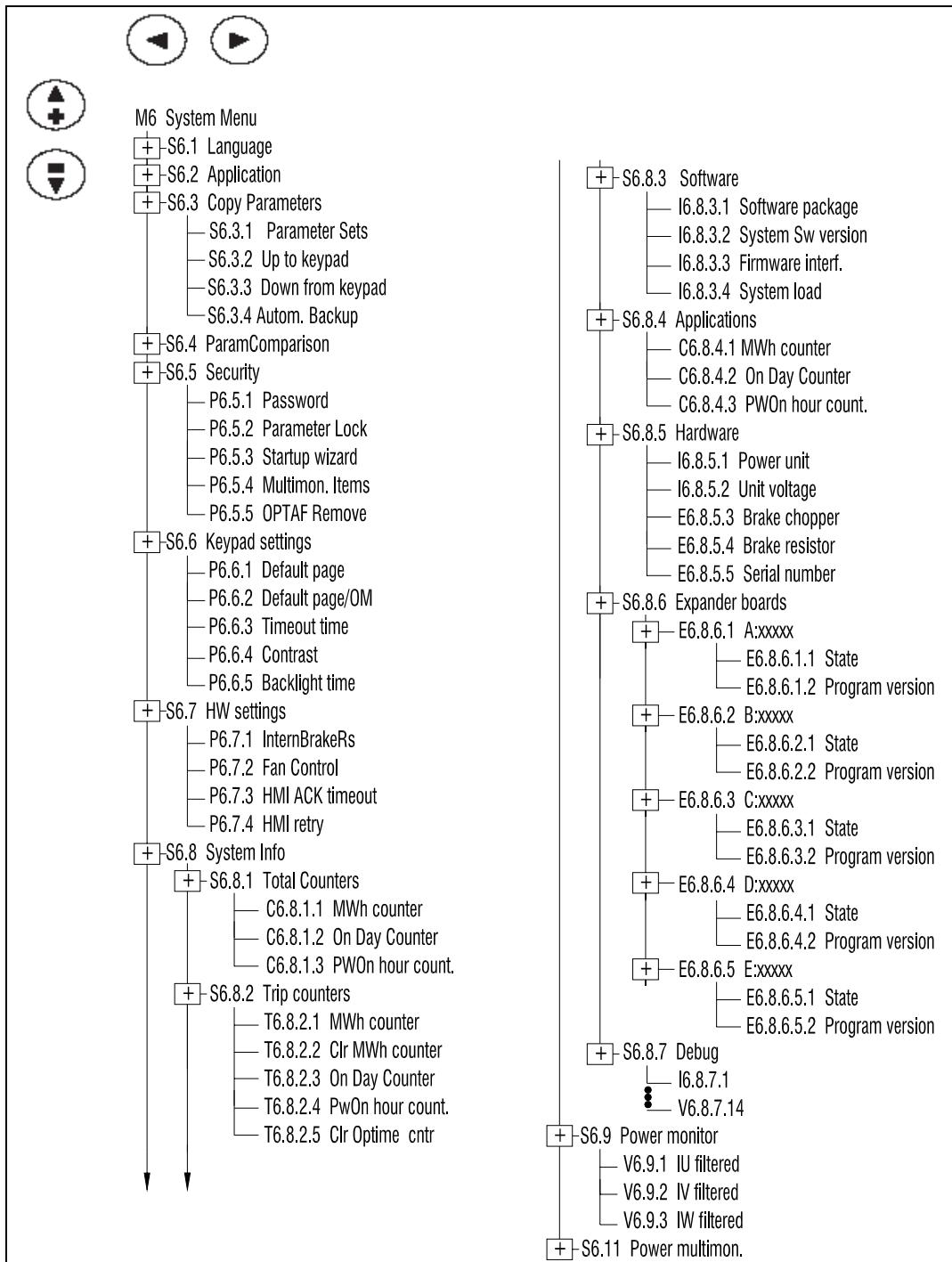


Figure 3-8. System Menu Structure

System Menu Parameters

S6.1 Range: English, Spanish, French, Portuguese Default: English

Language Selection This parameter offers the ability to control the ACCEL500 through the keypad in the language of your choice. Available languages are: English, Spanish, French and Portuguese.

S6.2 Range: Spd /Ten

Application This parameter sets the active application.

When changing applications, you will be asked if you want the parameters of the new application to be uploaded to the keypad. If you wish to load the new application parameters, push the **enter** button. Pushing any other button saves the parameters of the previously used application in the keypad.

Parameter Comparison Options (S6.4)

S6.4

Parameter Comparison With the Parameter Comparison function, you can compare the actual parameter values to the values of your customized parameter sets and those loaded to the control keypad.

The actual parameter values are first compared to those of the customized parameter Set1. If no differences are detected, a “0” is displayed on the lowermost line of the keypad.

If any of the parameter values differ from those of the Set1 parameters, the number of the deviations is displayed together with symbol P (e.g. P1 Δ P5 = five deviating values).

By pressing the right arrow button once again, you will see both the actual value and the value it was compared to. In this display, the value on the Description line (in the middle) is the default value, and the one on the value line (lowermost line) is the edited value. You can also edit the actual value by pushing the right arrow button.

Actual values can also be compared to Set2, Factory Settings and the Keypad Set values.

Security Parameter Options (S6.5)

The Security submenu is protected with a password. Store the password in a safe place.

S6.5.1 Range: 0 – 65535

Default: 0

Password The application selection can be protected against unauthorized changes with the Password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes.

By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 65535. The password will be activated after the Timeout time (Timeout Time) has expired.

To deactivate the password, reset the parameter value to 0.

P6.5.2	Range: ChangeEnable, ChangeDisabl	Default: ChangeDisabl
Parameter Lock	This function allows the user to prohibit changes to the parameters. If the parameter lock is activated, the text *locked* will appear on the display if you try to edit a parameter value.	
	This function does not prevent unauthorized editing of parameter values.	
P6.5.3	Range: Yes, No	Default: No
Start-up Wizard	The Start-Up Wizard facilitates commissioning the ACCel500. If selected active, the Start-Up Wizard prompts the operator for the language and application desired and then advances through the start-up parameter list. After completion, it allows the user to repeat the Start-Up Wizard or return to the default page, the Operate Menu. The Start-Up Wizard is always active for the initial power up of the ACCel500.	
P6.5.4	Range: ChangeEnable, ChangeDisabl	Default: ChangeEnable
Multimon. Items	The keypad display can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values being monitored with other values.	

Keypad Settings (S6.6)

There are five parameters (Default Page to Backlight Time) associated with the keypad operation:

P5.6.1		Default: 0
Default page	This parameter sets the view to which the display automatically moves as the Timeout Time expires or when the keypad power is switched on. If the Default Page value is 0, this function is not activated, i.e., the last displayed page remains on the keypad display.	
P5.6.2		
Default page/OM	Here you can set the location in the Operating menu to which the display automatically moves as the set Timeout Time expires, or when the keypad power is switched on. See setting of Default Page parameter above.	
P5.6.3	Range: 0 – 65535 Units: Seconds	Default: 30
Timeout time	The Timeout Time setting defines the time after which the keypad display returns to the Default Page. If the Default Page value is 0, the Timeout Time setting has no effect.	
P5.6.4		
Contrast	If the display is not clear, you can adjust the keypad contrast with this parameter.	
P5.6.5		Default: 10
Backlight time	Range: 1 – 65535 or Forever Units: Minutes	This parameter determines how long the backlight stays on before going out. You can select any time between 1 and 65535 minutes or “Forever”.

Hardware Settings (S6.7)

The Hardware Settings submenu (S6.7) provides parameters for setting information on Internal brake resistor connection, Fan control, Keypad acknowledge timeout and Keypad retries.

P6.7.1	Range: Connected – Not Connected	Default: Connected
InternBrakeRs	With this function you tell the ACCel500 whether the internal brake resistor is connected or not.	

If your drive has an internal brake resistor, the default value of this parameter is “Connected”. However, if it is necessary to increase braking capacity by installing an external brake resistor, or if the internal brake resistor is disconnected, it is advisable to change the value of this function to “Not Connected” in order to avoid unnecessary fault trips.

The brake resistor is available as an option for all drives. It can be installed internally in frame sizes FR4 to FR6.

P6.7.2	Range: Continuous, Temperature	Default: Continuous
Fan Control	This function sets the control method of the ACCel500 drive’s cooling fan. You can set the fan to run continuously when the power is switched on or to run based on the temperature of the unit. If the latter function has been selected, the fan is switched on automatically when the _eatsink temperature reaches 60°C. The fan receives a stop command when the _eatsink temperature falls to 55°C. The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from “Continuous” to “Temperature”.	

The fan runs continuously, regardless of this setting, when the ACCel500 drive is in RUN state.

P6.7.3	Range: 200 – 5,000	Default: 200
HMI ACK	Keypad Units: ms	
timeout	This function allows the user to change the timeout of the Keypad acknowledgement time.	

If the ACCel500 drive has been connected to a PC with a serial cable, the default values of Keypad Acknowledge Timeout and Number of Retries to Receive Keypad Acknowledgement must not be changed.

If the ACCel500 drive has been connected to a PC via a modem and there is delay in transferring messages, the value of Keypad Acknowledge Timeout must be set according to the delay as follows:

Example:

- Transfer delay between the ACCel500 drive and the PC is found to be = 600 ms
- The value of Keypad Acknowledge Timeout is set to 1200 ms (2 x 600, sending delay + receiving delay)
- The corresponding setting is then entered in the [Misc] section of the file ACCELDRIVE.INI:
Retries = 5
AckTimeOut = 1200
TimeOut = 5000

It must also be considered that intervals shorter than the Keypad Acknowledge Timeout time cannot be used in ACCel500 drive monitoring.

P6.7.4	Range: 1 – 10	Default: 5
HMI retry	With this parameter, you can set the number of times the drive will try to receive an acknowledgement when it has not been received within the acknowledgement time (Keypad Acknowledge Timeout) or if the received acknowledgement is faulty.	

System Information (S6.8)

This section contains hardware and software information as well as operation information.

S6.8.1

Total Counters In the Total Counters page you will find information related to the ACCEL500 operating times, i.e., the total numbers of MWh, operating days, and operating hours. See Table 3-6.

Unlike the counters for the Trip Counters, these counters cannot be reset.

The Power On time counters, days and hours, operate whenever power is applied to the ACCEL500 drive.

TABLE 3-6. TOTAL COUNTERS

Number	Name	Description
C6.8.1.1	MWh counter	Megawatt hours total operation time counter
C6.8.1.2	On Day counter	Number of days the ACCEL500 drive has been supplied with power
C6.8.1.3	PWOn hour count.	Number of hours the ACCEL500 drive has been supplied with power

S6.8.2

Trip counters The Trip Counters are counters whose values can be reset to zero. The resettable counters are shown in Table 3-7.

TABLE 3-7. TRIP COUNTERS

Number	Name	Description
T5.8.2.1	MWh counter	Megawatts hours since last reset
P5.8.2.2	Clear MWh counter	Resets megawatts hours counter
T5.8.2.3	Power On day counter	Number of days the ACCEL500 drive has been run since the last reset
T5.8.2.4	Power On hour counter	Number of hours the ACCEL500 drive has been run since the last reset
P5.8.2.5	Clr Optime cntr	Resets the operating day and hour counters

Note: The Trip Counters operate only when the motor is running.

S6.8.3

Software The Software information page includes information on the following software related topics:

TABLE 3-8. SOFTWARE INFORMATION

Number	Name	Description
I6.8.3.1	Software package	ACC00031V003
I6.8.3.2	System Sw version	11.53.6536
I6.8.3.3	Firmware interf.	4.37
I6.8.3.4	System load	G9.1

S6.8.4

- Applications** The Application information page includes information on not only the application currently in use but also all other applications loaded into the ACCEL500. The information available is shown in Table 3-9. Note that the “x” in the table refers to the sequential number of the application in the list.

TABLE 3-9. APPLICATIONS INFORMATION

Number	Content
A6.8.4.x	Application name
D6.8.4.x.1	Application ID
D6.8.4.x.2	Version
D6.8.4.x.3	Firmware interface

S6.8.5

- Hardware** The Hardware information page provides information on the following hardware-related topics.

TABLE 3-10. HARDWARE INFORMATION

Number	Content
I6.8.5.1	Number of the power unit
I6.8.5.2	Nominal voltage of the unit
I6.8.5.3	Brake chopper
I6.8.5.4	Brake resistor
I6.8.5.5	Serial Number

S6.8.6

- Expander boards** This parameter and its sub-items provide information about the basic and option boards plugged into the control board as shown in Table 3-11. Note that the “x” in the table refers to the sequential number of the slot, with slot A being “1” and slot E being “5”.

TABLE 3-11. EXPANDER BOARD INFORMATION

Number	Content
E6.8.6.x	Slot “x” board identification
E6.8.6.x.1	Operating state
E6.8.6.x.2	Software version

S6.8.7 Debug Menu

This menu is meant for advanced users and application designers. Contact the factory for any assistance needed.

Power Monitor (S6.9)

This menu shows the actual filtered current in amps.

TABLE 3-12. POWER MONITOR INFORMATION

Number	Content
C6.9.1	IU filtered
C6.9.2	IV filtered
C6.9.3	IW filtered

3-2.9 EXPANDER BOARD MENU (M7)

The Expander Board Menu makes it possible for the user:

- to see what expander boards are connected to the control board and
- to access and edit the parameters associated with the expander board.
- monitor option board values.

Each option board has its own set of parameters.

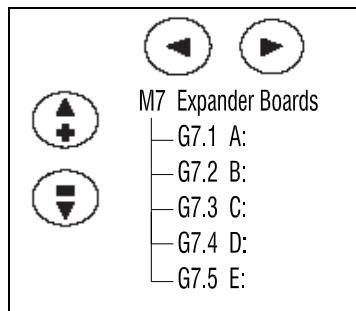


Figure 3-9. Expander Board Menu Structure

Example of Expander Board Parameters for Option Board A9

P7.1.1.1	Range: 1 – 5	Default: 3
AI1 Mode	Analog Input 1 input options:	
1	0 to 20 mA	
2	4 to 20 mA	
3	0 to 10V	
4	2 to 10V	
5	-10 to +10VP	
P7.1.1.2	Range: 1 – 5	Default: 1
AI2 Mode	Analog Input 2 input options:	
1	0 to 20 mA	
2	4 to 20 mA	
3	0 to 10V	
4	2 to 10V	
5	-10 to +10VP	
P7.1.1.3	Range: 1 – 4	Default: 1
AO1 Mode	Analog Output 1 output options:	
1	0 to 20 mA	
2	4 to 20 mA	
3	0 to 10V	
4	2 to 10V	

3-2.10 EDITING A NUMERIC VALUE

Use the following procedure to edit numeric parameter values.

1. To edit a parameter, navigate to show that parameter and its value.
2. Press the right arrow button to enter the edit mode. In edit mode, the parameter value will flash.
3. Pressing the up or down arrow keys to change the parameter value.

If you press the right arrow a second time, the leftmost digit of the parameter value will flash. You can then use the up or down arrow keys to change the value of the flashing digit.

Press the right arrow again to select the next digit, and repeat the process to change the rest of the digits in the parameter value.

4. When you are finished, you must press the **enter** button to confirm the parameter change.
The new value will not be saved unless the enter button is pushed.

3-2.11 EDITING A CONFIGURATION VALUE

A configuration parameter gets its data from the parameter whose ID number you enter here. Parameter ID numbers are listed in Appendix D.

Configuration parameters can have values ranging from 1 to 2000. Values 1 to 1000 indicate firmware values; values 1001 to 2000 indicate application values.

Use the following procedure to edit configuration parameter values.

1. To edit a parameter, navigate to show that parameter and its value.
2. Press the right arrow button to enter the edit mode. In edit mode, the parameter value will flash.
3. Pressing the up or down arrow keys to change the parameter value.

If you press the right arrow a second time, the rightmost digit of the parameter value will flash. You can then use the up or down arrow keys to change the value of the flashing digit.

Press the left arrow to select the next digit, and repeat the process to change the rest of the digits in the parameter value.

4. When you are finished, you must press the **enter** button to confirm the parameter change.
The new value will not be saved unless the enter button is pushed.

3-2.12 EDITING A SELECTION VALUE

Some parameter values are displayed as text. For example, parameter S6.1 (Language) can be set to four values: English, Español (Spanish), Français (French), or Português (Portuguese). Use the following procedure to edit a parameter selection value.

1. To edit a parameter, navigate to show that parameter and its value.
2. Press the right arrow button to enter the edit mode. In edit mode, the parameter value will flash.
3. Pressing the up or down arrow keys to change the parameter value.
4. When you are finished, you must press the **enter** button to confirm the parameter change.
The new value will not be saved unless the enter button is pushed.

3-2.13 KEYPAD REMOVAL WHILE DRIVE IS RUNNING

If the keypad is removed while the drive is running, a Keypad Comm fault (52) will result. The drive will also be placed in remote control mode. Clear the Keypad Comm fault by pressing the **reset** button. To restore local keypad control, press the **loc/rem** button.

3-2.14 STOP FAULT

The Keypad **stop** button will fault the drive and operate as a coast stop if held for three seconds, regardless which mode is active.

3-2.15 REMOTE KEYPAD

The Control Keypad is removable. It can be mounted externally and connected with the appropriate cable.

SECTION IV

I/O PARAMETER DESCRIPTIONS

4-1 ANALOG INPUTS

Parameters	Type	Default
<i>AIN1 Slot ID to AIN4 Slot ID</i>	ACFG	10, 11, then 0 for rest
<i>AIN1 Gain to AIN4 Gain</i>	CAL	1.00
<i>AIN1 Off to AIN4 Off</i>	CAL	0.0
<i>AIN1 Tc to AIN4 Tc</i>	CAL	0.1 seconds
<i>AII to AI4</i>	APB	
<i>AII Type to AI4 Type</i>	APB	
<i>AIN1 to AIN4</i>	APB	
<i>AIN1 Fault to AIN4 Fault</i>	DPB	

Description

Four analog inputs are available in this software. Two of the analog inputs are available with the standard board in slot A. The other four require additional I/O boards to take advantage of them.

The slot ID configures the location of the analog input. The first digit of the ID is the slot location: Slot A-E = 1-5. The second digit is the order of the input on the board. 0 = first analog input.

Before scaling, the value can be viewed as *AI 1 - AI 4* and is scaled 0-10,000; +/-10,000 for +/-10 volt boards.

The Type of board is read from the I/O slot and can be viewed as *AII Type-AI4 Type* as follows:

<u>Mode</u>
0 = Unknown
1 = 0-20 ma
2 = 4-20 ma
3 = 0-10 V
4 = 2-10 V
5 = +/-10 V

Scaling for the first analog input is done as follows:

$$\text{Value 1} = (\text{AI 1} \times \text{AIN1 Gain} / 100) + \text{AIN1 Off}$$

AIN1 Tc is a low pass filter on the input, entered in seconds.

AIN1 is the value after scaling and filtering.

AIN1 Fault bit will go high only in modes 2 or 4.

Mode 2 will fault when the input current is less than 4 mA.
 Mode 4 will fault when the input voltage is less than 2 V.

4-2 ANALOG OUTPUTS

Parameters	Type	Default
<i>AOUT1 ID</i> to <i>AOUT2 ID</i>	ACFG	3 = Motor Current 2 = Motor Speed
<i>AOUT1Zero</i> to <i>AOUT2Zero</i>	CAL	0.0
<i>AOUT1Cal</i> to <i>AOUT2Cal</i>	CAL	1.00
<i>AOUT_TC</i> to <i>AOUT2TC</i>	CAL	0.10 seconds
<i>AOUT1 Slot_ID</i> to <i>AOUT2 Slot_ID</i>	ACFG	10, 0
<i>AOUT1 Val</i> to <i>AOUT4 Val</i>	APB	

Description

Two analog outputs are available in this software. One analog output is available with the standard board in slot A. The other one require additional I/O boards to take advantage of them.

The ID configures which parameter value to map to the analog output.

The slot ID configures the location of the analog output. First digit of the ID is the slot location: Slot A-E = 1-5. Second digit is the order of the output on the board; 0 = first analog output.

After scaling, the value can be viewed as *AOUTx_Val* with a range of 0-10,000; +/-10,000 for ±10 volt boards.

The Type of board must be known for the scaling factor:

- 0 = Unknown
- 1 = 0-20 mA = 0-10,000 value
- 2 = 4-20 mA = 0-10,000 value
- 3 = 0-10 V = 0-10,000 value
- 4 = 2-10 V = 0-10,000 value
- 5 = +/-10 V = 0-10,000 value

Scaling for the fist analog output is done as follows:

$$\text{Value 1} = (\text{AOUT1 ID value} + \text{AOUT1 Zero}) \times \text{AOUT1 Cal} / 100$$

Note: 10,000 is the board's full output.

AOUTx Tc is a low-pass filter on the output entered in seconds.

4-3 DIGITAL INPUTS

Parameters	Type	Default
<i>DIN1 Slot ID to DIN8 Slot ID</i>	ACFG	10, 11, 12, 13, 14, 15, 0, 0
<i>DIN 1 to DIN 8</i>	DPB	
<i>Not DIN 1 to Not DIN 8</i>	DPB	

Description

Eight digital inputs are available in this software. Six digital inputs are available with the standard board in slot A. The other two require additional I/O boards to take advantage of them.

The slot ID configures the location of the digital input. the first digit of the ID is the slot location: Slot A-E = 1-5. The second digit is the order of the input on the board; 0 = first digital input.

The digital inputs and their invert can be viewed as *DINx* and *Not_DINx*.

4-4 DIGITAL OUTPUTS

Parameters	Type	Default
<i>DOUT1 ID to DOUT6 ID</i>	BCFG	111 6 = MC_Fault = Drive fault 1098 = MC_Run = Drive running 1118 = MC_AtSpeed = Not ramping 1002, 1002, 1002 = Zero Bit
<i>DOUT1 Inv to DOUT6 Inv</i>	En	0
<i>DOUT1 Slot ID to DOUT6 Slot ID</i>	ACFG	10, 20, 21, 0, 0, 0

Description

Six digital outputs are set up in the software. Three digital outputs are available with the standard board in slot A or B. The other three require additional I/O boards to take advantage of them.

The ID configures which parameter to map to the digital output.

The slot ID configures the location of the digital output. The first digit of the ID is the slot location: Slot A-E = 1-5. The second digit is the order of the output on the board; 0 = first digital output.

The value bit can be inverted before being sent out by *DOUTx_Inv* parameters.

4-5 ENCODER COUNTER OUTPUTS

Parameters	Type	Default
<i>Enc1 Slot ID, Enc2 Slot ID</i>	ACFG	0
<i>Enc1 Mlt, Enc2 Mlt</i>	CAL	1000
<i>Enc1 Div, Enc2 Div</i>	CAL	1000
<i>C_Enc2_Add</i>	CAL	1 ms
<i>Enc1 Tc, Enc2 Tc</i>	CAL	0
<i>Counter1 Dec, Counter2 Dec</i>	CAL	1
<i>Counter1 Mult, Counter2 Mult</i>	BCFG	Zero Bit
<i>Counter1 Hld, Counter2 Hld</i>	BCFG	Zero Bit
<i>Counter1 Res, Counter2 Res</i>	En	0 (Disabled)
<i>Counter1, Counter2</i>	Cal	1 ms
<i>Encoder1FiltTime</i>	APB	
<i>Enc1_Out, Enc2_Out</i>	APB	
<i>Counter1, Counter2</i>	APB	
<i>C1_1-3, C2_1-3</i>		

Frequency Description:

Two encoder inputs are available in this software, but require additional option boards to enable.

When closed loop speed control is requested, the first encoder feedback is always selected for speed feedback. This is taken from the board, and is not affected by the parameter scalings.

The slot ID configures the location of the encoder input. First digit of the ID is the slot location: Slot A – E = 1 – 5. Second digit is the order of the output on the board. 0 = first encoder input. On option board A7, the second frequency input is input 3 of the board.

The frequency feedback is scaled by the option board by entering the proper PPR in the option board parameters. It is assumed that the encoder is mounted directly to the motor with no gear ratio and value read from the board is in motor rotation in hertz for speed feedback.

$$\text{Value from board} = \frac{(\text{Frequency Hz}) \times (60 \text{ s/m}) \times (\text{Nominal motor frequency Hz})}{(\text{PPR}) \times (\text{Nominal motor speed RPM})}$$

Both frequency feedbacks can be scaled and filtered and used for other functions such as speed reference.

Enc1_Out = first encoder input scaled by (motor Hz x *Enc1 Mult / Enc1 Div*) with a low pass filter of time constant *Enc1 Tc*.

Enc2_Out = second encoder input scaled by ((motor Hz + *Enc2 ADD*) x *Enc2 Mult / Enc2 Div*) with a low pass filter of time constant *Enc2 Tc*.

Counter Description:

Both encoder inputs have pulse counters associated with them. These are bi-directional counters with hold and reset bits. The values of the counters will be stored and recalled through drive power loss (retentive).

Three words read from the encoder board contain the raw motor rotations. The first two offer complete revolution counter and the third is the fraction of rotation.

C1_1 = High word of first encoder motor rotations

C1_2 = Low word of first encoder motor rotations.

C1_3 = Fraction of rotation of first encoder input

C2_1, C2_2, C2_3 = counts for second encoder

Counter1 = Motor rotations x *Counter1 Mult* / *Counter1 Dec*

Counter2 = Motor rotations x *Counter2 Mult* / *Counter2 Dec*

Counter1 Hld, Counter2 Hld will hold their respective counters at their current count when high.

Counter1 Res, Counter2 Res will reset their respective counters to zero when high.

SECTION V

LOGIC SEQUENCE

5-1 MISCELLANEOUS LOGIC

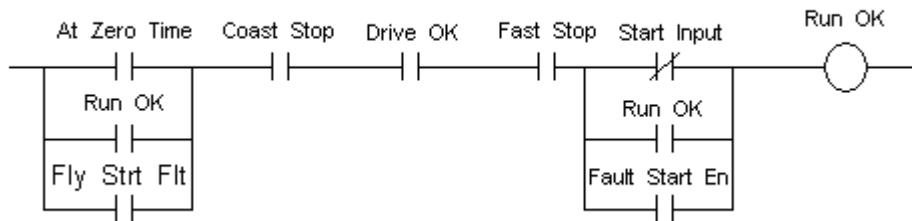
Zero Bit - Set to FALSE. ID number for this bit is 1002.

One Bit - Set to TRUE. ID number for this bit is 1001.

5-2 REMOTE OPERATION

There are four basic run commands for the ACCEL500 drive. Run and thread are maintained. Jog forward and Jog reverse are momentary.

5-2.1 Run OK



The *Run OK* bit is used to stop the drive in any control mode.

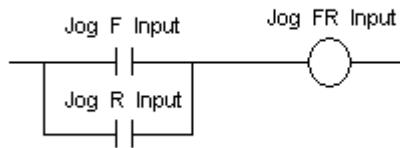
If the *Fly Start_Flt* bit is enabled, then the drive can be restarted after a fault without first going to zero speed. This may be helpful for sections such as dryer helpers that get dragged along with the machine.

The *Fault Start En* bit allows the drive to start running as soon as the fault is cleared. If it is disabled, the runs must first be removed before they can be energized again. This bit should be disabled when the runs come from a communication port rather than direct I/O. This will force the communications to come up and remove the runs before you can safely run.

The internal *MC Ready* is tied to the firmware *Drive OK* variable.

Coast Stop and *Fast Stop* are defaulted to *One Bit*.

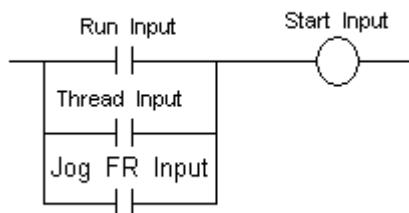
5-2.2 Jog FR Input



The *Jog FR Input* is active when either of the Jog inputs are a TRUE.

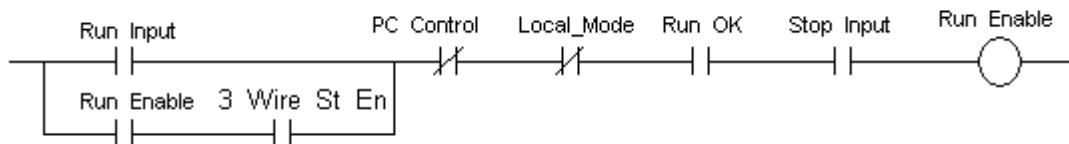
Jog F Input is defaulted to the second digital input. *Jog R Input* is defaulted to *Zero Bit*.

5-2.3 Start Input



Start Input is TRUE when any of the drive run inputs are active.

5-2.4 Run Enable

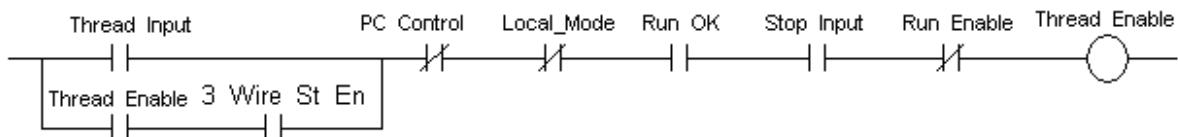


The *Run Input* will energize the *Run Enable* if all interlocks are met.

The *Stop Input* defaults to TRUE. This can be set to a normally closed stop input along with enabling the *3 Wire St En* to implement a three wire start/stop circuit.

Run Input is defaulted to the first digital input.

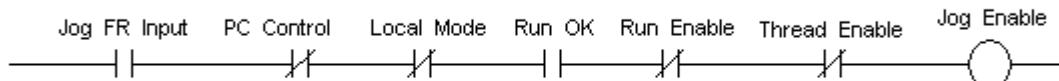
5-2.5 Thread Enable



Thread Enable is setup similar to the *RunEnable*. *Run_Enable* takes priority. If in Thread and the *Run_Input* goes high the control will transfer to the Run mode.

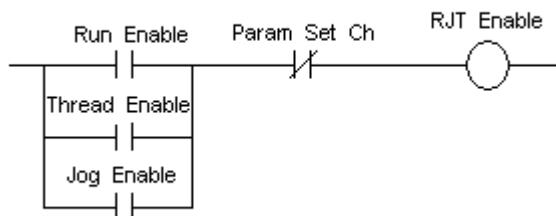
Thread Input is defaulted to *Zero Bit* which disables this function.

5-2.6 Jog Enable



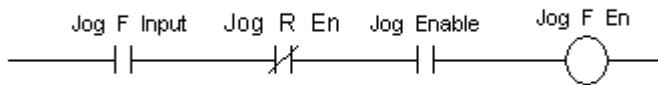
The *Jog Enable* is not maintained. Removing the input turns off the enable. Also, Thread and Run Enables have a higher priority.

5-2.7 RJT Enable



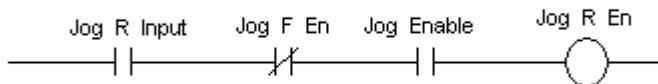
RJT Enable is high if any of the modes are enabled and the drive is done with a parameter change. This makes sure all proper values are in place before proceeding.

5-2.8 Jog F En



Enables Jog forward reference. First come, first serve between the two jog modes.

5-2.9 Jog R En



Enables Jog reverse reference. First come, first serve between the two jog modes.

5-2.10 Fast Stop

When *Fast stop* input goes low, the drive will stop at its fast ramp rate. This is defaulted to *One Bit*.

5-2.11 Cntr Mode

Control mode is an integer based on the following:

- 0 = Not enabled
- 1 = Run_Enable
- 2 = Thread_Enable
- 3 = Jog_F_En
- 4 = Jog_R_En

This is used for the reference select blocks.

Ltch_Rem	= NOT (<i>Rem Bit</i>)
Ltch_LTrq	= <i>Loc Trq Bit</i>
Ltch_Con_Md	= <i>Con_Mode_Inp</i>
Ltch_Maint	= <i>Maint_Bit</i>

The state of four internal values above are latched when *MC Run* is high.

Ltch_Rem – Latched into remote mode. External computer supplying setpoints.

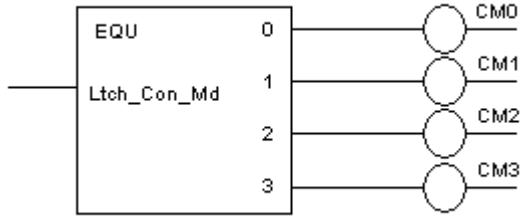
Ltch_LTrq – The test stand control console has commanded torque mode.

Ltch_Con_Md – Command word sent from console as follows:

- 0 – Run speed vs time curve
- 1 – Run engine start simulator
- 2 – Run speed vs time then engine start simulator
- 3 - Run engine start simulator then speed vs time curve

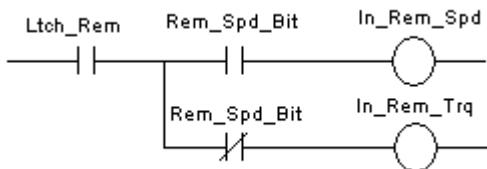
Ltch_Maint – Command from console for Maintenance mode

5.2.12 Console Mode Bits



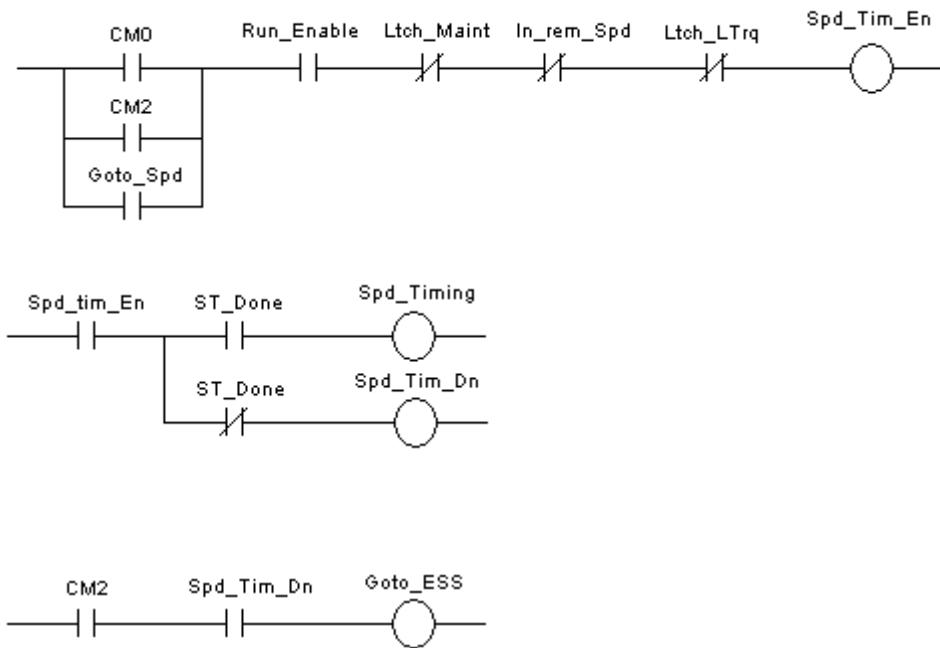
The four bits are set based on the value of Ltch_Con_Md used in the logic below.

5.2.13 In_Rem_Spd, In_Rem_Trq



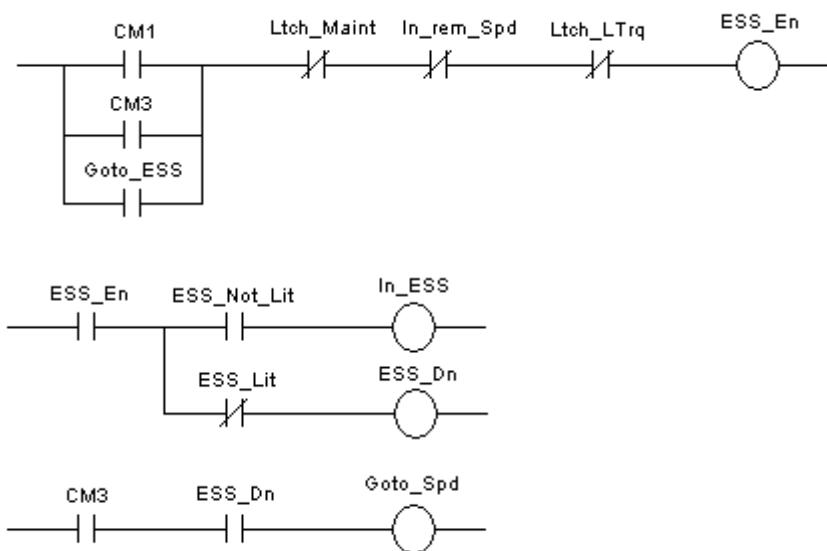
The drive can run in either a speed or torque mode in the remote mode. Drive does not have to stop to switch between these modes.

5-2.14 Speed vs. Time Logic



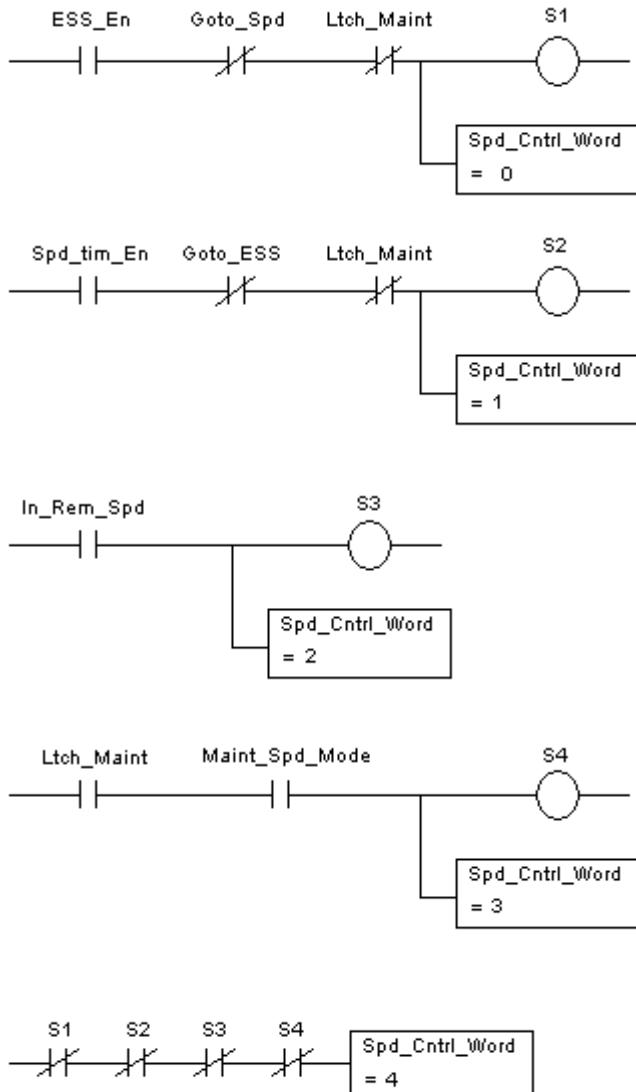
Spd Tim En is used to start the speed vs time table function. When the table is completed *ST Done* will go high. At that point if *CM2* is high the drive will transfer straight to the Engine start simulator mode. Otherwise the drive will stay at the tables last speed until the run is removed or the drive goes into maintenance mode.

5-2.15 Engine Start Simulator Logic



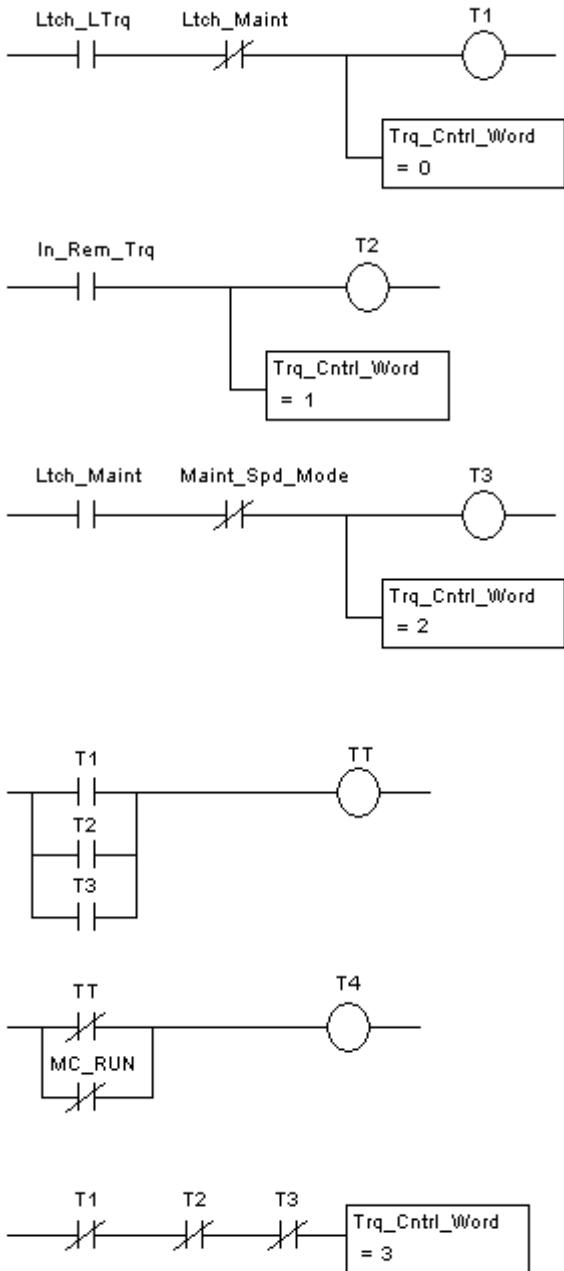
ESS En is used to start the engine starter simulator function. When the spdee has reached its lit setpoint *ESS Dn* will go high. At that point if *CM3* is high then the drive will transfer straight to the Speed vs time mode. Otherwise the drive will stay at the lit setpoint until run is removed or the drive goes into maintenance mode.

5.2.16 Speed Status



Spd Cntrl Word and the mode bits are used in the referencing to switch modes. They are also present for diagnostic purposes to determine the state of the drive.

5-2.17 Torque Status



The Torque status word and bits are used to switch torque references and also used for diagnostics to determine the mode the drive is in.

5-2.18 Ramp Delays

Two delays are available when operating in the closed loop mode.

- *Strt 0 Spd Time* will hold the speed ramp at zero until it times out on a start command. This value is in ms. This is used to allow contactors and brakes to energize before ramping up the speed. This operates in close loop mode only.
- *Stop 0 Spd Tim e* keeps the drive running at zero speed until it times out after runs are removed. This value is also in ms. This is used to hold at zero speed until brakes are removed.

5.3 LOCAL DRIVE KEYPAD

5-3.1 Local Run Mode

The drive can be put into the local mode by pressing the local/remote button on the keyboard. This will transfer control as long as the drive is not in PC control or running at the time.

Pressing the Start button on the keypad when in the local mode will initiate a drive Run as long as *MC Ready* is high and the drive is not faulted (*MC Fault* is low)

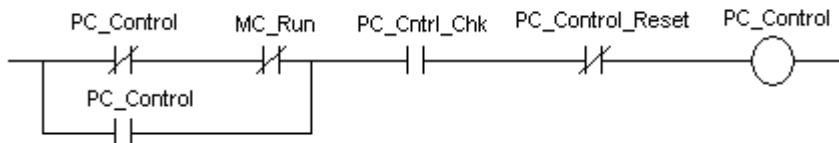
Pressing the Stop Button on the keypad will initiate a local stop. This does not stop the drive in remote or PC control. See button Stop fault in next section.

5-3.2 Button Stop Fault

In any mode, if the Stop button is pressed for 4 seconds a button stop fault will occur.

5.4 ADDaptACC SOFTWARE CONTROL

5-4.1 PC Control



PC Control is enabled by the ADDaptACC diagnostic software package. It will transfer into this mode only if the drive is not running. The drive will transfer out of *PC Control* if communications are lost to the computer.

5-4.2 SC Start

SC_Start is the run command from the ADDaptACC program. It will be enable if in *PC Control* and *MC Ready* is high and no drive faults are present (*MC Fault* is low)

5-4.3 SC Comm Fault

SC Comm Fault will fault out the drive and take the section out of *PC Control* mode.

5-5 RUN INTERFACE TO FIRMWARE

5-5.1 RunRequest

RunRequest enables the drive's firmware to start ramping and enables the inner torque loops. *RunRequest* will go high on any of the three control modes: Remote (*RJTEnable*), Local or diagnostic computer (*SC_Start*).

5-5.2 Coast Stop

The drive will coast stop under the following conditions:

- Not in *PC Control* and *Coast Stop* goes low.
- In *PC Control* and the user presses the coast stop button in Addapt ACC.
- Drive faults out and the response is setup for coast stop.

SECTION VI

REFERENCING AND OUTER CONTROL LOOP

6-1 SPEED RAMP REFERENCE

6-1.1 Maintenance Speed Reference

Parameters	Type	Default
<i>Maint Spd Inp</i>	Acfg	1245 = <i>M Spd Stpt</i> = 1000 RPM
<i>Spd Cntrl Word</i>	APB	

Description:

When the logic sets *Spd Cntrl Word* = 3 (See section 5-2) the speed reference will be derived from the configuration input *Maint Spd Inp* which is defaulted to the calibration setpoint *M Spd Stpt*.

6-1.2 Remote Speed Reference

Parameters	Type	Default
<i>Rem Spd Inp</i>	Acfg	1237 = <i>Rem Spd Stpt</i> = 5000 RPM
<i>Spd Cntrl Word</i>	APB	

Description:

When the logic sets *Spd Cntrl Word* = 2 (See section 5-2) the speed reference will be derived from the configuration input *Rem Spd Inp* which is defaulted to the calibration setpoint *Rem Spd Stpt*.

6-1.3 Speed vs Time Reference

Parameters	Type	Default
<i>Spd Tim En</i>	DPB	
<i>T1 X47</i>	TBL	
<i>ST Done</i>	DPB	
<i>Spd Tbl Tim</i>	APB	Sec
<i>Table 1</i>	TBL	
<i>Spd Cntrl Word</i>	APB	

Description:

When *Spd Tim En* goes high and *Spd Cntrl Word* = 1 the Speed vs time table becomes the speed reference. *Spd Tbl Tim* starts incrementing up in seconds. This becomes the time axis input to *Table 1*. The Y value corresponding to the time becomes the speed reference. There are 48 points that can be used to derive the speed function.

When the last point is executed in the table. *ST Done* goes high and the output is frozen at the last point.

6-1.4 Engine Starter Simulator Reference

Parameters	Type	Default
<i>Loss Tbl Inp</i>	Acfg	1201 = One Analog
<i>Abs Fil Spd</i>	APB	
<i>Loss Tbl Gn</i>	CAL	0.01
<i>Table 0</i>	TBL	
<i>Loss Tbl Out</i>	APB	
<i>Trq Ref Inp</i>	Acfg	1601 = AIN 1
<i>WK Scaling</i>	CAL	.01
<i>WK Inp</i>	Acfg	1234 = WK Stpt = 1.0
<i>PR Accel</i>	APB	
<i>MC Run</i>	DPB	
<i>S1</i>	DPB	
<i>ESS Int Gn</i>	CAL	= 1.00
<i>Max ESS Lim</i>	CAL	10000 rpm
<i>Min ESS Lim</i>	CAL	0 rpm
<i>Abs Fil Spd</i>	APB	RPM
<i>ESS Lit Stpt</i>	CAL	5000 RPM
<i>ESS Lit</i>	DPB	
<i>ESS Not Lit</i>	DPB	
<i>Lit Spd Inp</i>	Acfg	1247 = Lit Speed = 4000 RPM

Description:

In the Engine Starter simulator the test stand becomes a varying speed regulator that will resist against the starter. The basic concept is to accelerate like a jet engine. The starter torque minus the losses is the torque able to accelerate the engine. Dividing this torque by the programmable unit inertia yields the acceleration rate. This acceleration reference gets integrated to become the speed reference.

Trq Ref Inp is the starter torque input. This can be configured to an analog input from an external torque transducer or *Motor Torque* can be used.

To accurately depict engine torque losses a table is needed to modify the loss by speed. *Table 0* is a 48 point table that represents the losses. The x values are DUT RPM with no decimal point. The Y values is the torque loss and must be the same scale as *Trq Ref Inp*.

The difference from *Trq Ref Inp* and *Table 0* out is divided by *WK Inp* to become the acceleration torque. *WK Scaling* is a gain factor to properly scale the acceleration. The final value can be viewed by *PR Accel*.

PR Accel is integrated to become the speed reference. *ESS Int Gn* is a direct time constant that will affect the acceleration rate. *Max ESS Lim* and *Min ESS Lim* are output limits in RPM.

The integrated value becomes the speed reference until it reaches *ESS Lit Stpt*. At that time the drive stand will ramp to the value configured to *Lit Spd Inp*. *ESS Lit* indicates it has reached the value and *ESS Not lit* is the inverse bit.

The drive stand will stay at that speed until it is either stopped, goes to maintenance mode or is setup to automatically go to speed vs time talbe (See logic section).

6-1.5 Speed Control Word

Parameters	Type	Default
<i>Spd Cntrl Word</i>	APB	
<i>Mx Spd Lim</i>	Acfg	$1243 = \text{Max ESS Lim} = 10,000 \text{ RPM}$
<i>Spd Ref</i>	APB	

Description:

Depending on *Spd Cntrl Word* the speed reference comes from the maintenance, remote, speed vs time or ESS references(See prvious sections). This speed reference is limited between zero and the *Mx Spd Lim* input configuration point. The reference can then be viewed by *Spd Ref* value.

6-1.6 SPEED REFERENCE SELECTION

Parameters	Type	Default
<i>Cntrl Mode</i>	APB	
<i>Master Ref</i>	Acfg	<i>Spd Ref</i>
<i>Thread Ref</i>	Acfg	<i>Thread Speed</i> = 10.00
<i>Jog F Ref</i>	Acfg	<i>Jog Fwd Speed</i> = 5.00
<i>Jog R Ref</i>	Acfg	<i>Jog Rev Speed</i> = -5.00
<i>RJT Ref</i>	APB	
<i>ABS RJT Ref</i>	APB	
<i>Neg Spd Ref</i>	APB	

Description:

Cntrl_Mode determines where the speed reference comes from. See Section IV, Logic Sequence, for details on the logic for *Cntrl Mode*. Normal operation for the test stand the speed reference will come from *Master Ref*.

After selecting the proper reference, it is checked to see if it is negative. If negative, *Neg Spd Ref* bit is set. The absolute value is then applied to the speed reference and can be viewed by *ABS RJT Ref*.

6-1.7 REVERSE COMMAND

Parameters	Type	Default
<i>Revers Inp</i>	BCFG	<i>Zero Bit</i>
<i>Jog Enable</i>	DPB	
<i>Control Place</i>	APB	
<i>Keypad Spd Dir</i>	DPB	
<i>SC_Reverse</i>	DPB	
<i>Reverse</i>	DPB	

Description:

Reverse command is dependant on *Control Place* as follows:

- Remote Control - Reverse comes from *Reverse Inp* (the reverse input configuration point). This is not used when jogging since there is a separate jog forward and jog reverse. Reverse can also be commanded by having a negative speed reference.
- Panel Control - *Panel Reverse* command. This is changed via the keypad.
- Computer Control - Reverse comes from a check box on the control pad screen from ADDaptACC (*SC Reverse*)

6-1.8 REFERENCE SELECTION AND RAMP HOLD

Parameters	Type	Default
<i>Control Place</i>	APB	
<i>ABS RJT Ref</i>	APB	
<i>Keypad_Spd_ref</i>	APB	
<i>SC Spd Ref</i>	APB	
<i>LS to Freq</i>	CAL	.600
<i>LS Scl Div</i>	CAL	10000
<i>Min Frequency</i>	CAL	0
<i>FreqMax</i>	CAL	60.0 HZ
<i>Freq_Reference</i>	APB	

Description:

The Speed reference is dependent on *Control Place* as follows:

- Remote control - Comes from the Run,Jog, Thread reference *ABS RJT Ref*.
- Panel control - Set from the keypad *Keypad_Spd_ref*.
- Computer control - Set from the computer control slider bar from ADDaptACC (*SC Spd Ref*).

The Speed reference is then scaled from RPM to motor hertz. The default scaling is 10,000 RPM speed = 60 Hz. *LS to Freq* and *LS to Freq* are used for this scaling.

The frequency reference is then limited between *Min Frequency* and *Freq Max* and can be viewed by *Freq Reference*.

6-1.9 REFERENCE POLARITY

Parameters	Type	Default
<i>Freq Reference</i>	APB	
<i>Reverse</i>	DPB	
<i>Neg Spd Ref</i>	DPB	
<i>FreqReference</i>	APB	

Description:

The speed reference is then checked for polarity. The polarity can be derived from the digital input *Reverse* as described in section 6-3, or if the reference was negative from its reference point.

The output (*FreqReference*) is then passed to the firmware, which is detailed in the following sections.

6-1.10 LOW PASS AND DELAY

Parameters	Type	Default
<i>FreqReference</i>	APB	
<i>Freq Max</i>	CAL	60.0 Hz
<i>Strt 0 Spd Time</i>	CAL	0 ms
<i>RunRequest</i>	DPB	
<i>Freq Ref 3</i>	APB	
<i>Freq Ref LP TC</i>	CAL	0 ms
<i>Freq Ref Act</i>	APB	

Description:

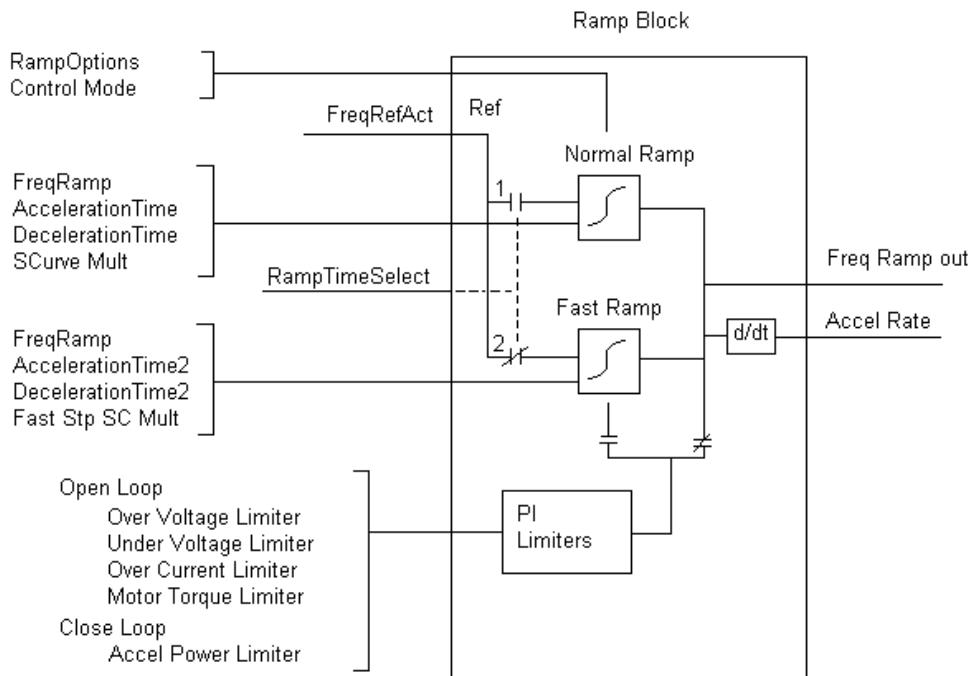
FreqReference is checked again to be within +/- *Freq Max* value and becomes *Freq Ref 3*.

A second order low pass filter with a time constant of *Freq Ref LP TC* is available to smooth the reference, if required. *Freq Ref Act* is the value after the filter.

If the drive is in the closed loop mode of operation, a time delay *Strt 0 Spd Time* can be set to delay the ramping of the reference. This can be used to delay for contactor or brake operations.

The output of this section then goes to the ramp generator blocks.

6-1.11 RAMPING



Parameters	Type	Default
Accel Inp	ACFG	Accel Time 1 = 10 seconds
Skip Freq Mlt	CAL	0.5 ratio
Decel Time	ACFG	Decel Time 1 = 10 seconds
Acc Skip Tim	APB	
Dec Skip Tim	APB	
In Skip Freq	DPB	
Acceleration Tim	APB	
Deceleration Time	APB	
Fast Stop Tim	CAL	0.1 seconds
Fast Stop	BCFG	One Bit
Smooth Ratio	CAL	1
Smooth Ratio 2	CAL	0

Description:

The ramp rates are entered in seconds, from zero speed to *Freq Max*. A default of ten seconds with *Freq Max* of 60 Hz gives a ramp rate of 6 Hz/s. Forward and reverse acceleration input is *Accel Inp*. Forward and reverse deceleration input is *Decel Time*.

While in any of the three user-defined skip frequencies (*In Skip Freq* is high), the ramp rate can be modified to get through them quicker. The default multiplier is 0.5. This would reduce the 10 second ramp time to 5 seconds, which increases the ramp rate from 6 Hz/s to 12 Hz/s. The ramp times for the skip frequencies can be viewed at *Acc Skip Tim* and *Dec Skip Tim*.

Acceleration Tim and *Deceleration Time* are the ramp time value depending if the section is in a skip frequency or not.

When *Fast Stop* input is goes low the drive stops at *Fast Stop Tim* ramp time. This allows for a very fast current limit deceleration during emergencies.

Smooth Ratio is used to create a rounding to the ramp rate. The units are in seconds to get to from zero to the ramp rate. Note that if *Smooth Ratio* = 2, then it will take 2 seconds to get to the ramp rate. It does not matter if the rate is 1 Hz/s or 10 Hz/s.

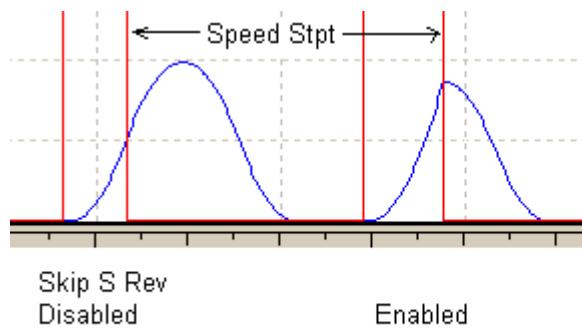
Smooth Ratio 2 is used during the fast stop condition and should be left at zero unless the machine can not handle the stress.

6-1.12 RAMP OPTIONS

Parameters	Type	Default
<i>Skip S Rev</i>	E/D	Disable
<i>Disable Ramp</i>	BCFG	Zero Bit
<i>Rmp Act Lim</i>	E/D	

Description:

Skip S Rev disables the continuation of an S-Curve when a reference change has been made. For example, if the drive is accelerating and the run is removed, the drive would continue to increase in speed until the S-Curve is complete before starting to decelerate. When *Skip S Rev* is enabled, the drive would not continue to accelerate at the time of the Run off, but start to decelerate right away. See the examples below.



Disable Ramp removes both the linear ramp and S-Curve. This should be used only when the drive is a slave section directly coupled and set as a current follower. This works only in the closed loop mode of operation.

There are four override speed limiters available. These modify the speed reference to keep the drive from faulting out. *Rmp Act Lim* enables these limiters to be ramped instead of being step changes to the speed loop.

6-1.13 RAMP OUTPUTS

Parameters	Type	Default
<i>Freq Ramp Out</i>	APB	
<i>Freq Delta</i>	APB	

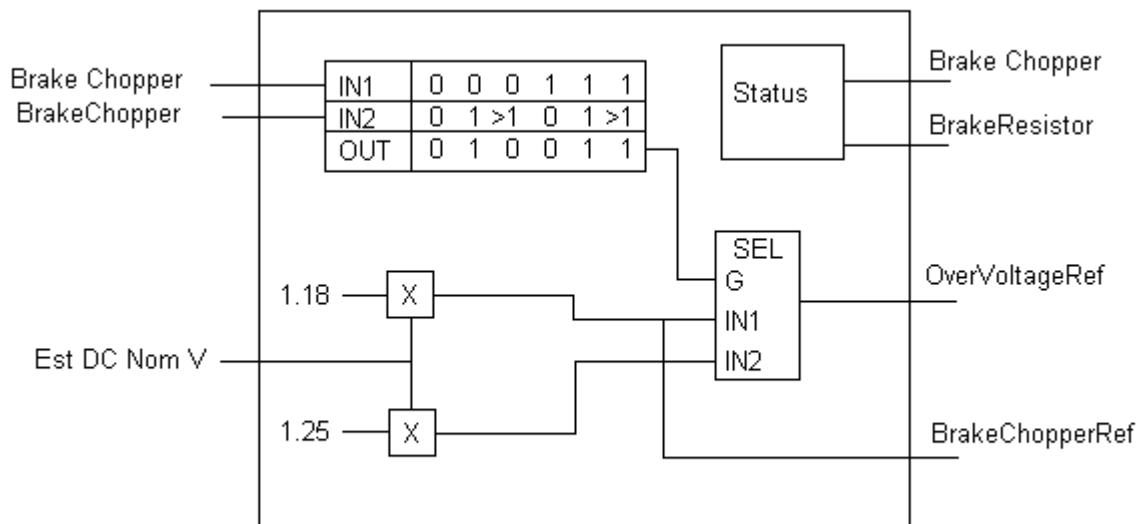
Description:

Freq Ramp Out is the final speed reference after ramping. The value is in Hz. *Freq Delta* is the derivative of the reference. The units are in Hz/s. See the appropriate sections for the other inputs to the blocks.

6-2 PI LIMITERS

There are four open loop PI limiters and two closed loop limiters. When enabled the limiters modify the speed reference to avoid the drive from tripping out. The output of these limiters can go before or after the ramp block depending if *Rmp Act Lim* is enabled.

6-2.1 OPEN LOOP OVERVOLTAGE LIMITER



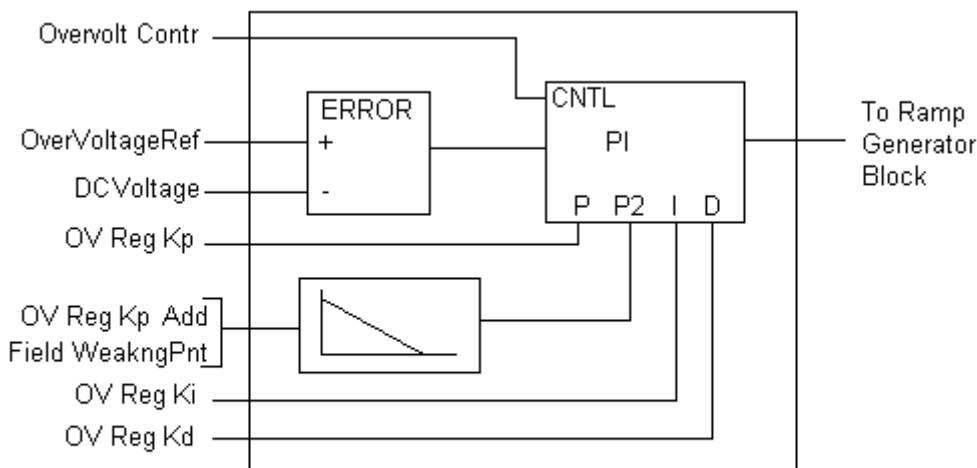
Parameters	Type	Default
<i>Brake Chopper</i>	APB	
<i>BrakeChopper</i>	CAL	0
<i>Est DC Nom V</i>	APB	
<i>BrakeResistor</i>	APB	

Description:

The Overvoltage reference is either set to 1.18 or 1.25 times the *Est DC Nom V*, depending on whether there is a DC chopper and if there is a resistor present.

Brake Chopper is set to 0 if the drive is not equipped with an internal brake Chopper. Otherwise, it is set equal to 1.

BrakeResistor is set to 0 if no resister is detected when tested. Otherwise, it is set equal to 1.



Parameters	Type	Default
<i>Overvolt Contrl</i>	CAL	0
<i>DCVoltage</i>	APB	
<i>OV Reg Kp</i>	CAL	By frame size
<i>OV Reg Kp Add</i>	CAL	By frame size
<i>OV Reg Kd</i>	CAL	By frame size
<i>Field WeakngPnt</i>	CAL	60 Hz
<i>OV Reg Ki</i>	CAL	By frame size

Description:

The Overvoltage limiter can be used to avoid the DC Bus from tripping out. This modifies the speed reference to try and keep the Bus voltage down.

Overvolt Contrl can be set to disabled, no ramp (resets the integrator), or ramping. Default is disabled.

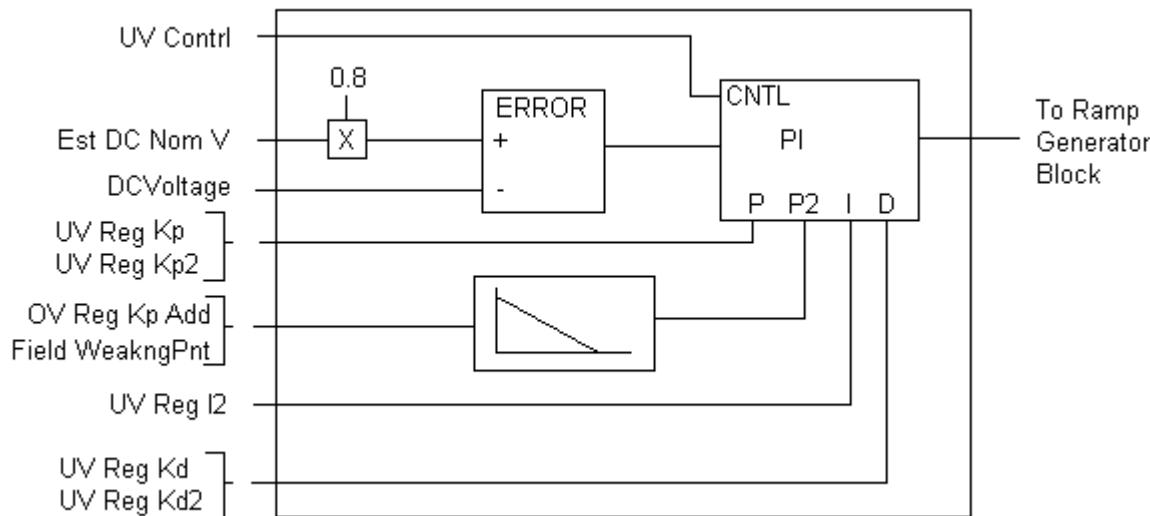
The over voltage reference is either 1.18 or 1.25 times the nominal bus voltage, depending on if there is a brake chopper circuit and resistor present.

The four gains *OV Reg Kp*, *OV Reg Kp Add*, *OV Reg Ki*, and *OV Reg Kd* all have different default values based on frame size. These should not need to be tuned except for extreme situations.

OV Ref Kp Add is an additional P gain for low speeds. It will decay to zero when the drive gets to the *Field WeakngPnt* (default 60 Hz).

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of *Freq Ramp Out*.

6-2.2 OPEN LOOP UNDERTOLAGE LIMITER



Parameters	Type	Default
<i>UV Contrl</i>	CAL	disable
<i>DCVoltage</i>	APB	
<i>UV Reg Kp</i>	CAL	By frame size
<i>UV Reg Kd</i>	CAL	By frame size
<i>UV Reg I2</i>	CAL	By frame size
<i>UV Reg Kp2</i>	CAL	By frame size
<i>UV Reg Kd2</i>	CAL	By frame size
<i>Field WeakngPnt</i>	CAL	60 Hz
<i>OV Reg Kp Add</i>	CAL	By frame size
<i>Est DC Nom V</i>	APB	

Description:

The Undervoltage limiter can be used to avoid the DC Bus from tripping out. This modifies the speed reference to try and keep the Bus voltage up.

UV Contrl can be used to enable or disable this function. It is defaulted to disable.

The setpoint is 0.8 x *Est DC Nom V*.

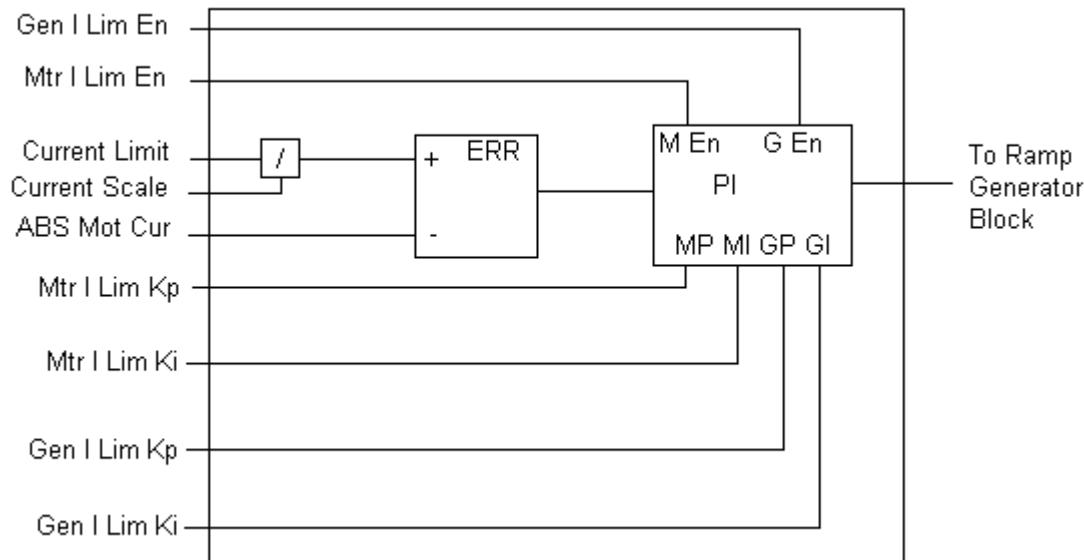
The four gains *UV Reg Kp*, *OV Reg Kp Add*, *UV Reg I2* and *UV Reg Kd* have different default values based on frame size. These should not need to be tuned except for extreme situations.

OV Ref Kp Add is an additional P gain for low speeds. It will decay to zero when the drive gets to the *Field WeakingPnt* (Default 60 Hz). Notice this is the same gain as the overvoltage limiter.

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of *FreqRampOut*.

UV Reg Kp2 and *UV Reg Kd2* are used for special high speed applications. More information on these are not available at this time.

6-2.3 OPEN LOOP CURRENT LIMITER



Parameters	Type	Default
<i>Gen I Lim En</i>	EN	1 – Disable
<i>Mtr I Lim En</i>	EN	1 – Disable
<i>Current Scale</i>	CAL	1,10 By frame size
<i>Mtr I Lim Kp</i>	CAL	By frame size
<i>Mtr I Lim Ki</i>	CAL	By frame size
<i>Gen I Lim Kp</i>	CAL	By frame size
<i>Gen I Lim Ki</i>	CAL	By frame size

Description:

The overcurrent limiter can be used to avoid the drive from tripping out. This modifies the speed reference to try and keep the current within tolerance.

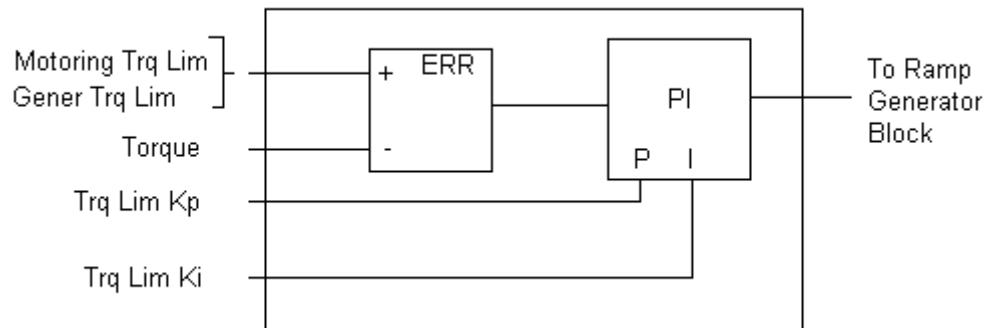
There are two regulators based on whether the drive is motoring or regenerating. *Gen I Lim En* enables the regeneration regulator, while *Mtr I Lim En* enables the motoring regulator. Both are defaulted to disable.

The entered current limit is the setpoint. This gets subtracted to the absolute value of the motor current to create the regulator error.

The four gains *Mtr I Lim Kp*, *Mtr I Lim Ki*, *Gen I Lim Kp* and *Gen I Lim Ki* have different default values based on frame size. These should not need to be tuned except for extreme situations.

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of *FreqRampOut*.

6-2.4 OPEN LOOP TORQUE LIMITER



Parameters	Type	Default
<i>Motoring Trq Lim</i>	CAL	300%
<i>Gener Trq Lim</i>	CAL	300%
<i>Motor Torque</i>	APB	
<i>Trq Lim Kp</i>	CAL	3000
<i>Trq Lim Ki</i>	CAL	200

Description:

The over torque limiter can be used to avoid the drive from tripping out. This modifies the speed reference to try and keep the current within tolerance.

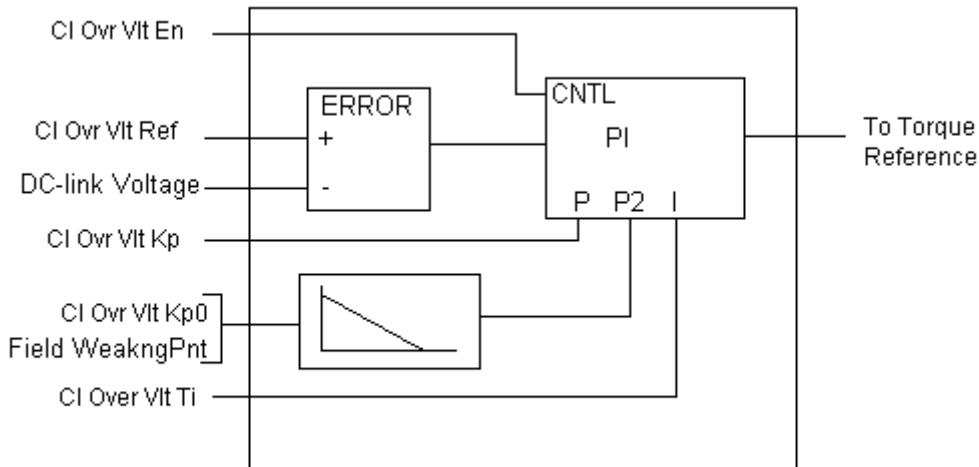
There are two regulators based on whether the drive is motoring or regenerating. Unlike the other regulators, there is no enable or disable for this limiter. The limits can be set above 300% to cause the drive to trip prior to the regulator turning on.

Motoring Trq Lim and *Gener Trq Lim* are the torque limits to start regulating the speed reference down. These are in percent motor torque. The feedback is unfiltered, calculated motor torque.

Trq Lim Kp and *Trq Lim Ki* are set up to run stable. These should not need to be tuned except for extreme situations.

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of *FreqRampOut*.

6-2.5 CLOSED LOOP OVER VOLTAGE LIMITER



Parameters	Type	Default
<i>Cl Ovr Vlt En</i>	EN	Disable
<i>Cl Ovr Vlt Ref</i>	CAL	118%
<i>Cl Ovr Mtr Lim</i>	CAL	100%
<i>Cl Ovr Vlt Kp</i>	CAL	50
<i>Cl Ovr Vlt Ti</i>	CAL	15
<i>Cl Ovr Vlt Kp0</i>	CAL	50

Description:

Unlike the other limiters the close loop over voltage limiter modifies the torque producing current to the motor.

The controller is a PI regulator that will try and keep the DC-voltage below *Cl Ovr Vlt Ref* percent of nominal bus voltage.

Cl Ovr Vlt Kp and *Cl Ovr Vlt Ti* are setup to run stable. These should not need to be tuned except for extreme situations.

Cl Ovr Vlt Kp0 is an additional gain added from field weakening frequency to zero frequency.

6-3 SPEED STEP REFERENCE

FreqRampOut is the final ramped speed reference after the limiters. Droop and step inputs are then added to this value before going to the velocity controller. Depending if the section is configured for open or closed loop, this section varies slightly.

6-3.1 SPEED STEP REFERENCES

Parameters	Type	Default
<i>Sup Enable</i>	BCFG	Zero Bit
<i>Slack Up</i>	ACFG	<i>Spd Slk Up</i> = 10 %
<i>Step Reverse</i>	BCFG	Zero_Bit
<i>Step Ref</i>	APB	
<i>LS to Freq</i>	CAL	600
<i>LS Scl Div</i>	CAL	10000
<i>Freq Max</i>	CAL	60.0 Hz
<i>Freq Ramp Out</i>	APB	
<i>ProcessPITrimRef</i>	APB	

Description:

The *Slack Up* input is available to inject step changes into the speed reference. This can be used for tuning or current sharing. To enable set *Sup Enable* high.

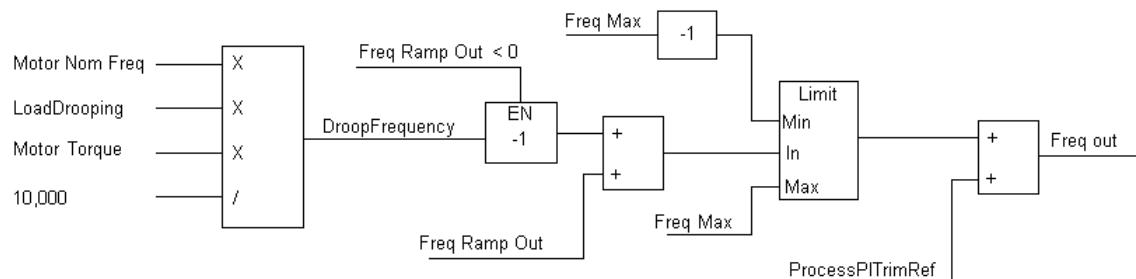
Step Reverse enables the inverse polarity of the *step reference*. The signal then becomes *Step Ref*.

LS to Freq and *LS Scl Div* are used to scale the speed step from process units to motor hertz.

Caution: The same scaling factors are used to re-scale the speed ramp reference.

Since this reference gets added to the ramped speed reference and goes directly to the speed loop error, limit checking must be done. The limits are set to *Freq Max* plus or minus the output of *Freq Ramp Out*.

6-3.2 OPEN LOOP STEP REFERENCE



Parameters	Type	Default
<i>Motor Nom Freq</i>	CAL	60.0 Hz
<i>LoadDrooping</i>	CAL	0
<i>Motor Torque</i>	APB	
<i>DroopFrequency</i>	APB	
<i>Freq Ramp Out</i>	APB	
<i>Freq out</i>	APB	
<i>Freq Max</i>	CAL	60.0 Hz

Description:

Freq Ramp Out is modified by the droop control. Droop gain is set from the *LoadDrooping* parameter. A setpoint of 100 equals 100% speed droop at 100% torque.

Example:

$$\text{LoadDroop} = 5.00\%$$

$$\text{Motor Nom Freq} = 60.00 \text{ Hz}$$

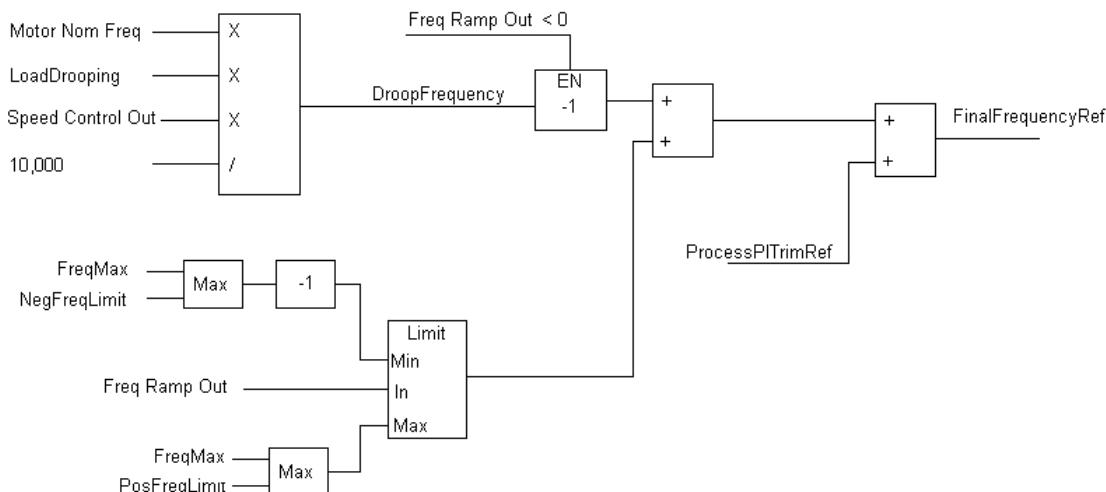
$$\text{Motor Torque} = 25.0\%$$

DroopFrequency would be equal to 0.75 Hz.

DroopFrequency is positive if the section is in motoring quadrant, so the value subtracted from the speed if running forward and added if running reverse.

The speed reference is then checked to be within +/- *FreqMax* limit and added to the *ProcessPITrimRef* from the slack step inputs. The final value that goes to the open loop regulator is called *Freq out*.

6-3.3 CLOSED LOOP STEP REFERENCE



Parameters	Type	Default
<i>Motor Nom Freq</i>	CAL	60.0 Hz
<i>Motor Torque</i>	APB	
<i>LoadDrooping</i>	CAL	0
<i>Speed Cntrll Out</i>	APB	
<i>DroopFrequency</i>	APB	
<i>Freq Ramp Out</i>	APB	
<i>Freq Max</i>	CAL	60.0 Hz
<i>ProcessPITrimRef</i>	APB	
<i>Pos Freq Limit</i>	CAL	60.0 Hz
<i>Neg Freq Limit</i>	CAL	-60.0 Hz
<i>Final Freq Ref</i>	APB	

Description:

Freq Ramp Out is checked to make sure it is within the minimum and maximum limits

This is then modified by the droop control. Droop gain is set from the *LoadDrooping* parameter. A setpoint of 100 equals 100% speed droop at 100% torque.

Example:

LoadDroop = 5.00%

Motor Nom Freq = 60.00 Hz

Motor Torque = 25.0%

DroopFrequency would be equal to 0.75 Hz.

DroopFrequency is positive if the section is in the motoring quadrant, so the value is subtracted from the speed if running forward and added if running reverse.

DroopFrequency is then added to the *ProcessPITrimRef* from the slack step inputs. The final value that goes to the open loop regulator is called *Final Freq Ref*.

6-4 SPARE BLOCKS

Two pages of spare blocks are added to the application. These are broken down into logic blocks and reference blocks.

6-4.1 SPARE REFERENCE BLOCKS

Parameters	Type	Default
Muldiv Block		
<i>Sp MD1 Val</i>	ACFG	<i>Zero Analog</i>
<i>Sp MD1 Mul</i>	ACFG	<i>Sp MD1 Mlt</i> = 1.00
<i>Sp MD1 Div</i>	ACFG	<i>Sp MD1 Dv</i> = 1.00
<i>Sp MD1 Out</i>	APB	
Muldiv Block		
<i>Sp MD2 Val</i>	ACFG	<i>Zero Analog</i>
<i>Sp MD2 Mul</i>	ACFG	<i>Sp MD2 Mlt</i> = 1.00
<i>Sp MD2 Div</i>	ACFG	<i>Sp MD2 Dv</i> = 1.00
<i>Sp MD2 Out</i>	APB	
Add Block		
<i>Sp Add1 In1</i>	ACFG	<i>Sp Add Val</i> = 0.00
<i>Sp Add1 In2</i>	ACFG	<i>Sp Add Val</i> = 0.00
<i>Sp Add1 Out</i>	APB	
Sub Block		
<i>Sp Sub1 In1</i>	ACFG	<i>Sp Sub Val</i> = 0.00
<i>Sp Sub1 In2</i>	ACFG	<i>Sp Sub Val</i> = 0.00
<i>Sp Sub1 Out</i>	APB	

Low Pass Block

<i>Sp LP Fil TC</i>	CAL	0.1 sec
<i>Sp LP Fil In</i>	ACFG	<i>Zero Analog</i>
<i>Sp LP Fil Out</i>	APB	

ABS Block

<i>Sp ABS In</i>	ACFG	<i>Zero Analog</i>
<i>Sp ABS Out</i>	APB	

Sum Block

<i>Sp Sum1 EnA</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sum1 EnB</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sum1 EnB</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sum1 InA</i>	ACFG	<i>Sp Sum1 StA = 0.00</i>
<i>Sp Sum1 InB</i>	ACFG	<i>Sp Sum1 StB = 0.00</i>
<i>Sp Sum1 InC</i>	ACFG	<i>Sp Sum1 StC = 0.00</i>
<i>Sp Sum1 Out</i>	APB	

Sel Block

<i>Sp Sel1 En1</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sel1 In0</i>	ACFG	<i>Sp Sel1 ST0 = 0</i>
<i>Sp Sel1 In1</i>	ACFG	<i>Sp Sel1 ST1 = 0</i>
<i>Sp Sel1 Out</i>	APB	

Sel Block

<i>Sp Sel2 En1</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sel2 In0</i>	ACFG	<i>Sp Sel2 ST0 = 0</i>
<i>Sp Sel2 In1</i>	ACFG	<i>Sp Sel2 ST1 = 0</i>
<i>Sp Sel2 Out</i>	APB	

Lim Block

<i>Sp Lim Min</i>	CAL	-100.00
<i>Sp Lim Max</i>	CAL	100.00
<i>Sp Lim Inp</i>	ACFG	<i>Zero_Analog</i>
<i>Sp Lim Out</i>	APB	

Description:

Each of these blocks are individual blocks as described in the block functional specification.

6-4.2 SPARE LOGIC BLOCKS

Parameters	Type	Default
Comp Block		
<i>Sp Cmp1 In</i>	ACFG	<i>Sp Cmp1 Stpt = 50.00</i>
<i>Sp Cmp1 Thres</i>	ACFG	<i>Sp Cmp1 Stpt = 50.00</i>
<i>Sp Cmp1 Hyst</i>	CAL	1.00
<i>Sp Cmp1 Out</i>	DPB	
<i>Sp Cmp1 Eq</i>	DPB	
Delay Block		
<i>Sp Dly1 TON</i>	CAL	0.100 seconds
<i>Sp Dly1 TOFF</i>	CAL	0.100 seconds
<i>Sp Dly1 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Dly1 Out</i>	DPB	

Parameters	Type	Default
Latch Block		
<i>Sp Latch1 L</i>	BCFG	<i>Zero Bit</i>
<i>Sp Latch1 H1</i>	BCFG	<i>One Bit</i>
<i>Sp Latch1 H2</i>	BCFG	<i>One Bit</i>
<i>Sp Latch1 Out</i>	DPB	
BInv Block		
<i>Sp Inv1 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Inv1 Out</i>	DPB	
BInv Block		
<i>Sp Inv2 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Inv2 Out</i>	DPB	
Or Block		
<i>Sp Or1 In1</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or1 In2</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or1 Nin3</i>	BCFG	<i>One Bit</i>
<i>Sp Or1 Out</i>	DPB	
Or Block		
<i>Sp Or2 In1</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or2 In2</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or2 Nin3</i>	BCFG	<i>One Bit</i>
<i>Sp Or2 Out</i>	DPB	
And Block		
<i>Sp And1 In1</i>	BCFG	<i>One Bit</i>
<i>Sp And1 In2</i>	BCFG	<i>One Bit</i>
<i>Sp And1 Nin3</i>	BCFG	<i>Zero Bit</i>
<i>Sp And1 Out</i>	DPB	
And Block		
<i>Sp And2 In1</i>	BCFG	<i>One Bit</i>
<i>Sp And2 In2</i>	BCFG	<i>One Bit</i>
<i>Sp And2 Nin3</i>	BCFG	<i>Zero Bit</i>
<i>Sp And2 Out</i>	DPB	

Description:

Each of these are individual blocks as described in the block functional specification.

SECTION VII

MOTOR CONTROL MODE

7-1 TORQUE REFERENCE

The torque reference is used when *MotorControlMode* is selected for torque control. The reference can be used with speed control as a torque limit.

7-1.1 TORQUE REFERENCE BLOCKS

Parameters	Type	Default
<i>Abs Fil Spd</i>	APB	
<i>Table 2</i>	Tbl	
<i>Trq Spd Tbl</i>	APB	
<i>Trq Cntrl Word</i>	APB	Control Word by Logic
<i>Rem_Trq Inp</i>	ACFG	1235 = <i>Rem Trq Stpt</i> = 10.0
<i>Maint Trq Inp</i>	ACFG	1244 = <i>M Trq Stpt</i> = 10.0
<i>Trq Lim Ref</i>	APB	
<i>Trq Scl Mlt</i>	CAL	1.00
<i>Trq Scl Div</i>	CAL	1.00
<i>T4</i>	DPB	
<i>Spd Trq Lim</i>	CAL	100.0
<i>Trq No Ramp</i>	BCFG	One Bit
<i>Trq Ref Rate</i>	CAL	10.00

Three torque references are available and select by *Trq Cntrl Word* (See section 4.2.17 for logic).

When *Trq Cntrl Word* = 0 the reference comes from *Table 2*. The table creates a torque reference based on the speed of the motor. The X parameter is speed in RPM while the associate Y parameter for each point is the torque reference.

When *Trq Cntrl Word* = 1 the reference comes from *Rem Trq Inp*.

When *Trq Cntrl Word* = 2 the reference comes from *Maint Trq Inp*.

The selected torque reference can be viewed at *Trq Lim Ref*.

Trq Lim Ref can be scaled in any customer units. *Trq Scl Mlt* and *Trq Scl Div* are used to convert the customer torque units to % motor torque with one decimal point.

T4 selects the given reference when in torque mode. When low the torque reference becomes *Spd Trq Lim*.

If *Trq No Ramp* is selected low then the reference goes through a ramp limiter with a value of *Trq Ref Rate*. *Trq Ref Rate* units are percent motor torque per second.

7-1.2 CLOSED LOOP TORQUE REFERENCE

Parameters	Type	Default
<i>Trq I Res1</i>	BCFG	1099 = <i>Cntrl Inhib</i>
<i>Trq I Res2</i>	BCFG	1001 (<i>One Bit</i>)
<i>Trq P Gain</i>	CAL	.01
<i>Trq I Gain</i>	CAL	1.00
<i>Trq LP Max</i>	CAL	100.0
<i>Trq LP Min</i>	CAL	-100.0
<i>Trq LP Gain</i>	CAL	1
<i>Trq Lp Ref</i>	ACFG	1512 = <i>Trq Lim Ref</i>
<i>Trq Lp Fdbk</i>	ACFG	1601 = <i>Ain 1</i>
<i>Trq PI Out</i>	APB	
<i>Regen_Trq_Lim</i>	APB	

An external torque transducer can be used to trim the torque reference. A PI regulator is present for this trim. The reference for the regulator is *Trq Lp Ref* which is defaulted to the open loop reference *Trq Lim Ref*. Configure the transducers analog input to *Trq Lp Fdbk*.

The Loop is enabled by having both *Trq I Res1* and *Trq I Res2* low.

The gains of the loop are set by *Trq P Gain*, *Trq I Gain* and *Trq LP Gain* which modifies both the proportional and integral gains.

The output of the close loop regulator can be limited by *Trq LP Max* and *Trq LP Min* values.

The output of the PI regulator can be viewed as *Trq PI Out* in % motor torque. This gets added to the open loop reference and becomes *Regen Trq Lim*.

7-1.3 TORQUE REFERENCE POLARITY AND RAMP

Parameters	Type	Default
<i>Control Place</i>	APB	
<i>Trq Ref</i>	ACFG	1517 = <i>Regen Trq Lim</i>
<i>Keypad Trq Ref</i>	APB	
<i>Trq Dir</i>	BCFG	1002 = <i>Zero Bit</i>
<i>Keypad Trq Dir</i>	DPB	
<i>Trq Ref En</i>	BCFG	1090 = <i>RunRequest</i>
<i>Trq No Ramp</i>	BCFG	1001 = <i>One Bit</i>
<i>Trq_Rmp_Rate</i>	CAL	5

The main torque reference *Trq Ref* is defaulted to the reference string described above. If *Control Place* = 1 the reference comes from the keypad (*Keypad Trq Ref*) for use as a debug setpoint. The polarity of the torque reference is set by *Trq Dir* in normal operation and *Keypad Trq Dir* in debug mode.

When *Trq No Ramp* is low then the final reference is rate limited by the value of *Trq Rmp Rate* in motor torque per second.

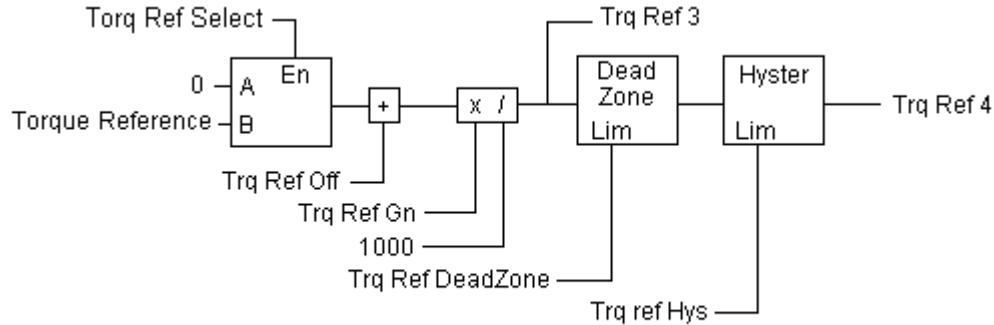
7-1.4 TORQUE REFERENCE LIMIT

Parameters	Type	Default
Abs Fil Spd	APB	
Trq Base_Spd	CAL	1700 RPM
Trq Ref_Max	CAL	100.0
Trq End Spd	CAL	5000 RPM
Trq Ref Min	CAL	50.0
Tbl Trq Lim	APB	
TorqueReference	APB	

The torque reference can be limited by speed. If the motor speed is below *Trq Base Spd* the reference is limited by *Trq Ref Max*. The limit will ramp down to *Trq Ref Min* when the speed reaches *Trq End Spd*. This limit can be viewed by *Tbl Trq Lim*.

The final torque reference goes into the firmware as *TorqueReference*.

7-1.5 TORQUE REFERENCE FIRMWARE, PART I



Parameters	Type	Default
SC Trq Chain Sel	En	0 = Not used
Torq Ref Select	En	0 = Not Used
Torque Reference	APB	
Trq Ref Gn	CAL	1000
Trq Ref Off	CAL	0
Trq Ref 3	APB	
Trq Ref DeadZone	CAL	0
Trq Ref Hyst	CAL	0
Trq Ref 4	APB	

SC Trq Chain Sel determines the operation of the torque reference as follows:

- 0 = Not Used
- 1 = Torque limit to the speed loop
- 2 = Torque reference added to speed loop (Or only reference)
- 4 = Position control (See closed loop speed loop description)

Torq Ref Select enables *Torque Reference* setpoint.

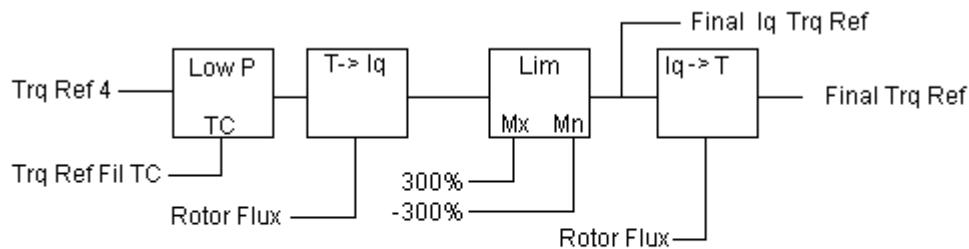
$$Trq\ Ref\ 3 = (Torque\ Reference + Trq\ Ref\ Off) \times Trq\ Ref\ Gn / 1000$$

The torque reference is forced to zero if it is less than +/- *Trq Ref DeadZone* in percent torque. This is used to ignore small values.

Trq ref Hys sets a limit around zero to which the setpoint will not be allowed to go. The polarity of the torque will depend on the polarity of the Torque command when it falls below this limit.

Trq Ref 4 is the value after the dead zone and hysteresis blocks.

7-1.6 TORQUE REFERENCE FIRMWARE, PART II



Parameters	Type	Default
<i>Trq Ref 4</i>	APB	
<i>Trq Ref Fil TC</i>	CAL	0 ms
<i>Rotor Flux</i>	APB	
<i>Final Iq Trq Ref</i>	APB	
<i>Final Trq Ref</i>	APB	

Trq Ref 4 goes through a second order low-pass filter with a time constant of *Trq Ref Fil TC*.

The reference is then converted to motor current by taking into account the estimated *Rotor Flux*.

After being checked to be within +/- 300% current, the *Final Iq Trq Ref* is created. Also, converting back to torque reference is done to create *Final Trq Ref*.

7-2 OPEN LOOP CONTROL

Open loop control is set by having *MotorControlMode* = 0 – 2.

- 0 = Frequency control (Volts/Hertz)
- 1 = Open loop speed control (Open loop vector speed control)
- 2 = Open loop torque control (Open loop vector torque control)

Each mode has its own regulator scheme. In each open loop mode there are three stabilizers: Torque, DC-Link, and Flux. Each of these are factory-set, but are explained for reference.

7-2.1 TORQUE STABILIZER

The Torque stabilizer is used to dampen possible oscillations in the estimated torque calculations. This loop comes into affect above 3 hertz and is factory tuned. The reference to the controller is the derivative of the estimated torque value. The stabilizer control is a proportional-only controller with a variable gain. The gain is changed linearly between zero and field weaken frequency. The Zero and field weaken gain points are be *TorqStabGain* and *TorqStabGainFWP*.

TorqStabGainHwDtcFWP is an additional gain with dead time compensation above the field weaken point.

The output of the regulator is also limited by *TorqStabLimit*. The output of the controller goes through a damping block to reduce spikes from the derivative input based on parameter *TorqStabDamp*.

The torque stabilizer is factory set and the parameters are not editable.

- TorqStabGain* = 100 gain
- TorqStabGainFWP* = 50 gain
- TorqStabGainHwDtcFWP* = 50
- TorqStabLimit*. = 150 Hz/FreqScale
- TorqStabDamp* = 900

7-2.2 DC-LINK STABILIZER

The DC-link Stabilizer operates similar to the Torque stabilizer and also operates above 3 hertz. The reference to the controller is the derivative of the DC-link voltage. The proportional gain is variable by estimated motor torque. As the torque increases from 10% to 50%, the controller gain decreases from *VoltStabGain* to zero gain.

VoltStabGainHwDtc is an additional gain with dead time compensation.

The output of this stabilizer is limited by VoltStabLimit. The output of the controller goes through a damping block to reduce spikes from the derivative input based on parameter VoltStabDamp.

The Voltage stabilizer is factory set and the parameters are not editable.

VoltStabGain = 100 gain

VoltStabGainHwDtc = 50 gain

VoltStabLimit = 150 Hz/FreqScale

VoltStabDamp = 900

7-2.3 FLUX STABILIZER

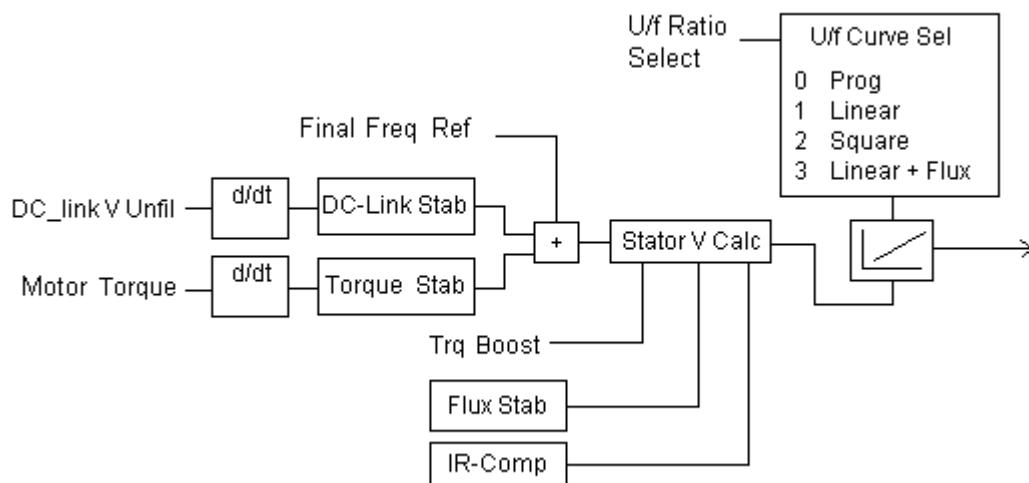
The Flux stabilizer purpose is to stabilize the magnetizing current. The error to the controller is from the difference between filtered and unfiltered magnetizing current. The filtered signal has a time constant of ldsFiltCoeff (in ms). The Flux stabilizer is a proportional-only controller with a gain of ldsStabGAinRef.

The Flux stabilizer is factory set and the parameters are not editable.

ldsFiltCoeff = 64 ms.

ldsStabGAinRef = 500 gain

7-2.4 OPEN LOOP FREQUENCY REFERENCE (*Motor Ctrl Mode* = 0)



Parameters	Type	Default
<i>Motor Ctrl Mode</i>	CAL	0 = Open Loop Frequency mode
<i>DC_link V Unfil</i>	APB	
<i>Motor Torque</i>	APB	
<i>Freq out</i>	APB	

<i>U/f Optimization</i>	CAL	0
<i>Meas Rs V Drop</i>	CAL	0
<i>Ir Add Mtr Scl</i>	CAL	100
<i>Ir Add Gen Scl</i>	CAL	0
<i>Ir Add 0 Pt V</i>	CAL	0
<i>U/F Ratio Select</i>	CAL	0 = Linear
<i>Zero Freq Voltg</i>	CAL	0
<i>Voltage at FWP</i>	CAL	100.00
<i>U/F Mid Voltg</i>	CAL	100.00

If *Motor Ctrl Mode* = 0, then *Freq out* becomes the drives motor frequency reference in volts per hertz mode.

The torque and DC-link voltage stabilizer output is added straight to the frequency reference. Both of these stabilizers are zero mean additions to the output frequency. The Torque stabilizer is to dampen possible oscillations in the estimated torque calculations and DC-Link stabilizer is to dampen changes in the DC bus voltage.

The Stator Voltage calculation block takes the output of *Freq out* modified by the stabilizers and calculates the correct stator voltage. Inputs to this calculation are the torque boost and IR compensation.

Torque boost is enabled by setting *U/F Optimization* = 1. The torque boost is to compensate for the voltage drop due to stator resistance. This is done in the following ways.

- If the *Meas Rs V Drop* is set, then this value is used. This can be set by the user or the drive will calculate it if DC-brake is active for longer than two seconds.
- If the *Meas Rs V Drop* is not used, then the drive will estimate the voltage drop. This estimation can be viewed at *DefRsVoltageDrop*.

The IR compensation scaling is broken up into two values, depending if the drive is in motoring or in generation mode. The two variables are *Ir Add Mtr Scl* and *Ir Add Gen Scl*. These are scaled in percentage of the amount to add to the reference. The IR compensation value then goes through a low-pass filter with a time constant of *IrAddFilterTC*, which is hard coded to 8 ms. The gain of this filter goes from zero to full scale at *IrAddFreqLimit*, which is hard coded to 1 Hz. Between zero and this *IrAddFreqLimit*, a constant voltage *IrAddZeroPointVoltage* can be added.

The output voltage is then determined by going through one of three volts per hertz curves. Selection of a curve is done with the *U/F Ratio Select* parameter.

- *U/F Ratio Select* = 0 = Linear curve – As the name implies, this performs a linear curve between the *Zero Freq Voltg* and *Voltage at FWP*. *Zero Freq Voltg* is entered in percent of nominal voltage and is the starting voltage for the drive.

Voltage at FWP is entered in percent of nominal voltage and is the ending voltage when the field weakening frequency has been reached.

- *U/F Ratio Select = 1 = Squared* – The same parameters as Linear curve are used except, instead of a linear interpolation between the two points, a squared curve is used.
- *U/F Ratio Select = 2 = Programmable* – This is automatically selected if the drive has completed its identification with run and built the frequency-to-voltage curve. Three voltage, frequency points are found and used to define the curve. The points are:

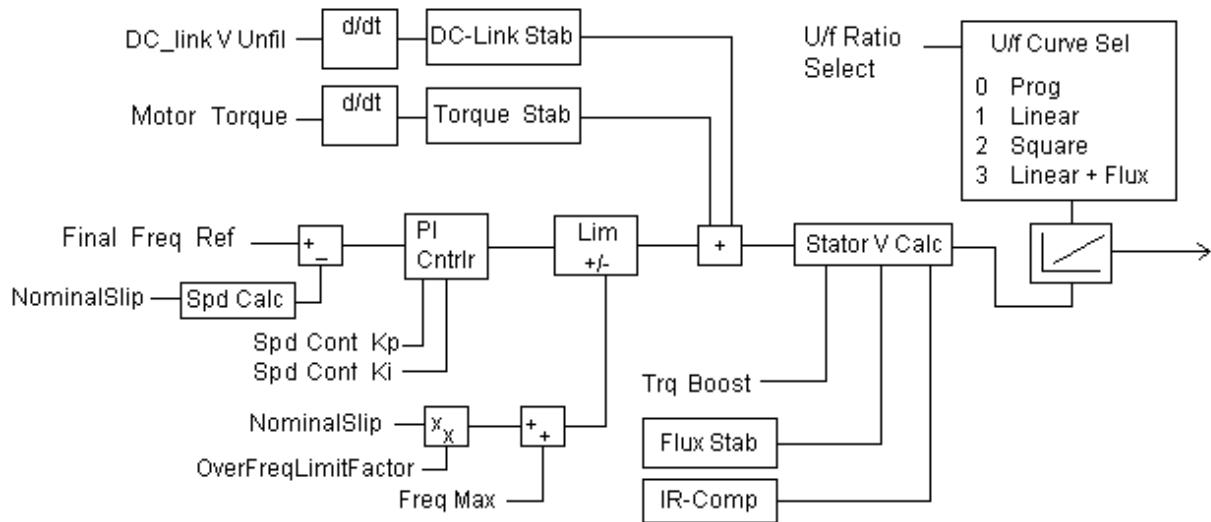
UFZeroPointVoltage

U/f Mid Freq

Voltage at FWP

- *UFRatio = 3 = Linear with Flux optimization* – Uses the linear curve with voltage being drooped during constant operation. The advantage if this modification is to reduce motor losses. The disadvantage is a lag in the torque loop.

7-2.5 OPEN LOOP SPEED CONTROL (*Motor Ctrl Mode = 1*)



Parameters	Type	Default
<i>Motor Ctrl Mode</i>	CAL	0 = Open Loop Frequency mode
<i>Freq out</i>	APB	
<i>Spd Cont Kp</i>	CAL	3000 Gain
<i>Spd Cont Ki</i>	CAL	300 Gain
<i>Freq Max</i>	CAL	60 Hz

If *Motor Ctrl Mode*= 1, then *Freq out* becomes the drive's open loop speed reference.

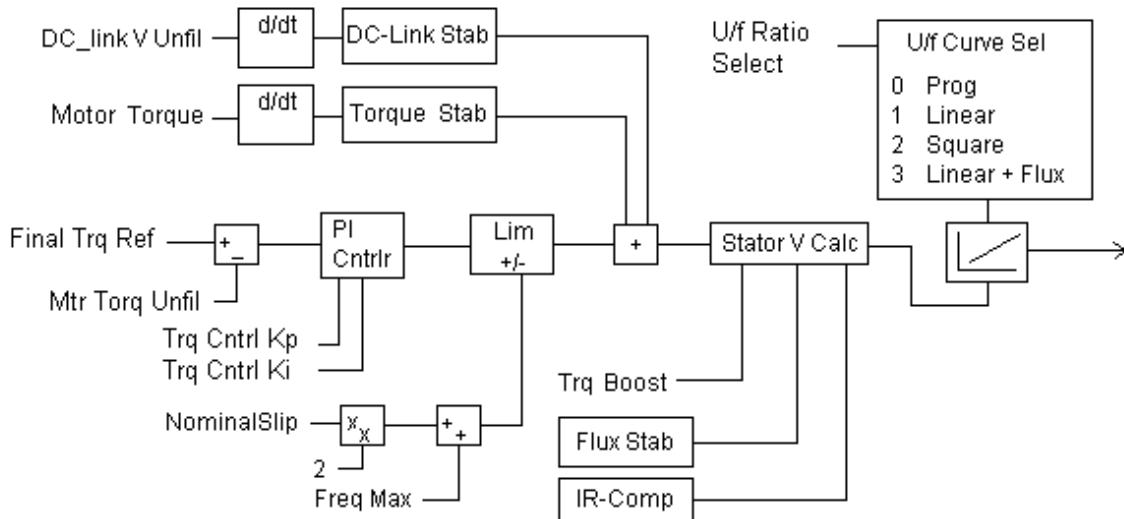
The motor speed feedback is calculated from the motor voltage and the estimated slip value (NominalSlip).

The error is then passed to a Speed PI regulator. The proportional gain is set by *Spd Cont Kp* and the integral gain is set by *Spd Cont Ki*.

The output of the PI regulator is limited to *Freq Max* plus the value of *NominalSlip* x *OverFreqLimitFactor*. *OverFreqLimitFactor* is factory-set for 300 and allows the motor to get to its rated speed.

After the frequency limiter, the reference goes through the same stabilizers and volts per hertz curve as the open loop frequency reference. See the section prior to setup of these control sections.

7-2.6 OPEN LOOP TORQUE CONTROL (*Motor Ctrl Mode* = 2)



Parameters	Type	Default
<i>Motor Ctrl Mode</i>	CAL	0 = Open Loop Frequency mode
<i>Final TrqRef</i>	APB	
<i>OL TC Min Freq</i>	CAL	3.00 Hertz
<i>Mtr Torq Unfil</i>	APB	
<i>Trq Cntrl Kp</i>	CAL	150 Gain
<i>TrqCntrl Ki</i>	CAL	10 Gain
<i>Freq Max</i>	CAL	60 Hz

If *Motor Ctrl Mode* = 2, then *Final Trq Ref* becomes the drive's open loop torque reference. See section 7-1 for the origin of this signal.

The drive goes into torque control if the drive is not in a limit controller and if the operating frequency is above the *Ol TC Min Freq* setting. The error from *Final Trq Ref* and *Mtr Torq Unfil* passes to a torque PI regulator. The proportional gain is set by *Trq Cntrl Kp* and the integral gain is set by *Trq Cntrl Ki*.

The output of the torque PI regulator is limited to *Freq Max* plus the value of NominalSlip x 2. This allows the motor to get to its rated speed.

After the frequency limiter, the reference goes through the same stabilizers and volts per hertz curve as the open loop frequency reference. See the section prior to setup of these control sections.

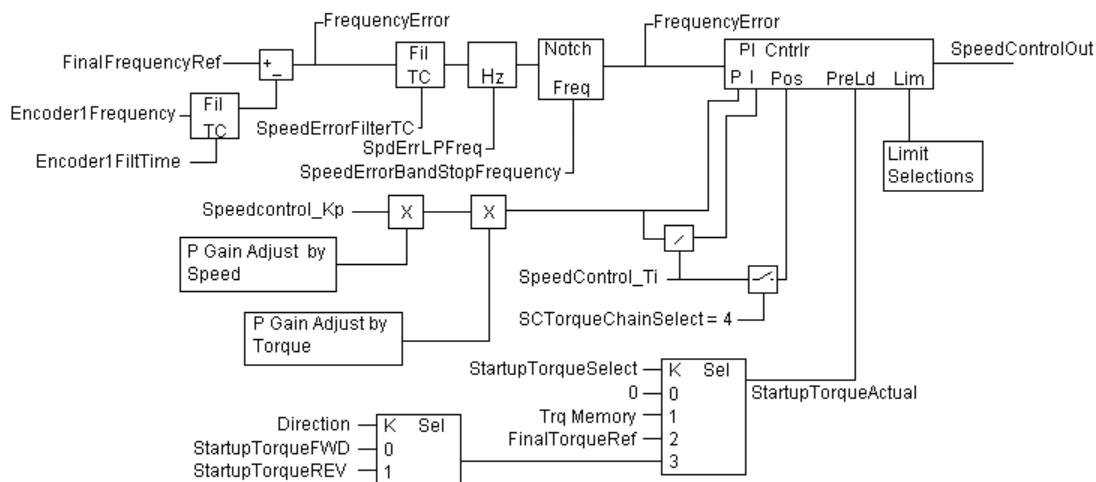
7-3 CLOSED LOOP CONTROL

Closed loop control is set by having *Motor Ctrl Mode* = 3 or 4.

3 = Closed loop speed control

4 = Closed loop torque control

7-3.1 CLOSED LOOP SPEED CONTROL (*Motor Ctrl Mode* = 3)



Parameters

Type	Default
<i>Motor Ctrl Mode</i>	CAL 0 = Open Loop Frequency mode
<i>Final Freq Ref</i>	APB
<i>Encoder1FiltTime</i>	CAL 0 ms
<i>Freq Error</i>	APB
<i>Spd Err Fil TC</i>	CAL 0 ms
<i>Spd Err LP Freq</i>	CAL 100 Hz
<i>Spd Err Bnd Frq</i>	CAL 0 Hz
<i>Freq Error I</i>	APB
<i>Spd Cont Kp</i>	CAL 30 Gain
<i>Spd Cont Ki</i>	CAL 300 ms
<i>Spd Cntrl F0</i>	CAL 0 Hz
<i>Spd Cntrl F1</i>	CAL 0 Hz
<i>Spd Cntrl Kp F0</i>	CAL 100%
<i>Spd Cntrl Kp FW</i>	CAL 100%
<i>Spd Cntrl Kp T0</i>	CAL 100%
<i>Spd Cntrl T0</i>	CAL
<i>SC Trq Chain Sel</i>	CAL 0 = Not Used.

Parameters	Type	Default
<i>Startup Trq Sel</i>	CAL	0 = No Preload
<i>StartupTorq FWD</i>	CAL	0%
<i>StartupTorq REV</i>	CAL	0%
<i>Mtr Cur Lim Scl</i>	ACFG	<i>Mtr Cur Limit</i> = 100%
<i>SC Trq Chain Sel</i>	En	0 – Not Used
<i>Final Trq Ref</i>	APB	
<i>Pos Iq Cur Lim</i>	APB	
<i>Neg Iq Cur Lim</i>	APB	
<i>Motoring Trq Lim</i>	CAL	300%
<i>Gener Trq Lim</i>	CAL	300%
<i>Trq Lim FWD</i>	CAL	300%
<i>Trq Lim REV</i>	CAL	300%
<i>Speed Cntrl Out</i>	APB	

If *Motor Ctrl Mode* =3, then *Final Freq Ref* becomes the drive's closed loop speed reference. See Speed Reference (section 6-1.1) and Speed Step Reference (section 6-1.2) in this manual for the origin of this signal.

The Speed feedback comes from the first encoder board input detected by the drive. This value is represented on the diagram as *Encoder1Frequency* but is not available for viewing. This frequency can be filtered by a low pass filter with a time constant of *Encoder1FilTime*.

The speed loop error signal is can be viewed with the parameter *Freq Error*, which is in Freqscale units.

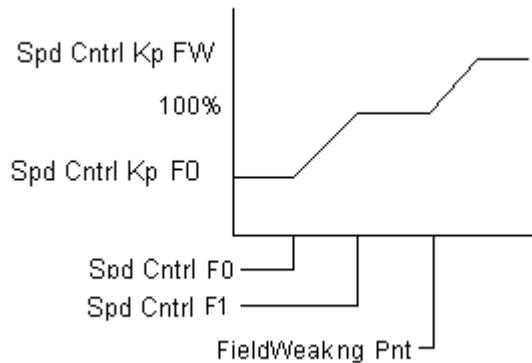
The error signal passes through two filters before going to the PI regulator. The first filter is a low pass filter with a time constant of *Spd Err Fil TC* and a cutoff frequency of *Spd Err LP Freq*. The second is a notch filter centered around *Spd Err Bnd Frq*. The error after filtering can be viewed by *Freq Err 1*.

Freq Err 1 is then passed to the speed loop PI regulator. This regulator is an anti-windup proportional integrator controller with variable gains.

The standard proportional gain is set by *SpdCntrl Kp*. The standard integral component is a ratio of the *Spd Cntrl Kp / Spd Cntrl Ki*.

Two algorithms are used to modify the speed loop gains. Both are defaulted such that 100% of *Spd Cntrl Kp* goes to the controller.

A) P Gain Adjust by Speed



The P gain adjust by speed has two parts associated with it: First, the gain can be modified at lower frequencies, and gain modified above the field weaken range. *Spd Cntrl F0* and *Spd Cntrl F1* define the frequency window which will modify the gain. The block gain will change linearly from the setpoint *Spd Cntrl Kp F0* at *Spd Cntrl F0* to 100% at *Spd Cntrl F1*.

Second, the gain can then be modified in the field weakened range. The percent output will increase linearly from 100% to *Spd Cntrl Kp FW* when the motor speed reaches maximum frequency.

B) P Gain Adjust by Torque

Spd Cntrl Kp T0 is the P gain percent adjust at zero torque. The percentage will go to 100% when torque reaches the *Spd Cntrl T0* point.

The Speed loop regulator has the option for Type II speed control or position control. This is enabled by setting *SC Trq Chain Sel* = 4. When enabled, a second proportional gain equal to *Speed Control Ti* is added to the integrator error. The idea is to keep zero position error by keeping the speed loop integrator equal to zero. When activated, *Speed Control Ti* may need re-tuning.

C) Closed Loop Speed Control Preload

The speed loop can be preloaded on start to provide initial torque. Preload can come from four sources, depending on *Startup Trq Sel*.

- *Startup Trq Sel* = 0 (Default) No preload.
- *Startup Trq Sel* = 1 (Torque Memory). The torque the drive was commanding prior to the last stop command being activated will be used.
- *Startup Trq Sel* = 2 (Torque Reference). The regulator will be preloaded with *Final Trq Ref* value. See section 7-1 for configuration.

- *Startup Trq Sel* = 3 (Starting Torque Setpoint). Depending on the direction commanded on the start, will decide if *Startup Torq FWD* or *Startup Torq REV* will be used to preload the regulator.

D) Closed Loop Speed Regulator Output Limits

The output of the speed control regulator has several limits that can be applied. Some are based on which quadrant the drive is running. The final limit is the least value of all of the following.

Mtr Cur Lim Scl is a percentage of the *Motor Nom Currnt* setpoint that is used as the main current limit. This limits the current in all quadrants. It is defaulted to 100%, which is the lowest default limit. Since *CurrentLimitOption.B0* is factory-set to zero, this current limit is the motor maximum current times the motor's power factor.

The overvoltage limiter controller will also limit the speed loop output if enabled. See section 6-2.6.

If *SC Trq Chain Sel* is set = 1, then *Final Trq Ref* becomes an output limit to the controller.

1. Quadrant #1: Forward Motoring

- *Motoring Trq Lim* which is defaulted to 300%
- *Trq Lim FWD* which is defaulted to 300%
- *MotoringPowerLim* which is factory set at 300%

The final value can be viewed at *Pos Iq Cur Lim*.

2. Quadrant #2: Reverse Generating

- *Gener Trq Lim* which is defaulted to 300%
- *Trq Lim REV* which is defaulted to 300%
- *GeneratorPowerLim* which is factory set at 300%

The final value can be viewed at *Pos Iq Cur Lim*.

3. Quadrant #3: Reverse Motoring

- *Motoring Trq Lim* which is defaulted to 300%
- *Trq Lim REV* which is defaulted to 300%
- *MotoringPowerLim* which is factory set at 300%

The final value can be viewed at *Neg Iq Cur Lim*.

4. Quadrant #4: Forward Generating

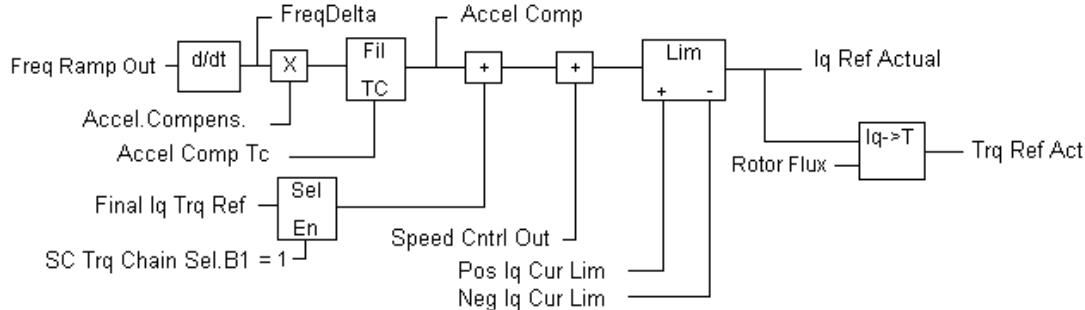
- *Gener Trq Lim* which is defaulted to 300%

- *Trq Lim FWD* which is defaulted to 300%
- *GeneratorPowerLim* which is factory set at 300%

The final value can be viewed at *Neg Iq Cur Lim*.

E) Closed Loop Speed Control Current Reference

The output of the speed regulator can be viewed at *Speed Cntrl Out* in percent motor torque.



Parameters	Type	Default
<i>Freq Ramp Out</i>	APB	
<i>FreqDelta</i>	APB	
<i>Accel.Compens.</i>	CAL	0 s
<i>Accel Comp Tc</i>	CAL	0 ms
<i>Accel Comp</i>	APB	
<i>Final Iq Trq Ref</i>	APB	
<i>SC Trq Chain Sel.B1</i>	CAL	0 Not Used
<i>Speed Cntrl Out</i>	APB	
<i>Pos Iq Cur Lim</i>	APB	
<i>Neg Iq Cur Lim</i>	APB	
<i>Iq Ref Actual</i>	APB	
<i>Rotor Flux</i>	APB	
<i>Trq Ref Act</i>	APB	

The output of the speed loop regulator gets added to the inertia compensation and optional torque adder reference.

The inertial compensation value is determined by taking the derivative of *Freq Ramp Out*, which will yield the acceleration rate in motor hertz per second (*FreqDelta*). *Accel.Compens.* is the gain of the inertia compensation. This value is scaled in the amount of time it takes to accelerate the drive with nominal torque to nominal speed. If *Freq Ramp Out* is coming from an external signal, a low pass filter is required to make the gain stable. *Accel Comp Tc* is the time constant in ms for this filter. The inertia compensation torque reference can be viewed at *Acc Comp*.

Final Iq Trq Ref is the output of the torque reference blocks and can be configured to add to the speed controller output. This would be used as a load anticipation signal.

After the signals are added together, the sum is then checked to be within the torque and current limits as defined based on the quadrant the drive is running. See the section before for details. These limits are *Pos Iq Cur Lim* and *Neg Iq Cur Lim*.

The reference can be viewed as torque using *Trq Ref Act* or as current using *Iq Ref Actual*.

7-3.2 CLOSED LOOP TORQUE CONTROL (*Motor Ctrl Mode* = 4)

Parameters	Type	Default
<i>Final Trq Ref</i>	APB	
<i>Final Iq Trq Ref</i>	APB	
<i>TC Spd Lim Mode</i>	CAL	0 – Maximum limits
<i>TC Pos Freq Lim</i>	APB	
<i>TC Neg Freq Lim</i>	APB	
<i>TC Spd Lim Sel</i>	CAL	0 – No ramping
<i>Freq Ramp Out</i>	APB	
<i>Win Pos Width</i>	CAL	0 Hz
<i>Win Neg Width</i>	CAL	0 Hz

In closed loop torque control, *Final Trq Ref* and *Final Iq Trq Ref* is used as the drive's torque command. See section 7-1 for how to setup the references.

While in closed loop torque control, there are several methods to limit the motor's speed. To use these, it must be noted that the speed loop must be tuned for stable operation. The method is selected by *TC Spd Lim Mode* and *TC Spd Lim Sel* parameters. The output limits of the different methods can be viewed by *TC Pos Freq Lim* and *TC Neg Freq Lim*.

- A) *TC Spd Lim Mode* = 0 = Maximum Limits. The section will be in torque control until motor speed exceeds either *PosFreqMaxActual* or *NegFreqMaxActual*.
- B) *TC Spd Lim Mode* = 1 = Absolute value of speed reference. The section will be in torque control until the motor exceeds the absolute value of *Freq Ramp Out*, which is the ramped speed reference.
- C) *TC Spd Lim Mode* = 2 = Speed reference and Min Frequency. The section will be in torque control until the motor exceeds *Freq Ramp Out* or *NegFreqMaxActual*.
- D) *TC Spd Lim Mode* = 3 = Max frequency and Speed reference. The section will be in torque control until the motor exceeds *PosFreqMaxActual* or *Freq Ramp Out*.
- E) *TC Spd Lim Mode* = 4 = Window. The section will be in torque mode as long as the speed is within a window around *Freq Ramp Out*.

The positive side is *Freq Ramp Out* + *Win Pos Width*. The negative side = *Freq Ramp Out* – *Win Neg Width*.

- F) *TC Spd Lim Mode* = 5 = Speed reference and zero. The section will be in torque control until the motor exceeds *Freq Ramp Out* and zero frequency. *Freq Ramp Out* is either the maximum limit or the minimum limit based on motor direction.
- G) *TC Spd Lim Mode* = 6 = Window select. This mode is not available and should not be selected.

The changes to *TC Pos Freq Lim* and *TC Neg Freq Lim* can be ramped to avoid fast speed changes. These limits are changed when *TC Spd Lim Mode* is changed while running or transferring into torque mode from speed control. The *TC Spd Lim Sel* word determines how the limits are ramped. *TC Spd Lim Sel* is defaulted to 0, which disables limit ramping.

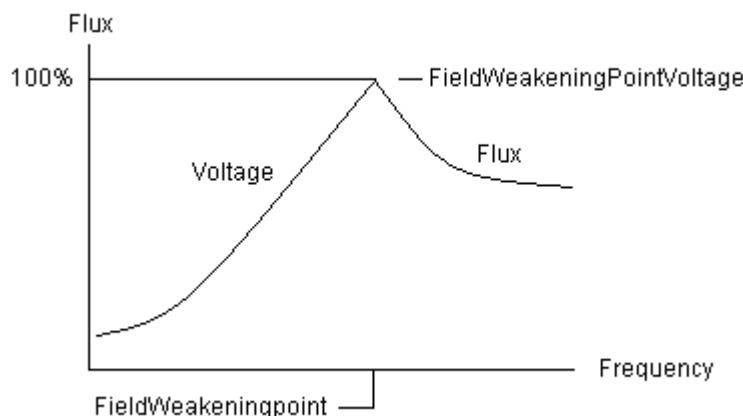
The speed reference ramp times are used when the limit ramping is enabled.

- A) *TC Spd Lim Sel.B0* = 1 = Ramp out of torque control. When enabled, the speed reference will ramp at its current value to *Freq Ramp Out* when the mode is transferred from torque control to speed control.
- B) *TC Spd Lim Sel.B1* = 1 = Smart ramp down. If the speed limit is reduced as a step change, the drive will ramp the limit from the current motor running speed to the new limit.
- C) *TC Spd Lim Sel.B2* = 1 = Ramp Up. If the speed limit is increased as a step change, the drive will ramp the limit up to its new value.
- D) *TC Spd Lim Sel.B3* = 1 = Ramp Down. If the speed limit is decreased as a step change, the drive will ramp the limit down to its new value.
- E) *TC Spd Lim Sel.B4* = 1 = Follow Actual. Used with *TC Spd Lim Mode* = 6, which is not available in this software version.
- F) *TC Spd Lim Sel.B5* = 1 = Force Ramp stop. On removal of run, the limits will step to the actual motor speed, then ramp to zero.
- G) *TC Spd Lim Sel.B6* = 1 = Max speed. Sets *TCPoSFreqLimitActual* to motor speed when transitioning into torque mode from speed mode. If Ramp Up is also enabled, the upper limit will then ramp to its setpoint creating a smooth transition into torque mode.
- H) *TC Spd Lim Sel.B7* = 1 = Speed Limits. Similar to *TC Spd Lim Sel.B6*, except that both limits are set to the motor speed on the transition into torque mode. Then based on the Ramp Up and Ramp Down bits, they will ramp to the setpoints. Provides a smooth transition into torque mode regardless of if the torque is higher or lower than the desired torque when enabled.

7-3.3 FLUX REFERENCE

Parameters	Type	Default
<i>MagnCurrent</i>	CAL	Tune
<i>Motor Nom Currnt</i>	CAL	SetId
<i>Id Ref Actual</i>	APB	
<i>Field Weakengpnt</i>	CAL	60.00 Hz
<i>Voltage at FWP</i>	CAL	100.00 volts
<i>Start DC-Brake Tm</i>	CAL	0 ms
<i>DC-Brake Current</i>	CAL	54.0 amps
<i>Strt 0 Spd Time</i>	CAL	100 ms.
<i>Stop 0 Spd Time</i>	CAL	100 ms.
<i>Stop St Magn I</i>	CAL	50%
<i>Stop St Magn Tim</i>	CAL	30 seconds

The magnetizing current reference for the motor is set by the parameter *Magn Current*. This value is in motor amps and gets converted to percentage by dividing it by *Motor Nom Currnt* x 100. This is the full magnetizing current during normal operation giving full rotor flux. Additional references are added before starting, after stop, and during field weakening operations. *Id Ref Actual* is the final Id current reference.



Id Re Actual is adjusted during the field weakened range of the motor. *Field Weakengpnt* defines the frequency to start reducing the motor flux. The drive also monitors motor voltage and reduces the flux to keep the value below *Voltage at FWP*. Another voltage limit is also used to keep the motor voltage below the DC-Link voltage. The motor voltage is limited by *ModIndexLimit* x measured motor volts. *ModIndexLimit* is factory-set to 100%.

FluxCurrentRampTime defines the rate of change limit for the Flux current except at a start. This value is factory set to 200 ms.

At a run command, the flux has an accelerated ramp time defined by *StartBoostRiseTime* which is factory-set to 10 ms.

The time between when the drive is commanded to run and the ramp is released is defined by *Strt 0 Spd Time*. During that time, *DC-Brake Current* can be added for the length of time

defined by *Start DC-Brake Tm*. After *Start DC-Brake Tm* has timed out, the flux returns to its full value by the *FluxCurrentRampTime*.

After the run command is removed and the section has ramped to zero, the motor flux stays at its nominal value until *Stop 0 Spd Time* has elapsed. The current then ramps to the *Stop St Magn I* percentage for the *Stop St Magn Tim*. This keeps the field at a lower level for a period of time for operations that perform a lot of quick start and stops.

7-3.4 FLUX MODELING

Parameters	Type	Default
<i>Slip Adjust</i>	CAL	100%
<i>Rotor TC</i>	APB	
<i>Flux Curve a</i>	CAL	10%
<i>Flux Curve b</i>	CAL	20%
<i>Flux Curve c</i>	CAL	30%
<i>Flux Curve d</i>	CAL	40%
<i>Flux Curve e</i>	CAL	50%
<i>Flux Curve f</i>	CAL	60%
<i>Flux Curve g</i>	CAL	70%
<i>Flux Curve h</i>	CAL	80%
<i>Flux Curve i</i>	CAL	90%
<i>Flux Curve j</i>	CAL	100%
<i>Flux Curve k</i>	CAL	110%
<i>Flux Curve l</i>	CAL	120%
<i>Flux Curve m</i>	CAL	130%
<i>Flux Curve n</i>	CAL	140%
<i>Flux Curve_o</i>	CAL	150%

The flux model of the drive uses the motor nameplate data, measured currents, and motor speeds and outputs flux angle, rotor flux frequency, and flux amplitude. The flux angle is used to perform field-oriented control that separates the magnetizing current and torque producing current. The rotor flux frequency is used to control the field weakening operations. The estimated flux versus motor current is adjusted by the programmable flux curve.

The rotor time constant is needed to perform the flux model. This time constant is estimated from the nominal motor speed, current, frequency, and cos (magnetizing current). This calculated value is then adjusted by *Slip Adjust*. Slip adjust is for manual tuning of the motor slip. A value less than 100% decreases the slip which, in turn, increases the rotor time constant. The final rotor time constant can be viewed at *Rotor TC*.

Motor magnetizing current is related to the estimated motor flux by a preset saturation curve. This curve has 15 points (*Flux Curve a* to *Flux Curve o*). Each point represents the flux at each step of the magnetizing current range, from 0 to 150% at 10% steps. The default is a linear line.

7-3.5 CURRENT CONTROL LOOP

Parameters	Type	Default
<i>CurrentControlKp</i>	CAL	4000 Gain
<i>Curr Cntrl_Ti</i>	CAL	15 ms

In closed loop mode, a faster current control loop is selected. The motor phase currents are measured and the corresponding vector reference is calculated. The actual current regulation is performed with two PI controllers. The IdReference controller regulates magnetizing current. The IqReference controller regulates motor torque. *CurrentControlKp* and *Curr Cntrl Ti* modify the gain of the regulators.

The output of the current regulators determines motor voltage vector.

Other factors that determine the final current loop output are encoder angle calculation from the encoder, Motor CEMF, and inverter bridge dead time.

The current loop regulator runs at 140 microsecond time frame.

SECTION VIII

MISCELLANEOUS CONTROL BLOCKS

This section deals with all the control blocks and firmware parameters that do not fit into any other category.

8-1 OVERSPEED AND AT ZERO SPEED

Spd Fdbk is defaulted to *Motor Speed* but can be reconfigured to an encoder input or analog input. This needs to be scaled into motor hertz with two decimal places.

Spd Fdbk is passed through a low pass filter with a time constant of *Spd Cmp Fil TC* before it goes to the speed comparator.

The speed comparator setpoints are a percentage of the value *Ovr Spd Inp*, which is defaulted to parameter *Freq Max*. *Freq Max* is scaled in motor hertz with two decimal places.

The zero speed setpoint is defined by *Zero Detect* which is defaulted to 2.00%. *At Zero Spd* bit will go high when the percentage of *Spd Fdbk* falls below this value minus the hysteresis value *Spd Hyst*.

The over speed setpoint is defined by *Ovr Spd Stp*, which is defaulted to 110.00%. *Over Speed* bit will go high when the percentage of *Spd Fdbk* goes above this value plus the hysteresis value *Spd Hyst*.

Spd Decimal is defaulted to 2. Modify this if the compare block setpoint decimal place needs to be moved due to integer limitations.

8-2 LIMIT CHECK

CheckParam gets executed only when one of the parameters shown is changed. The reason is to verify that crucial data is within their defined limits, which may also be changed by the user.

8-3 KEYPAD FUNCTIONS

ButtonStatusWord returns the status of the buttons from the keypad. Most are directed straight to *ButtonControlWord* that performs the proper function. Two buttons are not used in the *ButtonControlWord*.

Button LocRem represents the lower left hand button on the keypad, which the drive uses for transferring between local and remote mode. This is a different function than the firmware default for this button.

Button Stop is also redirected. The reason is to disable it when not in the local mode and to create the stop fault when held for two seconds.

Logic for the transfer to local mode is also on this block diagram. The keypad message logic, to display the mode briefly, is on the second page.

Keypad Ref diagram has the keypad speed and torque reference control blocks. These blocks set up the editing speed and switching speeds for the two entries.

8-4 SLOW MONITORING

For Ethernet communications and keypad viewing, several parameters are moved to special locations. These do not have to be done faster than 100 ms, so they are put into this control diagram.

8-5 LOGIC

Most of the control blocks on this diagram have been discussed in the logic and control place chapters.

Mtr Ctlr Sw toggles between two motor control modes, *Motor Ctrl Mode* and *Motor Ctrl Mode2*. This can be used to run open loop on a encoder failure or to switch between speed and torque mode.

The MCStatus word comes from the firmware, which indicates the drives state. These states are used all through the application program and also put back into the *Status Word* value. *Status Word* is used for viewing and for several fieldbus message structures.

8-6 PARAMETER SETS

The Keypad can store two sets of parameter values. These can be downloaded or saved via the keypad menu. The drive can not be running during this transition. The logic in control block diagrams Param_Set_1 and Param_Set_2 prevents the transitions or starting a run before the transition is complete.

Warning: The drive does not know which parameter set is loaded.

WARNING: This function does not work in this application due to size limitation.

SECTION IX

COMMUNICATIONS

The drive can communicate through a wide variety of communication boards that can be inserted into slots D and E. Examples of some of the protocols include:

- Ethernet – Modbus TCP
- Devicenet
- System Bus – Master Slave
- Profibus DP
- Modbus serial link

Each communication board has its own manual that details the protocol and connections. This section will discuss the generic software control blocks that are used for each protocol.

There are usually two methods of reading and writing data to the drive. The protocols either have preset messages such as defined in the EDS sheets for Devicenet or they can read or write to a particular address. The parameter ID number represents its address in most of the message structures. The drive appendices include the ID number with the parameter name. Not all parameters have an ID number.

ID numbers 0 – 1000 are designated for firmware variables.

ID numbers 1001 – 2000 are designated for the application variables.

9-1 READ AND WRITE STANDARD ID NUMBERS

The following parameters are set aside for write messages to the drive. The addresses are grouped together so one write message can get them all. The drive can then be configured to use these locations for proper function.

FB Fix Cntrl Wrd is used to read and write bits to the drive. The low byte is for writing 8 bits to the drive. The upper byte is for reading 8 bits from the drive.

Write bits to the drive:

ID	Parameter Name	Bit Location
1621	<i>FB Fix Cntrl Wrd</i>	0-7
1040	<i>FB Bit00</i>	0
1041	<i>FB Bit01</i>	1
1042	<i>FB Bit02</i>	2
1043	<i>FB Bit03</i>	3
1044	<i>FB Bit04</i>	4
1045	<i>FB Bit05</i>	5
1046	<i>FB Bit06</i>	6
1047	<i>FB Bit07</i>	7

Write integer to the drive:

ID	Parameter Name
1611	<i>A_FB_AIN1</i>
1612	<i>A_FB_AIN2</i>
1613	<i>A_FB_AIN3</i>
1614	<i>A_FB_AIN4</i>
1615	<i>A_FB_AIN5</i>
1616	<i>A_FB_AIN6</i>
1617	<i>A_FB_AIN7</i>
1618	<i>A_FB_AIN8</i>
1619	<i>A_FB_AIN9</i>
1620	<i>A_FB_AIN10</i>

The following parameters are set aside for read messages from the drive. The addresses are grouped together so one read message can get them all. Any parameter with an ID number can be configured to these locations.

FB Fix Cntrl Wrd is used to read and write bits to the drive. The low byte is for writing 8 bits to the drive. The upper byte is for reading 8 bits from the drive.

Read bits from the drive:

ID	Parameter Name	Bit Location
1621	<i>FB Fix Cntrl Wrd</i>	8 – 15

Configuration Parameter	Bit Set
<i>FB_Bit08</i>	08
<i>FB_Bit09</i>	09
<i>FB_Bit10</i>	10
<i>FB_Bit11</i>	11
<i>FB_Bit12</i>	12
<i>FB_Bit13</i>	13
<i>FB_Bit14</i>	14
<i>FB_Bit15</i>	15

Read integer from the drive:

ID	Parameter Name	Configuration Parameter
1622	<i>FB Data Out 1</i>	<i>FB AOUT1</i>
1623	<i>FB Data Out 2</i>	<i>FB AOUT2</i>
1624	<i>FB Data Out 3</i>	<i>FB AOUT3</i>
1625	<i>FB Data Out 4</i>	<i>FB AOUT4</i>
1626	<i>FB Data Out 5</i>	<i>FB AOUT5</i>
1627	<i>FB Data Out 6</i>	<i>FB AOUT6</i>
1628	<i>FB Data Out 7</i>	<i>FB AOUT7</i>
1629	<i>FB Data Out 8</i>	<i>FB AOUT8</i>

9-2 SPECIAL FIELD BUS VARIABLES

For certain predefined field bus messages, certain parameters are used in the firmware.

FBActSpd_ID is used for several predefined messages for Devicenet and Profibus DP. This parameter is set to *Motor Speed*.

9-3 FAULTS

- A) Slot Fault – *FB Fault Act* is set when either SlotDBoardStatus or SlotEBoardStatus indicates a problem. This bit can go to a fault block that can be configured for a drive warning or a fault.
- B) Watchdog Bit - Logic is built into the drive to allow for an external device to toggle a bit to create a communication watchdog. The system bus has separate watchdog timer logic.

Configure *Watchdog In* to the field bus input bit that the PLC is going to toggle.
Configure the fieldbus output bit to *Watchdog Out*.

The external device should read bit *Watchdog Out* and return the inverse of the bit that gets configured to *Watchdog In*.

When *Com WD* is enabled, Com WD Trip will go high after the bit stops toggling for *WD Com Dly* amount of time in ms.

Set *WD Flt Response* for the action the drive will take on a communication failure.

9-4 SYSTEM BUS

The Honeywell software supports the Master/Slave configuration of the system bus.

Each node on the network must have an ID from 0 to 63. *SBId* sets the section ID. Also set *SBNExtId* parameter for the next section's ID.

The parameter *SB Mode* determines if a drive is the master or a slave section. Only one master can be set up on the fiber network. The master sends out five integers which all slaves connected read and can act upon.

A) Master Section Output Packet

Integer	Parameter name	Description
1	<i>SB Out Cnt1 Word</i>	Control Bits
2	<i>Freq out</i>	Ramped speed reference
3	<i>Trq Ref Act</i>	Torque reference
4	<i>SB Out Int1</i>	Configurable variable
5	<i>SB Out Int2</i>	Configurable variable

B) Slave Section Input Packet

Integer	Parameter name	Description
1	<i>SB In Cnt1 Word</i>	Control Bits
2	<i>SB In Freq Ref</i>	Optional speed reference
3	<i>SB In Trq Ref</i>	Optional torque reference
4	<i>SB In Int1</i>	Unused variable
5	<i>SB In Int2</i>	Unused variable

C) Faults and Watchdog timer bit

The Master section sends out a watch dog bit called *SB WD Pulse* which is part of *SB Out Cnt1 Word*. This bit toggles every 100 ms.

The Slave sections read the master watchdog bit from *SB In Cnt1 Word*, which can be viewed at *MD_Watchdog*. If the bit does not toggle in 1 second, then *MD WD OK* will go low, which can be used to stop the section or fault the drive out.

The *MD_Watchdog* and *SB Comm Lost* bits are used to create *SB Comm Flt* after failure for *SB Comm Flt Tim* ms. When *SB Comm Flt* goes low, *SB Comm Flt Resp* will set a warning or fault the drive out.

SECTION X

FAULT CODES

Drive faults can be derived from either hard coded firmware faults or from the application Fault block.

The firmware faults have no options associated with them. They will fault the drive with a coast stop and record the event in the FIFOs.

The application Fault block allows different options such as drive action, Stop type, recording, and ability to reset the fault. See the Fault block in the function block library for in depth description of the Fault block. Fault block triggers can come from either the firmware or from the application program.

10-1 FAULT ACTIONS

Fault action is decided by the FMode input of the Fault block. There are three options available.

- 0 = Disabled
- 1 = Warning – No drive action but the information is stored in the Fault FIFO
- 2 = Fault – Drive performs a stop.

10-2 STOP ACTION

The type of drive stop command is decided with the Stop input of the Fault block. There are three options available.

- 0 = Coast stop – Highest priority if multiple faults occur
- 1 = Normal stop mode
- 2 = Ramp stop.

10-3 FAULT RESET

A fault can be reset by several methods. The parameter *FaultReset* will reset all active faults.

Each fault block also has an individual fault reset input, called Reset, that can be used.

The drive can be set up to disable reset a fault if it occurs over and over again in a period of time. The fault block input Trials determines the amount of restarts allowed. The input Svtme is the

amount of time in which the drive senses the motor restart before determining to lock out the drive. Svtimer input is set in 10 ms increments.

10-4 RECORDING

There are two fault FIFOs: active fault FIFO which records 10 faults, and history table FIFO that records 30 faults/warnings.

The Hist input of the Fault block determines how it is recorded into the FIFO. There are 4 options available:

- 0 = Fault always will be stored.
- 1 = If a fault occurs several times, each event will be logged unless they occur within the time frame defined by the Wait input. The wait input is set in 10 ms increments.
- 2 = Fault will be recorded if different than the previous fault recorded.
- 3 = Not recorded.

10-5 DRIVE FAULTS

Fault Code	Fault Text	Possible Cause	Solution
1	Overcurrent	Over 400% nominal current detected. - Sudden increase in load. - Needs tuning - Shorted motor / cables - Unsuitable or bad motor	- Check section for binding or excessive loads. - Check motor tuning - Check motor leads and motor shorts - Replace drive - Replace motor
2	Overtension	DC bus has exceeded its upper limit. - Braking resistor not working properly - Deceleration too rapidly - Unstable or utility voltage spikes.	- Check brake resistor and chopper unit - Check deceleration rates - Verify proper incoming voltage
3	Earth Fault	Sum of motor current do not equal zero. - Motor cable or motor short to ground. - Bad current sensing	- Check motor cables for shorts to ground - Check motor for short to ground. - Replace drive inverter.
5	Charging Switch	The charging switch was open when a run command was given. - Faulty operation - Component Failure	- Reset the fault and try to restart. - Replace charging unit
6	Emergency Stop	Input board not found or not seated properly.	- Reseat I/O boards. - Replace I/O boards.
7	Saturation	Very high overload - Cable / motor short - Defective component	- Cannot be reset must cycle power. - If occurs with Fault #1 then check motor and motor cables.
8	System Fault	Additional information will be stored in FIFOs. - Component Failure	- Replace processor board.
9	Undervoltage	DC bus has dropped below its lower limit. - Supply voltage too low - Converter fault - Excessive loading	- Check incoming voltage level - Check for Convert fault - Check motor loading - Replace converter
10	Input Phase	Input line phase missing. - Bad external fuse - Bad voltage sensing	- Check each input phase - Replace Converter
11	Output Phase	No current detected in one of the output motor leads. - Bad motor lead or motor. - Bad current sensor	- Check motor cables for an open phase. - Check motor for open winding - Replace Drive inverter
12	Brk Chopper Supr	Brake Chopper operation failure. - Bad resistor - Chopper failure	- Check and replace braking resistor - Replace brake chopper components
13	Undertemp	Heat sink temperature under -10°C. - Ambient temperature too low. - Thermister failure	- Heat drive enclosure - Replace drive power components.
14	Overtemp	Heatsink over 90°C. - Ambient temperature too high. - Drive cooling not adequate - Bad temperature sensor	- Lower drive enclosure ambient temperature. - verify fan operation

Fault Code	Fault Text	Possible Cause	Solution
15	Motor Stall	Motor stall protection tripped. - Motor is binding - Not enough motor torque available. - Stall protection set too tight.	- Check to make sure motor is not binding. - Retune to get proper magnetizing current. - Check stall protection for proper setup. - Verify motor is getting current. - Replace motor - Replace inverter
16	Mot.Overtemp	Motor over heating detected by temperature model.	- Check for excessive motor loading - Check motor cooling - Check motor current to verify proper tuning.
17	MotorUnderld	Motor underload protection trip.	- Check process for load. - Check shafts and couplings - Check Under load parameters for proper setting.
22/23	Chksum Flt	EEProm has checksum fault.	- Verify parameters are set properly - Replace microprocessor board.
24	Changed data warning	Changes may have occurred during power interruption	- Check parameters against saved file - re-download parameters - Replace microprocessor board.
25	Micro Watchdog	Microprocessor timed out.	- Redownload the system and application software. - Replace microprocessor board.
29	Thermistor	Thermistor out of range.	- Replace thermistor
31	IGBT Temp	IGBT temperature exceeded its limit.	- Check ambient temperature - Check drive fan - Check for excessive build up of material on heat sink - Observe operation for high drive loading.
37	Device Change	Option board changed.	- Enter correct parameters for new option board. - Check I/O board seating - Replace option board.
38	Device Added	Option board or different drive size changed.	- Enter correct parameters for new hardware. - Check I/O board seating. - Check microprocessor board connection. - Replace drive
39	Device Removed	Option board or drive removed from microprocessor.	- Check I/O board seating - Check microprocessor board connection. Replace drive.
40	Device Unknown	Unknown option board added to the drive.	- Check I/O board seating - Replace I/O board
41	IGBT Temp	Same as fault 31	Same as fault 31
50	Anlg In Flt	Analog input is below its low limit.	- Check signal source - Check connections - Verify correct option board and jumpers. - Replace option board
51	Ext Fault	User configured PB_Ext_Fault_Inp is high.	- Determine external fault reason - Verify proper external fault setup
52	Keypad Comm	Connection between keypad and drive is broken.	- Verify keypad cable connections or proper seating of keypad - Replace keypad - Replace microprocessor board.
53	FBCommunicat	Field bus fault fro D_FB_Fault bit. Bit is set when board failure is noted	- Check fieldbus board seating. - Replace fieldbus board

Fault Code	Fault Text	Possible Cause	Solution
54	Slot Communic	Communication to a smart I/O option board is lost	<ul style="list-style-type: none"> - Check board seating in slots C-E. - Replace option boards - Replace microprocessor board
56	PT100 Temp	PT100 exceeds either the temperature warning or fault limit	<ul style="list-style-type: none"> - Check device for over heating. - Check PT100 device - Check for proper temperature probe connections. - Check for proper limits - Replace PT100 option board
57	Identification	Identification is completed	<ul style="list-style-type: none"> - Verify Identification parameter is set to a value other than 0.
60	Com Watchdog	Communication watchdog bit is not toggling	<ul style="list-style-type: none"> - Verify communications is working. - Verify watchdog bit is being toggled by host device.
61	User Fault 1	PB_User_Flt_1 is configured to a value that is High.	<ul style="list-style-type: none"> - Check configuration for function.
62	User Fault 2	PB_User_Flt_2 is configured to a value that is High.	<ul style="list-style-type: none"> - Check configuration for function.
63	User Fault 3	PB_User_Flt_3 is configured to a value that is High.	<ul style="list-style-type: none"> - Check configuration for function.
64	User Fault 4	PB_User_Flt_4 is configured to a value that is High.	<ul style="list-style-type: none"> - Check configuration for function.
65	Overspeed Flt	Drive tripped out on overspeed.	<ul style="list-style-type: none"> - Check for sudden loss of load. - verify proper speed feedback device and scaling. - Check overspeed setup
66	SB Comm Fault	System bus watchdog trip or board failure.	<ul style="list-style-type: none"> - Verify all drives on the system bus is up and running. - Verify system bus cabling. - Replace system bus cabling - Replace system bus board.
70	Loc Stop Flt	Keypad stop button pressed for two seconds.	<ul style="list-style-type: none"> - Replace keypad.

10-6 DRIVE FAULT OPTIONS

Fault Code	Fault Text	Fault Mode	Stop Mode
1	Overcurrent	Fault	Coast Stop
2	Overtension	Fault	Coast Stop
3	Earth Fault	<i>Earth Fault</i>	<i>Earth Fault</i>
5	Charging Switch	Fault	Coast Stop
6	Emergency Stop	Fault	Coast Stop
7	Saturation	Fault	Coast Stop
8	System Fault	Fault	Coast Stop
9	Undervoltage	Fault	Normal Stop
10	Input Phase	<i>Input Ph. Superv</i>	<i>Input Ph. Superv</i>
11	Output Phase	<i>Phase Supv F</i>	<i>Phase Supv F</i>
12	Brk Chopper Supr	Fault	Coast Stop
13	Undertemp	Fault	Coast Stop
14	Overtemp	Fault	Coast Stop
15	Motor Stall	<i>Stall Protection</i>	<i>Stall Protection</i>
16	Mot.Overtemp	<i>Therm Prot F</i>	<i>Therm Prot F</i>
17	MotorUnderld	<i>ULoad Protect F</i>	<i>ULoad Protect F</i>
22/23	Chksum Flt	Fault	Coast Stop
24	Changed data warning	Fault	Coast Stop
25	Micro Watchdog	Fault	Coast Stop
29	Thermistor	<i>ThermistorF.Resp</i>	<i>ThermistorF.Resp</i>
31	IGBT Temp	Fault	Coast Stop
37	Device Change	Fault	Coast Stop
38	Device Added	Fault	Coast Stop
39	Device Removed	Fault	Coast Stop
40	Device Unknown	Fault	Coast Stop
41	IGBT Temp	Fault	Coast Stop
50	Anlg In Flt	Fault	Coast Stop
51	Ext Fault	<i>Ext Fault Resp</i>	<i>Ext Fault Resp</i>
52	Keypad Comm	Fault	Normal Stop
53	FBCommunicat	<i>FBComm.FaultResp</i>	<i>FBComm.FaultResp</i>
54	Slot Communic	<i>SPI Flt Resp</i>	<i>SPI Flt Resp</i>
56	PT100 Temp	<i>PT100 FaultRespo</i>	<i>PT100 FaultRespo</i>
57	Identification	Warning	Coast Stop
60	Com Watchdog	<i>WD Flt Response</i>	<i>WD Flt Response</i>
61	User Fault 1	<i>User Flt1 Resp</i>	<i>User Flt1 Resp</i>
62	User Fault 2	<i>User Flt2 Resp</i>	<i>User Flt2 Resp</i>
63	User Fault 3	<i>User Flt3 Resp</i>	<i>User Flt3 Resp</i>
64	User Fault 4	<i>User Flt4 Resp</i>	<i>User Flt4 Resp</i>
65	Overspeed Flt	<i>Overspeed Resp</i>	<i>Overspeed Resp</i>
66	SB Comm Fault	<i>SB Comm Flt Resp</i>	<i>SB Comm Flt Resp</i>
70	Loc Stop Flt	Fault	Coast Stop

SECTION XI

QUICK STARTUP

The drive has two functions to help the user get started. The first is the startup wizard, which will assist in setup of the most basic motor parameters. The second is the identification routine, which will find the motor characteristics.

11-1 STARTUP WIZARD

The startup wizard can be accessed via the keypad under System Menu/Security. Setting this to **Yes** will enable the wizard on the next powerup of the drive.

The following parameters are presented for entry within the startup wizard:

Parameter	Default	Description
Language	English	Changes certain parameter names
Application	Spd/Ten	Application program
<i>Min Frequency</i>	0 Hz	Set to the minimum running motor frequency
<i>Freq Max</i>	60 Hz	Set to maximum motor frequency
<i>Accel Time 1</i>	10.0 s	Time to accelerate to nominal motor speed
<i>Decel Time 1</i>	10.0 s	Time to stop from, nominal motor speed
<i>Motor Nom Voltg</i>	460 V	Motor nominal voltage
<i>Motor Nom Freq</i>	60 Hz	Motor base running frequency
<i>Motor Nom Speed</i>	1750 rpm	Motor base running speed in RPM
<i>Motor Nom Currnt</i>	Varies by drive size	Motor 100% running current
<i>Motor Cos Phi</i>	0.85	Power factor value of drive

After completing the entry, the option is given to repeat the wizard in case a variable was missed. After accepting the wizard, it will be disabled.

11-2 IDENTIFICATION

The Motor Identification program is used to scale motor parameters that are not listed on the nameplate. The parameters listed in the startup wizard must be entered.

The Identification parameter (*Self Tune Motor*) is located in the parameters\motor menu of the drive. Three options are available.

- 0 = No Action
- 1 = ID No Run
- 2 = ID With Run

After selecting the action desired, the user has 20 seconds to activate a drive Run before the parameter switches back to 0 = No Action.

If possible, perform ID With Run with no load connected to the motor.

At any time during the Identification process, the stop button can be pressed to abort.

After identification is complete, the drive will turn off, and after 20 seconds, the *Self Tune Motor* parameter will go back to 0 = No Action.

The motor control mode determines what parameters are adjusted.

- *Self Tune Motor* = ID No Run
 - a) For open loop motor control:
 - U/f curve, stator resistance, and torque boost are found
 - b) For close loop motor control:
 - Magnetizing current
 - Rotor time constant
- *Self Tune Motor* = ID With Run
 - a) For open loop motor control
 - U/f curve, stator resistance, and torque boost are found
 - b) For close loop motor control
 - Magnetizing current
 - Rotor time constant
 - 15 point flux linearization curve

During the self tuning of the motor, a couple of parameters can be monitored with ADDaptACC to see the progress of the tuning. These are firmware parameters not found in the parameter list.

- Identification parameter:
B0 = Programming U/f curve
B1 = Tr/Lm identification at a stand still
B2 = Magnetizing current testing
B3 = Saturation curve testing
B4 = Encoder zero position test
B5 = Magnetizing current Default
B14 = Phase Check
B15 = Synch check
- IdentMagnetizingCurrent = Value found from self tune
- IdentMakeFluxTime = Time constant found during self tune
- IdentMakeFluxVoltage = Flux voltage found during self tune

- IdentOptions:
B0 = Enable U/f curve tuning
B1 = Enable close loop tuning
B2 = Enable encoder direction check
B3 = Automatic magnetizing current check with motor change
- IdentRSVoltageDrop = Voltage drop found during self tune

APPENDIX A

CONTROL BLOCK DIAGRAMS

Accel500 Honeywell Application Software control block diagrams are available upon request.
Please contact the Avtron Customer Help Desk for assistance.

Phone: (216) 642-1230 ext. 1369

FAX: (216) 642-6037

APPENDIX B

PARAMETER LIST

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1	Monitor					Menu Name
1.1	Multimonitor					Menu Name
1.2	Appl Digital					Menu Name
1.2.1	Drive OK	1088	0	1		Drive is not faulted
1.2.2	Cntrl Inhib	1099	0	1		Inverse of MC_Run. Used to reset loops when drive is off.
1.2.3	MC Run	1098	0	1		Drive is running. Bit from status word from firmware.
1.2.4	MC Ready	1115	0	1		Drive is ready to run status from firmware
1.2.5	MC Fault	1116	0	1		Drive is in a fault condition.
1.2.6	MC Reverse	1086	0	1		Status from firmware on direction
1.2.7	MC AtSpeed	1118	0	1		Drive is done ramping to its speed setpoint. From firmware.
1.2.8	MC Warning	1117	0	1		Drive is in a warning state. Bit from status word from firmware
1.2.9	Run OK	1091	0	1		All the interlocks are met to enable a run command.
1.2.10	Start Input	1089	0	1		Run jog or thread is requested.
1.2.11	Reverse	1128	0	1		Reverse commanded by remote, keypad or computer.
1.2.12	Run Enable	1096	0	1		Run is commanded and it is enabled.
1.2.13	RJT Enable	1097	0	1		Run jog or thread commanded and enabled.
1.2.14	Thread Enable	1095	0	1		Thread mode is commanded and enabled.
1.2.15	Jog enable	1094	0	1		Jog enabled
1.2.16	Jog F En	1093	0	1		Jog forward has been commanded and is enabled.
1.2.17	Jog R En	1092	0	1		Jog reverse commanded and enabled
1.2.18	Jog FR Input	1087	0	1		Either jog forward or jog reverse is commanded.
1.2.19	RunRequest	1090	0	1		Run request: 0=no, 1=yes
1.2.20	PC Control	1121	0	1		Control has been transferred to the PC.
1.2.21	SC Start	1122	0	1		PC control run commanded
1.2.22	SC Reverse	1123	0	1		PC reverse command
1.2.23	Neg Spd Ref	1129	0	1		Speed reference is negative
1.2.24	Local Stop Flt	1112	0	1		Local stop button pressed for three seconds which will fault the drive on a stop fault.
1.2.25	Over Temp Warn	1114	0	1		Unit above 85 C. 90 C will trip unit
1.2.26	Therm Fault Act	1119	0	1		Thermister fault from inverter.
1.2.27	Therm Warn Act	1120	0	1		Inverter thermister warning
1.2.28	SC Comm Fault	0	0	1		PC communication fault
1.2.29	Panel Fault ACT	0	0	1		Panel fault detected
1.2.30	C1 Overflow	1124	0	1		First encoder counter is in overflow condition
1.2.31	C2 Overflow	1126	0	1		Second encoder counter is in overflow condition
1.2.32	UV Fault	0	0	1		Under voltage fault detected.
1.2.33	OC Fault	0	0	1		Over current fault detected.
1.2.34	OV Fault	0	0	1		Over voltage fault detected.
1.2.35	IGBT Temp Fault	0	0	1		IGBT temperature fault has been detected.
1.2.36	Ext Fault	0	0	1		External fault detected. See Ext Fault Response for action.
1.2.37	Ext Warn	0	0	1		External warning detected. See Ext Fault Response for action.
1.2.38	Mtr OT Fault	0	0	1		Motor Over temperature fault
1.2.39	Mtr OT Warn	0	0	1		Motor Over temperature warning
1.2.40	Ident Warn	0	0	1		Warning has occurred during identification
1.2.41	FB Fault Act	0	0	1		Field Bus fault active
1.2.42	SPI Fault Act	0	0	1		SPI bus fault active.
1.2.43	Sp Cmp1 Eq	1152	0	1		First spare comparitor input and threshold difference is within the hysteresis value.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.2.44	Sp Cmp1 Out	1153	0	1		First spare comparitor input is greater than the threshold plus/minus the hysteresis value.
1.2.45	Sp Dly1 Out	1156	0	1		First spare delay block output bit.
1.2.46	Sp Latch1 Out	1158	0	1		First spare latch block output.
1.2.47	Sp Inv1 Out	1161	0	1		First spare bit invert output.
1.2.48	Sp Inv2 Out	1162	0	1		Second spare bit invert output.
1.2.49	Sp And1 Out	1164	0	1		First spare and output.
1.2.50	Sp And2 Out	1165	0	1		Second spare and output.
1.2.51	Sp Or1 Out	1167	0	1		First spare or output.
1.2.52	Sp Or2 Out	1168	0	1		Second spare or output.
1.2.53	At Zero Spd	1127	0	1		Speed feedback is near zero speed.
1.2.54	WD Trip	0	0	1		Communications watch dog timer is in fault condition.
1.2.55	ESS Dn	1104	0	1		ESS mode complete
1.2.56	ESS En	1105	0	1		ESS mode enabled
1.2.57	ESS Lit	0	0	1		ESS engine has started and running constant speed.
1.2.58	ESS Not Lit	1107	0	1		ESS mode still in acceleration mode.
1.2.59	Goto ESS	1108	0	1		Done with Spd vs time and ready to start ESS.
1.2.60	Goto Spd	1109	0	1		Done with ESS and ready to go to spd vs time
1.2.61	CM0	1100	0	1		Speed vs time mode selected.
1.2.62	CM1	1101	0	1		ESS mode selected.
1.2.63	CM2	1102	0	1		Speed vs time mode selected then ESS.
1.2.64	CM3	1103	0	1		ESS selected then Speed vs time mode
1.2.65	In Ess	1061	0	1		In ESS mode
1.2.66	In Rem Spd	1062	0	1		In remote speed mode
1.2.67	In Rem Trq	1063	0	1		In remote torque mode
1.2.68	S1	1064	0	1		ESS mode speed reference enabled
1.2.69	S2	1065	0	1		Speed vs time speed reference enable
1.2.70	S3	1066	0	1		Remote speed reference enabled
1.2.71	S4	1067	0	1		Maint speed reference enabled.
1.2.72	Spd Tim Dn	1068	0	1		Speed vs time is enabled and timed out
1.2.73	Spd Tim En	1069	0	1		Speed vs time mode enabled.
1.2.74	Spd Timing	1070	0	1		Speed vs time table in process.
1.2.75	T1	1071	0	1		Local torque reference enabled.
1.2.76		1072	0	1		Remote torque reference enabled.
1.2.77		1073	0	1		Maintenance torque reference enabled.
1.2.78		1074	0	1		Full regen torque setpoint enabled.
1.2.79	TT	1075	0	1		Either in T1, T2 or T3 torque reference enabled.
1.3	Appl Analog					Menu Name
1.3.1	Motor Speed	2	-100.00	100.00		[R] Motor speed in rpm
1.3.2	Motor Current	3	0.00	MotorCurrent Max		Motor current. = MotorCurrent/current scale = Amps
1.3.3	Mtr Cur Unfil	1113	0.00	MotorCurrent Max		Filtered motor current. motorcurrent/currentscale = amps
1.3.4	Motor Torque	4	-300.0	300.0		[R] Motor torque as % value, +1000 equals +100.0 %//pos=clockwise, neg=counterclockwise
1.3.5	Motor Power	5	-300.0	300.0		Motor shaft power filtered. 1000 = 100%
1.3.6	Motor Voltage	6	0.0	1000.0		[R] Motor voltage in 0.1 Volts, e.g. 100 equals to 10.0V
1.3.7	DCVoltage	7	0	1000		DC voltage in Volts with 32 ms time constant.
1.3.8	DC_link V Unfil	44	0	1000		Unfiltered DC voltage in Volts.
1.3.9	Rotor Flux	1541	-300.0	300.0		Estimated rotor flux, 1000 = nominal
1.3.10	Final Trq Ref	1542	-300.0	300.0		Final, limited torque reference for speed/torque controller
1.3.11	Pos Iq Cur Lim	1543	0.0	300.0		Final upper IqCurrentLimit 1000 = motor nominal current (unsigned)
1.3.12	Neg Iq Cur Lim	1544	0.0	300.0		Final lower IqCurrentLimit 1000 = motor nominal current (unsigned)
1.3.13	Iq Ref Actual	1545	-100.0	100.0		Final IqReference, 1000 = motor nominal current
1.3.14	Id Ref Actual	1546	0.0	300.0		Final IdReference 1000 = motor nominal current
1.3.15	Rotor TC	1547	0	32000		Used RotorTimeConstant in ms
1.3.16	MtrCalcTemp	9	0.0	1000.0		Calculated motor temperature. 1000 = 100%
1.3.17	Unit Temperature	8	-50	300		Drive temperature in degrees C

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.3.18	Control Place	1505	1	3		Location of reference. 0 = remote, 1 = keypad, 2 = computer
1.3.19	Cntrl Mode	1506	0	4		0 = Off, 1 = Run, 2 = Thread, 3 = Jog F, 4 = Jog R
1.3.20	SC Control Word	0	0	32000		SCI Control word bits B0-B15//B0 - RunRequest, 0=stop, 1=run//B1 - DirRequest, 0=clockwise, 1=counter-clockwise//B2 - FaultReset, 1=reset//B3 - GenSwitch1, application dependent //B4 - DO1, control of digital input 1, 1=active//B5 - DO2, control of d
1.3.21	Mtr Torq Unfil	1125	-300.0	300.0		Unfiltered motor torque. 1000 = 100%, pos = motor, Neg = regen
1.3.22	Speed Cntrl Out	1548	-327.67	327.67		TorqueReference from Speed controller output
1.3.23	RJT Ref	1504	-327.67	327.67		RJT thread reference
1.3.24	Freq Reference	1507	0.0	3200.0		Speed reference after checking for skip frequency
1.3.25	ABS RJT Ref	1570	0.00	327.67		Absolute value of speed reference
1.3.26	FreqReference	25	-320.00	320.00		[W] Frequency reference to motor control, f[Hz] = FreqRef/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz
1.3.27	Freq Ref 3	0	-3276.7	3276.7		Frequency reference after interpolator and limiter (next FreqRefActual)
1.3.28	Freq Ref Act	1571	-3276.7	3276.7		Frequency reference in use selected with FreqRefSelect,//and adjusted with SpeedShare,FreqRefAdd,FreqRefInterpolatorTC,FreqRefFilterTC (in FreqScale)
1.3.29	Final Freq Ref	1540	-3200.0	3200.0		Final shaft frequency reference for speed controller in FreqScale
1.3.30	Freq out	1	-3200.0	3200.0		[R] Output frequency to motor, f[Hz] = FreqOut/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz
1.3.31	Freq Error	0	-3276.7	3276.7		Frequency Error
1.3.32	Acceleration Tim	0	0.1	3000.0		Acceleration time in RampTimeScale, Acceleration=FreqRamp[Hz]/AccelerationTime[s]
1.3.33	DecelerationTime	0	0.1	3000.0		Deceleration time in RampTimeScale, Deceleration=FreqRamp[Hz]/DecelerationTime[s]
1.3.34	Freq Delta	1508	-3000.0	3000.0		Acceleration in FreqScale/s
1.3.35	Freq Ramp Out	1568	0.00	FreqMax		[R] Output of ramp generator//f[Hz]=FreqRampOut/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz.
1.3.36	Brake Chopper	1509	0	1		0 = no brake chopper,1 = brake chopper is installed
1.3.37	Est DC Nom V	1567	0	2000		Estimated nominal DC voltage in volts
1.3.38	BrakeResistor	1511	0	1		1 = no brake resistor,1 = brake resistor is installed
1.3.39	Step Ref	1520	-327.67	327.67		Step speed reference before limit check
1.3.40	ProcessPITrimRef	1521	-3276.7	3276.7		Process PI Trim Frequency reference (in FreqScale)
1.3.41	MtrRegStatus	1525	0	256		Status of motor limit regulators, 0=not active,1=active//B0=motoring current regulator//B1=generating current reg.//B2=motoring torque reg.//B3=generating torque reg.//B4=over voltage reg. //B5=under voltage reg.
1.3.42	MotorCurLimit	1526	0.00	MotorCurrent Max		Motor current limit, I[A] = MotorCurrentLimit/CurrentScale//Range[1...65535]//If CurrentScale=10 then 100 equals 10.0 A
1.3.43	SC Spd Ref	1527	-327.67	327.67		PC speed reference
1.3.44	Sp MD1 Out	1553	-327.67	327.67		First spare MULDIV output
1.3.45	Sp MD2 Out	1554	-327.67	327.67		Second spare MULDIV output
1.3.46	Sp Add1 Out	1555	-327.67	327.67		Spare Add block output
1.3.47	Sp Sub1 Out	1565	-327.67	327.67		Spare sub block output.
1.3.48	Sp LP Fil Out	1557	-327.67	327.67		Output of spare low pass filter
1.3.49	Sp ABS Out	1558	0.00	327.67		Spare ABS block output
1.3.50	Sp Sum1 Out	1559	-327.67	327.67		Sp sum block output
1.3.51	Sp Sel1 Out	1561	-327.67	327.67		First spare select block output.
1.3.52	Sp Sel2 Out	1562	-327.67	327.67		Second spare select block output.
1.3.53	Sp Lim Out	1574	-327.67	327.67		Spare limit value output
1.3.54	Torque Reference	18	-300.0	300.0		Torque reference 3000 = 300%
1.3.55	Status Word	43	0	65536		Factory use.
1.3.56	Active Flt Last	37	0	2000		[R] Last active fault code.
1.3.57	Mtr Cur ID	45	0.0	MotorCurrent Max		Motor current from the Identification
1.3.58	Accel Comp	1566	-500.0	500.0		AccelCompensation IqReference, 1000 = motor nominal current
1.3.59	Trq Ref Act	1536	-500.0	500.0		Adjusted TorqueReference (-3000...3000) = -300...300%
1.3.60	Trq Ref 3	1537	-300.0	300.0		Torque reference After scaling
1.3.61	Trq Ref 4	1538	-300.0	300.0		Torque reference After scaling and hysteresis and dead zone
1.3.62	Final Iq Trq Ref	1539	-300.0	300.0		Final, limited Iq reference for speed/torque controller
1.3.63	TC Pos Freq Lim	1572	-3200.0	3200.0		Upper frequency limit in Torque Control (signed)

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.3.64	TC Neg Freq Lim	1573	-3200.0	3200.0		Lower frequency limit in Torque Control (signed)
1.3.65	Current Scale	0	0	100		Current Scale (1 or 10)::// 1: I[A] = "CurrentVariable"// 10: I[A] = "CurrentVariable"/10//Depends on UnitSelIndex
1.3.66	Abs Fil Spd	1519	0	32767		Absolute value of speed feedback in rpm.
1.3.67	Loss Tbl Out	1518	0.0	3276.7		Output of loss table for ESS mode.
1.3.68	Regen Trq Lim	1517	-3276.7	3276.7		Regen torque limit
1.3.69	Spd Cntrl Word	1516	0	5		Speed reference. 0=ESS, 1=spd vs time, 2=Remote, 3=Maint, 4=none
1.3.70	Spd Ref	1515	0	32767		Spd reference in RPM from any of the modes.
1.3.71	Spd Tbl Tim	1514	0	32767		Speed table time elapsed in seconds.
1.3.72	Trq Cntrl Word	1513	0	5		Torque control word. 0=Torque tbl, 1=Remote, 2=Maint
1.3.73	Trq Lim Ref	1512	-3276.7	3276.7		Torque limit reference from all modes in ft lbs.
1.3.74	Trq Spd Tbl	1510	-3276.7	3276.7		Output of the speed vs torque table.
1.3.75	Trq PI Out	0	-3276.7	3276.7		Torque PI output
1.3.76	Tbl Trq Lim	0	-3276.7	3276.7		
1.4	Digital IO					Menu Name
1.4.1	DIN 1	1011	0	1		First digital input value.
1.4.2	DIN 2	1012	0	1		Second digital input value.
1.4.3	DIN 3	1013	0	1		Third digital input value.
1.4.4	DIN 4	1014	0	1		Fourth digital input value.
1.4.5	DIN 5	1015	0	1		Fifth digital input value.
1.4.6	DIN 6	1016	0	1		Sixth digital input value.
1.4.7	DIN 7	1017	0	1		Seventh digital input value. Default to zero. Used for additional digital input boards.
1.4.8	DIN 8	1018	0	1		Eight digital input value. Default to zero. Used for additional digital input boards.
1.4.9	DIN123 Status	15	0	7		Digital Inputs 1, 2 and 3 Status (sum)
1.4.10	DIN456 Status	16	0	7		Digital Inputs 4, 5 and 6 Status (sum)
1.4.11	Not DIN 1	1021	0	1		Inverse of digital input 1
1.4.12	Not DIN 2	1022	0	1		Inverse of digital input 2
1.4.13	Not DIN 3	1023	0	1		Inverse of digital input 3
1.4.14	Not DIN 4	1024	0	1		Inverse of digital input 4
1.4.15	Not DIN 5	1025	0	1		Inverse of digital input 5
1.4.16	Not DIN 6	1026	0	1		Inverse of digital input 6
1.4.17	Not DIN 7	1027	0	1		Inverse of digital input 7
1.4.18	Not DIN 8	1028	0	1		Inverse of digital input 8
1.4.19	CM0	1100	0	1		Speed vs time mode selected.
1.4.20	CM1	1101	0	1		ESS mode selected.
1.4.21	CM2	1102	0	1		Speed vs time mode selected then ESS.
1.4.22	CM3	1103	0	1		ESS selected then Speed vs time mode
1.5	Analog IO					Menu Name
1.5.1	AI 1	0	-100.00	100.00		Analog in 1 before scaling and filter
1.5.2	AI1 Type	0	0	5		First analog input type
1.5.3	AI 2	0	-100.00	100.00		Analog in 2 before scaling and filter
1.5.4	AI2 Type	0	0	5		Second analog input type
1.5.5	AI 3	0	-100.00	100.00		Analog in 3 before scaling and filter
1.5.6	AI3 Type	0	0	5		Three analog input type
1.5.7	AI 4	0	-100.00	100.00		Analog in 4 before scaling and filter
1.5.8	AI4 Type	0	0	5		Fourth analog input type
1.5.9	AIN1	1601	-327.67	327.67		First analog input after scaling and filtering
1.5.10	AIN2	1602	-327.67	327.67		Second analog input after scaling and filtering
1.5.11	AIN3	1603	-327.67	327.67		Third analog input after scaling and filtering
1.5.12	AIN4	1604	-327.67	327.67		Fourth analog input after scaling and filtering
1.5.13	AIN1 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.14	AIN2 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.15	AIN3 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.16	AIN4 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.17	AOUT1 Val	1590	-327.67	327.67		Value of first analog out. +/- 10,000 to full scale
1.5.18	AOUT2 Val	1591	-327.67	327.67		Value of second analog out. +/- 10,000 to full scale

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.5.19	Enc1_Out	1609	-3276.7	3276.7		First encoder input after scaling and low pass filter
1.5.20	Enc2_Out	1610	-3276.7	3276.7		Second encoder input after scaling and low pass filter
1.5.21	C1_1	0	0	65535		High byte of raw motor turns for first counter
1.5.22	C1_2	0	0	65535		Low byte of raw motor turns for first counter
1.5.23	C1_3	0	0	65535		Fractional raw motor turns for first counter
1.5.24	C2_1	0	0	65535		High byte of raw motor turns for second counter
1.5.25	C2_2	0	0	65535		Low byte of raw motor turns for second counter
1.5.26	C2_3	0	0	65535		Fractional raw motor turns for second counter
1.5.27	Counter1	1528	-32767	32767		First encoder counter output after scaling
1.5.28	Counter2	1529	-32767	32767		Second encoder counter output after scaling
1.6	FB I/O					Menu Name
1.6.1	Digital Inputs					Menu Name
1.6.1.1	FB Bit00	1040	0	1		Bit 0 data from the field bus FBFixedControlWord.
1.6.1.2	FB Bit01	1041	0	1		Bit 1 data from the field bus FBFixedControlWord.
1.6.1.3	FB Bit02	1042	0	1		Bit 2 data from the field bus FBFixedControlWord.
1.6.1.4	FB Bit03	1043	0	1		Bit 3 data from the field bus FBFixedControlWord.
1.6.1.5	FB Bit04	1044	0	1		Bit 4 data from the field bus FBFixedControlWord.
1.6.1.6	FB Bit05	1045	0	1		Bit 5 data from the field bus FBFixedControlWord.
1.6.1.7	FB Bit06	1046	0	1		Bit 6 data from the field bus FBFixedControlWord.
1.6.1.8	FB Bit07	1047	0	1		Bit 7 data from the field bus FBFixedControlWord.
1.6.1.9	FB Fix Cntrl Wrd	1621	-32767	32767		Control word.bits B0-15://B0 - RUN //B1 - DIRECTION//B2 - FaultRST//B3 - FBDIN1 //B4 - FBDIN2 //B5 - FBDIN3 //B6 - FBDIN4 //B7 - FBDIN5 //B8 - BusCtrl//B9 - BusRef//B10 - FBDIN6//B11 - FBDIN7//B12 - FBDIN8//B13 - FBDIN9//B14 - FBD
1.6.2	Analog Inputs					Menu Name
1.6.2.1	A_FB_AIN1	1611	-327.67	327.67		First int in from field bus
1.6.2.2	A_FB_AIN2	1612	-327.67	327.67		Second int input from field bus
1.6.2.3	A_FB_AIN3	1613	-327.67	327.67		Third int input from field bus
1.6.2.4	A_FB_AIN4	1614	-327.67	327.67		Fourth int input from field bus
1.6.2.5	A_FB_AIN5	1615	-327.67	327.67		Fifth int input from field bus
1.6.2.6	A_FB_AIN6	1616	-327.67	327.67		Sixth int input from field bus
1.6.2.7	A_FB_AIN7	1617	-327.67	327.67		Seventh int input from field bus
1.6.2.8	A_FB_AIN8	1618	-327.67	327.67		Eighth int input from field bus
1.6.2.9	A_FB_AIN9	1619	-327.67	327.67		Ninth int input from field bus
1.6.2.10	A_FB_AIN10	1620	-327.67	327.67		Tenth int input from field bus
1.6.2.11	FB Spd Ref	1632	-327.67	327.67		Speed reference from filed bus. Enter RPM gets converted to percentage.//Typically this value is in percent of the frequency area between the set minimum and maximum frequency.
1.6.3	Analog Outputs					Menu Name
1.6.3.1	FB Data Out 1	1622	-32767	32767		Application Specific process data
1.6.3.2	FB Data Out 2	1623	-32767	32767		Application Specific process dataApplication Specific process data
1.6.3.3	FB Data Out 3	1624	-32767	32767		Application Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.4	FB Data Out 4	1625	-32767	32767		Application Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.5	FB Data Out 5	1626	-32767	32767		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.6	FB Data Out 6	1627	-32767	32767		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.7	FB Data Out 7	1628	-32767	32767		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.8	FB Data Out 8	1629	-32767	32767		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.7	SB Data					Menu Name

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.7.1	SB WD Pulse	0	0	1		Toggles every 100 ms. Used to tell slaves that the master is still communicating over the system bus.
1.7.2	MD WD OK	1172	0	1		Master sections Watchdog is OK.
1.7.3	SB In Cntl Word	1530	0	32767		System bus control word from the master section.
1.7.4	SB In Freq Ref	1531	-327.67	327.67		System Bus frequency reference from the master.
1.7.5	SB In Int1	1532	-327.67	327.67		System bus first configurable integer input from master section.
1.7.6	SB In Int2	1533	-327.67	327.67		System bus second configurable integer input from master section.
1.7.7	SB In Trq Ref	1535	-327.67	327.67		System Bus torque reference from the master.
1.7.8	SB Out Cntl Word	1534	0	32767		System bus control word out of the slave sections
1.7.9	MD Bit In1	1050	0	1		First configurable bit from the system bus master section
1.7.10	MD Bit In2	1051	0	1		Second configurable bit from the system bus master section
1.7.11	MD Bit In3	1052	0	1		Third configurable bit from the system bus master section
1.7.12	MD Bit In4	1053	0	1		Fourth configurable bit from the system bus master section
1.7.13	MD Bit In5	1054	0	1		Fifth configurable bit from the system bus master section
1.7.14	MD Bit In6	1055	0	1		Sixth configurable bit from the system bus master section
1.7.15	MD Bit In7	1056	0	1		Seventh configurable bit from the system bus master section
1.7.16	MD Bit In8	1057	0	1		Eighth configurable bit from the system bus master section
1.7.17	MD Drive OK	1058	0	1		System bus master section Drive OK Bit.
1.7.18	MD One Bit	1059	0	1		System bus master section One Bit. Easy way to tell the master drive is on and communicating.
1.7.19	MD Run Enable	1060	0	1		System bus master section Run Enable is high.
1.7.20	SB Comm Lost	0	0	1		System bus is not communicating
1.7.21	SB Comm Flt	1173	0	1		System bus slot comm fault or master WD fault.
1.8	Can I/O					Menu Name
1.8.1	Can Aln 1	1640	-327.67	327.67		First Can I/O analog input
1.8.2	Can Aln 2	1641	-327.67	327.67		Second Can I/O analog input
1.8.3	Can Aln 3	1642	-327.67	327.67		Third Can I/O analog input
1.8.4	Can Aln 4	1643	-327.67	327.67		Fourth Can I/O analog input
1.8.5	Can In 1	1030	0	1		First Can digital input bit
1.8.6	Can In 2	1031	0	1		Second Can digital input bit
1.8.7	Can In 3	1032	0	1		Third Can digital input bit
1.8.8	Can In 4	1033	0	1		Fourth Can digital input bit
1.8.9	Can Bus Flt	1029	0	1		Can I/O Fault bit
2	Parameters					Menu Name
2.1	Protections					Menu Name
2.1.1	Fault Reset	0	0	2000	1002	Fault reset. Default to Zero Bit.
2.1.2	User Flt 1	0	0	2000	1002	First user fault configuration point. Default to Zero Bit.
2.1.3	User Flt 2	0	0	2000	1002	Second user fault configuration point. Default to Zero Bit.
2.1.4	User Flt 3	0	0	2000	1002	Third user fault configuration point. Default to Zero Bit.
2.1.5	User Flt 4	0	0	2000	1002	Fourth user fault configuration point. Default to Zero Bit.
2.1.6	User Flt1 Resp	0	0	3	2	Response to the 1st user fault.
2.1.7	User Flt2 Resp	0	0	3	2	Response to the 2nd user fault.
2.1.8	User Flt3 Resp	0	0	3	2	Response to the 3rd user fault.
2.1.9	User Flt4 Resp	0	0	3	2	Response to the 4th user fault.
2.1.10	Ext Fault Inp	0	0	2000	1002	External fault input. High for fault. Default to zero bit.
2.1.11	Ext Flt Resp	701	0	3	2	Set Drive response to an external fault. Ignore, Warn, Fault, Fault coast
2.1.12	Overspeed Resp	0	0	3	3	Response to drive overspeed. Default to coast stop and fault the drive.
2.1.13	Input Ph. Superv	730	0	3		Set response to an input phase fault. Ignore, Warn, Fault, Fault coast
2.1.14	UVolt Fault Resp	727	0	1		Set Drive response to an under voltage fault. Ignore, Warn, Fault, Fault coast
2.1.15	Phase Supv F	702	0	3		Set Drive response to an output phase fault. Ignore, Warn, Fault, Fault coast
2.1.16	Earth Fault	703	0	3		Set Drive response to a ground fault. Ignore, Warn, Fault, Fault coast
2.1.17	Therm Prot F	704	0	3		Set Drive response to a motor thermal fault. Ignore, Warn, Fault, Fault coast
2.1.18	MotAmbTempFactor	705	-100.0	100.0		[W] Ambient temperature factor,(-100... 1000) 0= nominal, 1000= max, kf=(Tamb-Tn)/(Tmax-Tn)*1000.
2.1.19	Mot Therm 0 Spd	706	0.0	150.0		[W] Motor cooling ability at zero speed unit 0,1%. Init := 400
2.1.20	Mtr Therm TC	707	1	200		[W] Motor Thermal Time Constant in minutes, (1... 200). Init := 45
2.1.21	Motor Duty Cycle	708	0	100		[W] Motor Duty Cycle in %. Init := 100

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.1.22	Stall Protection	709	0	3		Set Drive response to a stall fault. Ignore, Warn, Fault, Fault coast
2.1.23	Stall Cur Lim	710	MotorCurrentMin	MotorCurrentMax		[W] Current limit of motor stall protection, I[A] = StallCurrentLimit/CurrentScale//(1...65535)//if CurrentScale=10 then 100 equals 10.0 A. Init := 100
2.1.24	Stall Time	711	1.00	120.00		[W] Max time for stall in 0,01s (100 ... 12000). Init := 1500
2.1.25	Stall Freq	712	1.00	Max_Frequency	2.50	[W] Max frequency for stall protection, f[Hz] = StallFrequency/FreqScale. Init := 250
2.1.26	ULoad Protect F	713	0	3		Set Drive response to a loss of load fault. Ignore, Warn, Fault, Fault coast
2.1.27	Under Ld Trq Nom	714	10.0	150.0		[W] Underload load curve at nominal freq.unit = 0.1%. Init := 500
2.1.28	Under Ld Trq 0	715	5.0	150.0		[W] Underload load curve at zero freq.unit = 0.1%. Init := 100
2.1.29	Under Ld State T	716	2.00	600.00		[W] Time limit for underload supervision in 0.01 sec (0 65536). Init := 2000
2.1.30	ThermistorF.Resp	732	0	3		Set Drive response to a thermistor fault. Ignore, Warn, Fault, Fault coast
2.1.31	FBComm.FaultResp	733	0	3		Set Drive response to a field bus fault. Ignore, Warn, Fault, Fault coast
2.1.32	SPI Flt Resp	734	0	3		Set Drive response to a slot communication fault. Ignore, Warn, Fault, Fault coast
2.1.33	Auto Rst Wait	717	0.10	10.00		Wait time between logging separate instance of the same fault. Enter in seconds.
2.1.34	Auto Rst SVTime	718	0.00	60.00		Used with trials. The drive will allow the number of trial resets on this fault within this given time. Entered in seconds.
2.1.35	Auto Rst StartM	719	0	2		0 = ramp,1 = flying start,2 = system defined
2.1.36	Auto Rst UV Trls	720	0	10		Determines the numbe of auto restarts allowed in the trial time for the undervoltage fault.
2.1.37	Auto Rst OV Trls	721	0	10		Determines the numbe of auto restarts allowed in the trial time for the over voltage fault.
2.1.38	Auto Rst OC Trls	722	0	3		Determines the numbe of auto restarts allowed in the trial time for the over current fault.
2.1.39	Auto Rst Mtr OT	726	0	10		Determines the numbe of auto restarts allowed in the trial time for the motor temperature fault.
2.1.40	Auto Rst ExtF T	725	0	10		Determines the numbe of auto restarts allowed in the trial time for the external fault.
2.1.41	Auto Rst Uload T	738	0	10		Determines the numbe of auto restarts allowed in the trial time for the under load fault.
2.1.42	WD Flt Response	0	0	3	2	Response to a communication watch dog time out. Default to fault the drive.
2.1.43	Com WD	0	0	1	0	Enables the communications watchdog timer. Default to not run it.
2.1.44	Can Comm flt Res	0	0	3	0	Response to Can I/O failure. Default to no action.
2.2	Setpoints					Menu Name
2.2.1	Run Speed	1254	-327.67	327.67	20.00	Default run speed if a fix value is desired. Default to 0 - 100% speed
2.2.2	Thread Speed	1255	-327.67	327.67	10.00	Default thread speed. Used if a fixed value is desired.
2.2.3	Jog F Speed	1256	-327.67	327.67	5.00	Fixed jog forward speed setpoint.
2.2.4	Jog R Speed	1257	-320.00	320.00	-5.00	Jog reverse speed setpoint.
2.2.5	Spd Slk Up	1273	-327.67	327.67	10.00	Speed step slack up value
2.2.6	Panel Ref Src	121	0	9		0=A11, 1=A12, 2=Panel, 3=Remote to the fieldbus output
2.2.7	Remote Ref Src	122	0	9		0=A11, 1=A12, 2=Panel, 3=Remote reference to the fieldbus output.
2.2.8	Trq Ref StA	1302	-300.0	300.0	0.0	Fixed value for the first torque reference input if desired. Enter in percent torque.
2.2.9	Field WeakngPnt	602	0.80	320.00	6.00	[W] Field weakening point, f[Hz] = FieldWeakeningPoint/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz
2.2.10	Sp Sum1 StA	1330	-327.67	327.67	0.00	Sp sum blocks first inputs default calibration value..
2.2.11	Sp Sum1 StB	1331	-327.67	327.67	0.00	Sp sum blocks second inputs default calibration value..
2.2.12	Sp Sum1 StC	1332	-327.67	327.67	0.00	Sp sum blocks third inputs default calibration value..
2.2.13	Sp Sel1 ST0	1337	-327.67	327.67	0.00	First spare select block input 0 default calibration value.
2.2.14	Sp Sel1 ST1	1338	-327.67	327.67	0.00	First spare select block input 1 default calibration value.
2.2.15	Sp Sel2 ST0	1339	-327.67	327.67	0.00	Second spare select block input 0 default calibration value.
2.2.16	Sp Sel2 ST1	1340	-327.67	327.67	0.00	Second spare select block input 1 default calibration value.
2.2.17	Sp Cmp1_Hyst	1345	0.00	327.67	0.01	First spare comparitor block Hysteresis value. Plus or minus around the threshold.
2.2.18	Sp Cmp1_Spt	1346	-327.67	327.67	0.10	First spare comparitor block default setpoint value. Can be used for the input or threshold.
2.2.19	Con Mode	1251	0	5	0	Console mode stpt 0=spd vs time, 1=ESS, 2= spd vs time then ESS, 3=ESS then Spd vs time, 4=none

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.2.20	ESS Lit Stpt	1248	0	32767	5000	Engine start speed to transfer from starting to constant speed mode.
2.2.21	Lit Speed	1247	0	32767	4000	Constant speed to go to after engine start.
2.2.22	M Spd Stpt	1245	0	32767	1000	Maint speed setpoint in rpm.
2.2.23	M Trq Stpt	1244	-3276.7	3276.7	10.0	Maint torque setpoint in ft lbs.
2.2.24	Rem Spd Stpt	1237	0	32767	5000	Optional remote speed stpt
2.2.25	Rem Trq Stpt	1235	-3276.7	3276.7	10.0	Optional remote torque setpoint in ft lbs.
2.2.26	WK Stpt	1234	0.0	3276.7	1.0	Inertia of unit for engine start. Entered in ft lbs seconds squared
2.2.27	Trq Base Spd	1260	0	32767	1700	Start RPM to start torque limit
2.2.28	Trq End Spd	1261	0	32767	5000	End speed to go to low torque limit
2.3	Rates / Times					Menu Name
2.3.1	Accel Time 1	103	0.1	3000.0	10.0	Default acceleration time constant for the speed ramp.
2.3.2	Decel Time 1	104	0.1	3000.0	10.0	Default deceleration time constant for the speed ramp.
2.3.3	Smooth Ratio	500	0.0	10.0	0.1	[W] Smooth ratio for S-curves//0 = linear ramps//100 = full acc/dec inc/dec times.
2.3.4	Fast Stop Tim	503	0.1	3000.0	0.1	Fast stop ramp time
2.3.5	Smooth Ratio 2	501	0.0	10.0		[W] Smooth ratio 2 for S-curves//0 = linear ramps//100 = full acc/dec inc/dec times.
2.3.6	Strt 0 Spd Time	615	0	32000		After giving the start command the drive will remain in zero speed for the time defined by this parameter. The ramp will be released to follow the set frequency/speed reference after this time is elapsed from the instant where command is given.
2.3.7	Stop 0 Spd Time	616	0	32000		The drive will remain at zero speed with controllers active for the time defined by this parameter after reaching the zero speed on giving a stop command.
2.3.8	Freq Ref LP TC	1309	0	1000	0	Frequency reference filter time constant in ms//0 = not in use
2.3.9	Trq Rmp Rate	1290	0	3200	5	Torque reference ramp limit in percent per second.
2.3.10	Sp LP Fil TC	1329	0.00	10.00	0.10	Spare low pass filter time constant. Default to 100 ms.
2.3.11	Sp Dly1 TOFF	1349	0.00	327.67	0.10	First spare timer delay off setting in seconds. Default to 100 ms.
2.3.12	Sp Dly1 TON	1350	0.00	327.67	0.10	First spare timer delay on setting in seconds. Default to 100 ms.
2.3.13	Spd Cmp Fil TC	0	0.00	10.00	0.10	Spd Comparitor low pas filter. Default to 100 ms.
2.3.14	WD Com Dly	0	0.00	100.00	0.10	Communications watch dog timer delay. Default to 100 ms.
2.3.15	WD Init Dly Tim	0	0.00	327.67	10.00	Power up delay for the communications watchdog timer. Default to 10 seconds.
2.3.16	Accel Comp Tc	0	0.002	1.000	0.100	Filtering Time Constant for acceleration compensation in s
2.3.17	Trq Ref Fil TC	0	0.0	1000.0	0.0	Filter time for torque reference (0...10000) = 0...1000.0 ms
2.3.18	Spd Err Fil TC	0	0	1000	0	Filter time for speed error (0 ...1000) = 0...1000 ms
2.3.19	Trq Ref Rate	1241	0.00	327.67	10.00	Regen torque reference ramp limit.
2.4	Tuning Gains					Menu Name
2.4.1	Speed Control Kp	613	1	1000		Gain for the speed controller. (% / Hz)
2.4.2	Speed Control Ti	614	0.0	500.0		Integral time constant for the speed controller
2.4.3	Spd Cntrl F0	0	0.0	3200.0	0.0	Corner frequency for SpeedControl_Kp_f0
2.4.4	Spd Cntrl F1	0	0.0	3200.0	0.0	Corner frequency for SpeedControl_Kp
2.4.5	Spd Cntrl Kp F0	0	0	300		Relative gain (%) below SpeedControl_f0
2.4.6	Spd Cntrl Kp FW	0	0	300		Relative final gain for Speed controller p-gain at field weakening in%//< 100 reduces gain, >100 increases gain above FWP
2.4.7	Spd Cntrl Kp T0	0	0	300		Relative gain (%) if torque is below SpeedControl_T0
2.4.8	Spd Cntrl T0	0	0	300		Torque Limit for reduced SpeedControl_Kp (1000 = nominal)
2.4.9	Accel.Compens.	626	0.00	300.00		Inertia compensation to improve speed response during acceleration and deceleration. Time is defined as acceleration time to nominal speed with nominal torque. This parameter is active also in advanced openloop.
2.4.10	Spd Err Bnd Frq	0	0.0	450.0	0.0	Speed Error Notch filter BandStop frequency (10...4500) = 1.0 ... 450.0 Hz//0 = Not in Use
2.4.11	Spd Err LP Freq	0	1.0	250.0	100.0	Speed Error LowPass filter cutoff frequency (10...2500) = 1.0 ... 250.0 Hz//0 = Not in Use
2.4.12	CurrentControlKp	617	0.00	100.00		Gain for the current controller. This controller is active only in closed loop and advanced open loop. It generates the voltage vector reference to the modulator.
2.4.13	Curr Cntrl Ti	0	0.0	100.0		Current controller integrator time constant (0 ... 1000) = 0...100.0 ms
2.4.14	OV Reg Kp	0	0	32767		P-gain of over voltage controller (0 ...32767)
2.4.15	OV Reg Kp Add	0	0	32767		Addition to P-gain of over voltage controller (0 ...32767)
2.4.16	OV Reg Ki	0	0	32767		I-gain of over voltage controller (0 ...32767)

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.4.17	OV Reg Kd	0	0	32767		D-gain of over voltage controller OL, 256 equals 1.0 (0 .. 32767)
2.4.18	UV Reg Kp	0	0	32767		P-gain of under voltage controller (0 ...32767)
2.4.19	UV Reg Kp2	0	0	32767		P-gain of under voltage controller nonlinear part
2.4.20	OV Reg Ki	0	0	32767		I-gain of over voltage controller (0 ...32767)
2.4.21	UV Reg I2	0	0	32767		I-gain of under voltage controller nonlinear part
2.4.22	UV Reg Kd	0	0	32767		D-gain of under voltage controller
2.4.23	UV Reg Kd2	0	0	32767		D-gain of under voltage controller nonlinear part
2.4.24	Mtr I Lim Ki	0	0	32767		I-gain of motor side over current controller (0 ... 32767)
2.4.25	Mtr I Lim Kp	0	0	32767		P-gain of motor side over current controller (0 ... 32767)
2.4.26	Gen I Lim Ki	0	0	32767		I-gain of generator side over current controller (0 ... 32767)
2.4.27	Gen I Lim Kp	0	0	32767		P-gain of generator side over current controller (0 ... 32767)
2.4.28	Trq Lim Kp	610	0	32000		P-gain of torque limit controller
2.4.29	Trq Lim Ki	611	0	32000		I-gain of torque limit controller
2.4.30	Spd Cont Kp	637	0	32767		[W] P-gain of open loop speed controller (0...32767). Init := 3000
2.4.31	Spd Cont Ki	638	0	32767		[W] I-gain of open loop speed controller (0 ... 32767). Init := 300
2.4.32	Temp CL Param	0	0	0		Reserved for future use.
2.4.33	Trq Cntrl Kp	639	0	32000		P-gain of torque controller
2.4.34	Trq Cntrl Ki	640	0	32000		I-gain of torque controller
2.4.35	Cl Ovr Vlt Kp	0	0	5000		CL OverVoltage Controller base gain
2.4.36	Cl Ovr Vlt Kp0	0	0	5000		CL OverVoltage Controller gain increase at zero frequency
2.4.37	Cl Ovr Vlt Ti	0	0	500		CL OverVoltage Controller integral time in ms
2.4.38	ESS Int Gn	1249	0.00	100.00	1.00	Engine start integral time constant in seconds. Scales input to output.
2.4.39	Trq LP Gain	0	-32767	32767	1	Overall gain for the outer trq regulator
2.4.40	Trq I Gain	0	0.00	327.67	1.00	Tension loop i gain
2.4.41	Trq P Gain	0	0.000	32.767	0.010	Trq loop p gain
2.5	Limits					Menu Name
2.5.1	Freq Max	102	FreqMin	320.00	6.00	[W] Max output frequency, f[Hz] = FreqMax/FreqScale//Range[FreqMin...32767]/If FreqScale=100 then 5000 equals 50.00 Hz. Init := 5000
2.5.2	Min Frequency	101	0.00	Max_Frequency		Minimum frequency the speed reference is allowed to go down to in hertz.
2.5.3	Mtr Cur Limit	1291	0.00	300.00	100.00	Motor current limit value
2.5.4	Motoring Trq Lim	1305	0.0	300.0	300.0	Torque limit for motor side torque limitter,1000 equals 100% nominal torque
2.5.5	Gener Trq Lim	1306	0.0	300.0	300.0	Torque limit for generator side torque limitter,1000 equals 100% nominal torque
2.5.6	Trq Lim FWD	1307	0.0	300.0	300.0	Additional Torque limit for Forward Reference Direction,1000 equals 100% nominal torque
2.5.7	Trq Lim REV	1308	0.0	300.0	300.0	Additional Torque limit for Reverse Reference Direction,1000 equals 100% nominal torque
2.5.8	Ovr Spd Stp	1258	0.00	327.67	110.00	Overspeed setpoint in percentage of max speed. Default to 110%
2.5.9	Zero Detect	1259	0.00	200.00	2.00	Speed feedback comparitor At zero speed setpoint. Default to 2% of max speed.
2.5.10	Spd Hyst	0	0.00	200.00	1.00	Speed feedback comparitor hysteresis value. Default to 1%
2.5.11	Spd Decimal	0	0	4	2	Speed feedback comparitor decimal point resolution. Default to 2.
2.5.12	Trq Ref Max	1274	0.0	300.0	100.0	Maximum limit for the torque reference. Entered in percent torque.
2.5.13	Trq_Ref_Min	1275	0.0	300.0	50.0	Minimum limit for the torque reference. Entered in percent torque.
2.5.14	Torq Speed Limit	644	0	2		Torque control max frequency 0 = Max Frequency Par 2.1.1, 1 = Selected frequency reference, 2 = Preset speed 7
2.5.15	Trq Ref Hyst	0	-3000	3000	0	Hysteresis for TorqueReference before filtering (-3000...3000) = -300..300%
2.5.16	Trq Ref DeadZone	0	-300.0	300.0	0.0	Dead zone for TorqueReference before hysteresis (-3000...3000) = -300..300%
2.5.17	Pos Freq Limit	1300	-3200.0	3200.0	60.0	Additional signed Upper Frequency limit in FreqScale, Used while in torque mode to control overspeed//Range [-32767..32767],//0 prevents running to forward direction
2.5.18	Neg Freq Limit	1301	-3200.0	3200.0	-60.0	Additional signed lower Frequency limit in FreqScale, Used while in torque mode to control overspeed//Range [-32767..32767],//0 prevents running to forward directionAdditional signed Lower Frequency limit in FreqScale, //Range [-32767..32767],//0 prevents running to reverse direction
2.5.19	Win Pos Width	0	-3200.0	3200.0	6.0	Frequency Window width for positive direction in FreqScale, activated with TCSpeedLimiterMode=4

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.5.20	Win Neg Width	0	-3200.0	3200.0	6.0	Frequency Window width for negative direction in FreqScale, activated with TCSpeedLimiterMode=4.
2.5.21	Cl Ovr Mtr Lim	0	0.0	500.0		CL Motoring current limit (1000 = 100.0%) for OverVoltage Controller
2.5.22	Sp Lim Max	1353	-32.767	32.767	10.000	Spare limit block maximum value.
2.5.23	Sp Lim Min	1354	-327.67	327.67	-100.00	Spare limit block minimum value.
2.5.24	Max Spd RPM	1292	0	32565	1800	Max speed used for overspeed and zero speed detection in RPM.
2.5.25	DUT Max Spd	1250	0	32767	10000	Device under test max speed limit in rpm
2.5.26	Min ESS Lim	0	0	32767	0	Minimum for ESS integrator output. Usually left at 0.
2.5.27	Max ESS Lim	1243	0	32767	10000	Maximum limit for ESS integrator output.
2.5.28	Spd Trq Lim	1242	-3276.7	3276.7	100.0	Regen torque limit.
2.5.29	Trq LP Max	0	-3276.7	3276.7	100.0	Upper torque loop limit
2.5.30	Trq LP Min	0	-3276.7	3276.7	-100.0	Lower torque loop limit
2.6	Scaling					Menu Name
2.6.1	LS to Freq	0	-32.767	32.767	0.600	Scaling factor to convert speed reference units (usually %) to motor units (Usually motor Hz)
2.6.2	LS Scl Div	0	-32767	32767	10000	Scaling factor to convert speed reference units (usually %) to motor units (Usually motor Hz)
2.6.3	DCBrake Mlt	1293	0.00	300.00	100.00	DC Brake scaling factor as a percentage
2.6.4	Sp MD1 Dv	1323	-327.67	327.67	1.00	Default value for the first spare MULDIV block divide input.
2.6.5	Sp MD1 Mlt	1324	-327.67	327.67	1.00	Default value for the first spare MULDIV block multiply input.
2.6.6	Sp MD2 Dv	1325	-327.67	327.67	1.00	Default value for the second spare MULDIV block divide input.
2.6.7	Sp MD2 Mlt	1326	-327.67	327.67	1.00	Default value for the second spare MULDIV block multiply input.
2.6.8	Sp Add Val	1327	-327.67	327.67	0.00	Spare add block optional cal number.
2.6.9	Sp Sub Val	1328	-327.67	327.67	0.00	Spare sub block optional scaling value.
2.6.10	FreqRamp	0	0.00	327.67	100.00	Frequency range for ramp calculation, f[Hz] = FreqRamp/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz
2.6.11	Trq Ref Off	1298	-3200.0	3200.0	0.0	Offset for TorqueReference (-32000...32000)
2.6.12	Trq Ref Gn	1299	-320.00	320.00	10.00	Gain for TorqueReference, Divided by 1000 for end gain.//(-32000..32000), nom = 1000
2.6.13	Loss Tbl Gn	1246	0.00	100.00	0.01	Loss table gain. Usually left at default.
2.6.14	Trq Scl Div	1240	0.01	327.67	1.00	Scaling from ft lbs to percent motor torque.
2.6.15	Trq Scl Mlt	1239	-327.67	327.67	1.00	Torque reference scaling from ft lbs to %
2.6.16	WK Scaling	1238	-327.67	327.67	0.01	Optional scaling for inertia input.
2.7	Bit Config					Menu Name
2.7.1	Run Input	0	0	2000	1011	enables the drive in run mode. Default to the first digital input
2.7.2	Thread Input	0	0	2000	1002	Enables the drive at the thread speed. Default to zero bit.
2.7.3	Jog F Input	0	0	2000	1012	Enables jog forward in the drive. Default to second digital input
2.7.4	Jog R Input	0	0	2000	1002	Enables the jog reverse function in the drive. Default to zero bit.
2.7.5	Reverse Inp	0	0	2000	1002	Negates the speed reference. Default to zero bit.
2.7.6	Stop Input	0	0	2000	1001	Stop input used for 3 wire control. Stops drive when it goes low. Default to one bit.
2.7.7	Fast Stop	0	0	2000	1001	Initiates a stop and switches in faster ramp rates when input goes low. Default to one bit.
2.7.8	Coast Stop	0	0	2000	1001	Set to input for emergency coast stop. Default to one bit.
2.7.9	At Zero Time	0	0	2000	1127	Rests the Drive OK after a fault. Default to At Zero Spd
2.7.10	DC Brk Cmd	0	0	2000	1002	Enables DC injection braking after stop. Default to Zero Bit
2.7.11	Disable Ramp	0	0	2000	1002	Disable speed reference ramp function
2.7.12	Step Reverse	0	0	2000	1002	Inverts the speed step references when set.
2.7.13	Sup Enable	0	0	2000	1002	Enables the speed slack up setpoint.
2.7.14	Trq Ref En	0	0	2000	1090	Enables the torque reference. Default to RunRequest
2.7.15	Trq Dir	0	0	2000	1002	Reverse the polarity of the torque reference. Default to Zero bit
2.7.16	Trq No Ramp	0	0	2000	1001	Disables the torque reference ramp. Defaults to disable the ramp.
2.7.17	Param Set Sel	0	0	2000	1002	Selects between the two parameter sets when enabled.
2.7.18	Thermistor Inp	0	0	2000	1002	Input for thermistor fault. Default to zero Bit.
2.7.19	Sp Sum1 EnA	0	0	2000	1002	Enables the first spare sum input. Default to Zero bit.
2.7.20	Sp Sum1 EnB	0	0	2000	1002	Enables the second spare sum input. Default to Zero bit.
2.7.21	Sp Sum1 EnC	0	0	2000	1002	Enables the third spare sum input. Default to Zero bit.
2.7.22	Sp Sel1 En1	0	0	2000	1002	First spare select block enables input 1 configuration point.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.7.23	Sp Sel2 En1	0	0	2000	1002	Second Spare select block enables input 1 configuration point.
2.7.24	Sp Dly1 In	0	0	2000	1002	First delay block input. Default to Zero Bit
2.7.25	Sp Ltc1 H1	0	0	2000	1001	First spare latch block first hold bit. Default to One bit.
2.7.26	Sp Ltc1 H2	0	0	2000	1001	First spare latch block second hold bit. Default to One bit.
2.7.27	Sp Ltc1 L	0	0	2000	1002	First spare latch block latch input bit. Default to Zero bit.
2.7.28	Sp Inv1 In	0	0	2000	1002	First spare Bit invert blocks input bit.
2.7.29	Sp Inv2 In	0	0	2000	1002	Second spare Bit invert blocks input bit.
2.7.30	Sp And1 In1	0	0	2000	1002	First spare And block input 1. Default to Zero Bit.
2.7.31	Sp And1 In2	0	0	2000	1002	First spare And block input 2. Default to Zero Bit.
2.7.32	Sp And1 NIn3	0	0	2000	1002	First spare And block inverted input 3. Default to Zero Bit.
2.7.33	Sp And2 In1	0	0	2000	1002	Second spareAnd block input 1. Default to Zero Bit.
2.7.34	Sp And2 In2	0	0	2000	1002	Second spare and block input 2. Default to Zero Bit.
2.7.35	Sp And2 NIn3	0	0	2000	1002	Second spare And block inverted input 3. Default to Zero Bit.
2.7.36	Sp Or1 In1	0	0	2000	1002	First spare Or block input 1. Default to Zero Bit.
2.7.37	Sp Or1 In2	0	0	2000	1002	First spare Or block input 2. Default to Zero Bit.
2.7.38	Sp Or1 NIn3	0	0	2000	1002	First spare Or block inverted input 3. Default to Zero Bit.
2.7.39	Sp Or2 In1	0	0	2000	1002	Second spareOr block input 1. Default to Zero Bit.
2.7.40	Sp Or2 In2	0	0	2000	1002	Second spareOr block input 2. Default to Zero Bit.
2.7.41	Sp Or2 NIn3	0	0	2000	1002	Second spare Or block inverted input 3. Default to Zero Bit.
2.7.42	Wlthcdog In	0	0	2000	1002	Communications watchdog timer input from PLC. Default to Zero Bit.
2.7.43	Loc Trq Bit	0	0	2000	1002	Enabled local torque mode
2.7.44	Maint Bit	0	0	2000	1001	Enables Maintenance mode
2.7.45	Maint Spd Mode	0	0	2000	1002	Speed mode is used instead of torque when enabled and in maint mode.
2.7.46	Rem Bit	0	0	2000	1002	Remote control selector bit input.
2.7.47	Rem Spd Bit	0	0	2000	1001	Remote speed / torque selector bit. Default to speed control.
2.7.48	Trq I Res1	0	0	2000	1099	Reset the torque outer PI loop.
2.7.49	Trq I Res2	0	0	2000	1001	Reset the torque outer PI loop.
2.8	Anlg Config					Menu Name
2.8.1	Master Ref	0	0	2000	1515	Speed ref - Default to Run Speed
2.8.2	Thread Ref	0	0	2000	1255	Thread speed ref. Default to Thread Speed
2.8.3	Jog F Ref	0	0	2000	1256	Jog forward ref. Defaulted to Jog F Speed
2.8.4	Jog R Ref	0	0	2000	1257	Jog Reverse ref. Default to Jog R Speed
2.8.5	Accel Inp	0	0	2000	103	Acceleration rate input. Default to Accel_Time_1 parameter.
2.8.6	Decel Time	0	0	2000	104	Deceleration rate input. Default to Decel_Time_1 parameter.
2.8.7	Slack Up	0	0	2000	1273	Speed slack up input. Default to Spd Slk Up
2.8.8	Spd Fdbk	0	0	2000	2	Speed feedback input for over and zero speed comparitor.
2.8.9	Ovr Spd Inp	0	0	2000	1292	Overspeed comparitor maximum setpoint. Default to MaxFreq.
2.8.10	Mtr Cur Lim Scl	0	0	2000	1291	Scaling value for current limit. Default to MotorCurrentLim.
2.8.11	DCBrake Scl Inp	0	0	2000	1293	DCBrake scaling input. Default to DCBrake Mlt
2.8.12	Sp MD1 Val	0	0	2000	1200	Input for the first spare MULDIV block. Default to Zero analog.
2.8.13	Sp MD2 Val	0	0	2000	1200	Input for the second spare MULDIV block. Default to Zero analog.
2.8.14	Sp MD1 Div	0	0	2000	1323	First spare MULDIV block divide input. Default to Sp MD1 Dv cal number.
2.8.15	Sp MD1 Mul	0	0	2000	1324	First spare MULDIV block multiply input. Default to Sp MD1 Mlt cal number.
2.8.16	Sp MD2 Div	0	0	2000	1325	Second spare MULDIV block divide input. Default to Sp MD2 Dv cal number.
2.8.17	Sp MD2 Mul	0	0	2000	1326	Second spare MULDIV block multiply input. Default to Sp MD2 Mlt cal number.
2.8.18	Sp Add1 In1	0	0	2000	1327	First input of spare Add block.
2.8.19	Sp Add1 In2	0	0	2000	1327	Second input of spare Add block.
2.8.20	Sp Sub1 In1	0	0	2000	1328	First input of spare Sub block.
2.8.21	Sp Sub1 In2	0	0	2000	1328	Second input of spare Sub block.
2.8.22	Sp LP Fil In	0	0	2000	1200	Input to the spare low pass filter. Default to zero analog.
2.8.23	Sp ABS In	0	0	2000	1200	Spare absolute value block input. Default to Zero Analog
2.8.24	Sp Sum1 InA	0	0	2000	1330	Spare sum block first input. Default to Sp Sum1 StA.
2.8.25	Sp Sum1 InB	0	0	2000	1331	Spare sum block second input. Default to Sp Sum1 StB.
2.8.26	Sp Sum1 InC	0	0	2000	1332	Spare sum block third input. Default to Sp Sum1 StC.
2.8.27	Sp Sel1 In0	0	0	2000	1337	First spare select block input 0. Default to Sp Sel1 ST0
2.8.28	Sp Sel1 In1	0	0	2000	1338	First spare select block input 1. Default to Sp Sel1 ST1
2.8.29	Sp Sel2 In0	0	0	2000	1339	Second spare select block input 0. Default to Sp Sel2 ST0

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.8.30	Sp Sel2 In1	0	0	2000	1340	Second spare select block input 1. Default to Sp Sel2 ST1
2.8.31	Sp Cmp1 In	0	0	2000	1346	First spare comparitor block input parameter to be compared with the threshold. Default to Sp Cmp1 Stpt.
2.8.32	Sp Cmp1 Thres	0	0	2000	1346	First spare comparitor block threshold parameter to be compared with the input. Default to Sp Cmp1 Stpt.
2.8.33	Sp Lim Inp	0	0	2000	1200	Spare limit input. default to Zero Analog
2.8.34	Trq Ref	0	0	2000	1517	Torque reference. Default to C_Trq_Ref_STA
2.8.35	Con Mode Inp	0	0	2000	1251	Console command for which mode to run.
2.8.36	ESS Lit Stpt	0	0	2000	1248	ESS speed setpoint to switch from engine start to constant speed.
2.8.37	Lit Spd Inp	0	0	2000	1247	Speed to run at after engine lit complete.
2.8.38	Loss Tbl Inp	0	0	2000	1201	Optional Loss table input gain input. Default to 1.
2.8.39	Maint Spd Inp	0	0	2000	1245	Maint speed reference input in rpm
2.8.40	Main Trq Inp	0	0	2000	1244	Main torque reference input in ft lbs.
2.8.41	Mx Spd Lim	0	0	2000	1243	Unit under test max speed reference limit in rpm.
2.8.42	Rem Spd Inp	0	0	2000	1237	Remote speed reference input in rpm.
2.8.43	Rem Trq Inp	0	0	2000	1235	Remote torque reference input in ft lbs.
2.8.44	Trq Ref Inp	0	0	2000	1601	Torque input for engine start mode.
2.8.45	WK Inp	0	0	2000	1234	Inertia compensation input.
2.8.46	Trq Lp Ref	0	0	2000	1512	Outer torque loop reference input. Default to A Trq Lim Ref
2.8.47	Trq Lp Fdbk	0	0	2000	1601	Outer torque loop feedback selection input. Default to first analog input.
2.9	Enables					Menu Name
2.9.1	Skip S Rev	0	0	1	0	Skip S2,S4 scurve when opposite direction asked for during a ramp
2.9.2	Rmp Act Lim	0	0	1	0	Enables ramping during the over ride limits
2.9.3	Fly Strt Flt	0	0	1	1	Enables the ability to start into a spinning motor after a fault
2.9.4	3 Wire St En	0	0	1	0	Enables three wire start stop logic
2.9.5	Start Function	505	0	1		Start function. 0 = Ramp, 1 = Flying start
2.9.6	Stop Function	506	0	3		Stopping mode. 0 = coast, 1= Ramping, 2 = Ramp with Run enable coast stop.
2.9.7	Brake Chopper	0	0	8	0	Brake Chopper Control Mode//0 = Brake NO, Test NO, 1 = Brake EXTERNAL, Test NO//2 = Brake YES(Ready), Test NO, 3 = Brake YES(Run), Test NO//4 = Brake YES(Ready), Test YES(Ready), 5 = Brake YES(Run), Test YES(Ready)//6 = Brake YES(Run), Test YES(R
2.9.8	Overvolt Contr	607	0	2	0	[W] Over voltage controller oper. Mode 0=disabled,1=no ramping, 2 = ramping//. Init := 1
2.9.9	UV Contrl	608	0	1	0	[W] Enables under voltage controller, 0= disabled, 1= enabled. Init := 1
2.9.10	Mtr I Lim En	0	0	1	0	Enables motor side over current control, 0= disabled, 1= enabled
2.9.11	Gen I Lim En	0	0	1	0	Enables generator side over current control, 0= disabled, 1= enabled
2.9.12	Fault Start En	0	0	1	1	Enable restart of the drive after a fault without toggling run inputs
2.9.13	Param Set En	0	0	1	0	Enables the two saved parameter set option.
2.9.14	SC Trq Chain Sel	0	0	4	1	Control word for torque in speed control mode, bits B0 ... B7 //B0=TorqueLim, 0-not in use, 1=[TorqueReferenceActual] is used as an additional torque limit//B1=TorqueAdd, 0-not in use, 1=TorqueReferenceActual is added to speed control output//B2=Posi
2.9.15	Torq Ref Select	0	0	1	0	Selector for torque reference//0 = not in use//1 = TorqueReference//2 = ExtTorqueReference
2.9.16	TC Spd Lim Sel	0	0	255	0	options for speed limit in torque control mode, bits B0 ... B7 //B0=Update Ramp Generator when MotorControlMode changes from TC (4) to SC (3)//B1=SmartRampDown, When speed limit goes down it rapidly goes to actual value//and then goes to a lower val
2.9.17	Cl Ovr Vlt En	0	0	1	0	Enable CL OverVoltage Controller
2.10	I/O					Menu Name
2.10.1	Digital Inputs					Menu Name
2.10.1.1	DIN1 Slot ID	0	0.0	CrossCon_Ma x	1.0	Configure to the the desired I/O slot and position for the first digital input. Default to slot A digital input 0.
2.10.1.2	DIN2 Slot ID	0	0.0	CrossCon_Ma x	1.1	Configure to the the desired I/O slot and position for the second digital input. Default to slot A digital input 1.
2.10.1.3	DIN3 Slot ID	0	0.0	CrossCon_Ma x	1.2	Configure to the the desired I/O slot and position for the third digital input. Default to slot A digital input 2.
2.10.1.4	DIN4 Slot ID	0	0.0	CrossCon_Ma x	1.3	Configure to the the desired I/O slot and position for the fourth digital input. Default to slot A digital input 0.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.10.1.5	DIN5 Slot ID	0	0.0	CrossCon_Ma x	1.4	Configure to the the desired I/O slot and position for the fifth digital input. Default to slot A digital input 4.
2.10.1.6	DIN6 Slot ID	0	0.0	CrossCon_Ma x	1.5	Configure to the the desired I/O slot and position for the sixth digital input. Default to slot A digital input 5.
2.10.1.7	DIN7 Slot ID	0	0.0	CrossCon_Ma x	0.0	Configure to the the desired I/O slot and position for the seventh digital input. Default to zero.
2.10.1.8	DIN8 Slot ID	0	0.0	CrossCon_Ma x	0.0	Configure to the the desired I/O slot and position for the eighth digital input. Default to zero.
2.10.2	Digital Outputs					Menu Name
2.10.2.1	DOUT1 ID	0	0	2000	1116	First digital output configuration point. Default to Drive fault
2.10.2.2	DOUT1 Slot ID	0	0.00	CrossCon_Ma x	0.10	Configure first digital output to actual I/O location. Default to first output of slot A.
2.10.2.3	DOUT1 Inv	0	0	1	0	Inverts the first digital output when enabled.
2.10.2.4	DOUT2 ID	0	0	2000	1098	Second digital output configuration point. Default to Drive Running
2.10.2.5	DOUT2 Slot ID	0	0.00	CrossCon_Ma x	0.20	Configure second digital output to actual I/O location. Default to first output of slot B.
2.10.2.6	DOUT2 Inv	0	0	1	0	Inverts the second digital output when enabled.
2.10.2.7	DOUT3 ID	0	0	2000	1118	Third digital output configuration point. Default to At zero speed.
2.10.2.8	DOUT3 Slot ID	0	0.00	CrossCon_Ma x	0.21	Configure third digital output to actual I/O location. Default to second output of slot B.
2.10.2.9	DOUT3 Inv	0	0	1	0	Inverts the third digital output when enabled.
2.10.2.10	DOUT4 ID	0	0	2000	1002	Fourth digital output configuration point. Default to zero bit
2.10.2.11	DOUT4 Slot ID	0	0.00	CrossCon_Ma x	0.00	Configure fourth digital output to actual I/O location. Default to no slot. Need additional I/O board.
2.10.2.12	DOUT5 ID	0	0	2000	1002	Fifth digital output configuration point. Default to zero bit
2.10.2.13	DOUT5 Slot ID	0	0.00	CrossCon_Ma x	0.00	Configure fifth digital output to actual I/O location. Default to no slot. Need additional I/O board.
2.10.2.14	DOUT5 Inv	0	0	1	0	Inverts the fifth digital output when enabled.
2.10.2.15	DOUT6 ID	0	0	2000	1002	Sixth digital output configuration point. Default to zero bit
2.10.2.16	DOUT6 Slot ID	0	0.00	CrossCon_Ma x	0.00	Configure sixth digital output to actual I/O location. Default to no slot. Need additional I/O board.
2.10.2.17	DOUT6 Inv	0	0	1	0	Inverts the sixth digital output when enabled.
2.10.3	Analog Inputs					Menu Name
2.10.3.1	AIN1 Slot ID	0	0.000	CrossCon_Ma x	0.010	Configure to the the desired I/O slot and position for the first analog input. Default to slot A analog input 0.
2.10.3.2	AIN1 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.3	AIN1 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.4	AIN1 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.3.5	AIN2 Slot ID	0	0.000	CrossCon_Ma x	0.011	Configure to the the desired I/O slot and position for the second analog input. Default to slot A analog input 1.
2.10.3.6	AIN2 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.7	AIN2 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.8	AIN2 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.3.9	AIN3 Slot ID	0	0.000	CrossCon_Ma x	0.000	Configure to the the desired I/O slot and position for the third analog input. Default to 0. Need additional option boards.
2.10.3.10	AIN3 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.11	AIN3 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.12	AIN3 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.3.13	AIN4 Slot ID	0	0.000	CrossCon_Ma x	0.000	Configure to the the desired I/O slot and position for the fourth analog input. Default to 0. Need additional option boards.
2.10.3.14	AIN4 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.15	AIN4 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.16	AIN4 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.4	Analog Outputs					Menu Name
2.10.4.1	AOUT1 ID	0	0	2000	3	Select value for first analog output. Default to MotorCurrent
2.10.4.2	AOUT1 Zero	0	-327.67	327.67	0.00	Offset for the first analog output.
2.10.4.3	AOUT1 Cal	0	-327.67	327.67	1.00	Multiply for first analog output. 100 equals 1.00
2.10.4.4	AOUT1 TC	0	0.00	5.00	0.10	filter time constant for the first analog out. 100 equals one second.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.10.4.5	AOUT1 Slot ID	0	0	CrossCon_Ma x	10	Selects which slot and address the first analog out goes to. Default to slot A analog output 0.
2.10.4.6	AOUT2 ID	0	0	2000	2	Select value for second analog output. Default to MotorSpeed
2.10.4.7	AOUT2 Zero	0	-327.67	327.67	0.00	Offset for the second analog output.
2.10.4.8	AOUT2 Cal	0	-327.67	327.67	1.00	Multiply for second analog output. 100 equals 1.00
2.10.4.9	AOUT2 TC	0	0.00	5.00	0.10	filter time constant for the second analog out. 100 equals one second.
2.10.4.10	AOUT2 Slot ID	0	0	CrossCon_Ma x	0	Selects which slot and address the second analog out goes to. Default to 0. Need additional option boards.
2.10.5	Encoders					Menu Name
2.10.5.1	Enc1 Slot ID	0	0.000	CrossCon_Ma x	0.000	First encoder slot ID. Default to not present.
2.10.5.2	Enc2 Slot ID	0	0.000	CrossCon_Ma x	0.000	Second encoder slot ID. Default to not present.
2.10.5.3	Enc1 Mlt	0	0.000	32.767	1.000	First encoder scaling multiply value. Used with Enc1_Div
2.10.5.4	Enc1 Div	0	0	32767	1000	First encoder scaling divide value. Used with Enc1_Mlt
2.10.5.5	Enc1 Tc	0	0.00	10.00	0.01	First encoder low pass filter time constant. Default to 10 ms.
2.10.5.6	Enc2 Mlt	0	0.000	32.767	1.000	Second encoder scaling multiply value. Used with Enc2_Div
2.10.5.7	Enc2 Div	0	0	32767	1000	Second encoder scaling divide value. Used with Enc2_Mlt
2.10.5.8	Enc2 Tc	0	0.00	10.00	0.01	Second encoder low pass filter time constant. Default to 10 ms.
2.10.5.9	C_Enc2_Add	0	-327.67	327.67	0.00	Offset for the second encoder input.
2.10.5.10	Counter1 Dec	1294	1	10000	1	Divide number for the first counter scaling. Should be power of tens.
2.10.5.11	Counter1 Mult	1295	0	30000	1	Gain factor for first counter. Used with Counter1 Dec .
2.10.5.12	Counter1 Hld	0	0	2000	1002	Holds the first counter when high
2.10.5.13	Counter1 Res	0	0	2000	1002	Resets the first counter when high
2.10.5.14	Counter1	0	0	1	0	Enables the first footage counter
2.10.5.15	Counter2 Dec	1296	1	10000	1	Divide number for the second counter scaling. Should be power of tens.
2.10.5.16	Counter2 Mult	1297	0	30000	1	Gain factor for second counter. Used with Counter2 Dec .
2.10.5.17	Counter2 Hld	0	0	2000	1002	Holds the second counter when high
2.10.5.18	Counter2 Res	0	0	2000	1002	Resets the second counter when high
2.10.5.19	Counter2	0	0	1	0	Enables the second footage counter
2.10.5.20	Encoder1FiltTime	618	0.0	100.0		Filter time constant for speed measurement.
2.11	Tables					Menu Name
2.11.1	Table0					Menu Name
2.11.1.1	X0	1700	0	32767	0	Table 0 - X0 - Value. See table block descr for details.
2.11.1.2	X1	1701	0	32767	500	Table 0 - X1 - Value. See table block descr for details.
2.11.1.3	X2	1702	0	32767	1000	Table 0 - X2 - Value. See table block descr for details.
2.11.1.4	X3	1703	0	32767	1500	Table 0 - X3 - Value. See table block descr for details.
2.11.1.5	X4	1704	0	32767	2000	Table 0 - X4 - Value. See table block descr for details.
2.11.1.6	X5	1705	0	32767	2500	Table 0 - X5 - Value. See table block descr for details.
2.11.1.7	X6	1706	0	32767	3000	Table 0 - X6 - Value. See table block descr for details.
2.11.1.8	X7	1707	0	32767	3500	Table 0 - X7 - Value. See table block descr for details.
2.11.1.9	X8	1708	0	32767	4000	Table 0 - X8 - Value. See table block descr for details.
2.11.1.10	X9	1709	0	32767	4500	Table 0 - X9 - Value. See table block descr for details.
2.11.1.11	X10	1710	0	32767	5000	Table 0 - X10 - Value. See table block descr for details.
2.11.1.12	X11	1711	0	32767	5500	Table 0 - X11 - Value. See table block descr for details.
2.11.1.13	X12	1712	0	32767	6000	Table 0 - X12 - Value. See table block descr for details.
2.11.1.14	X13	1713	0	32767	6500	Table 0 - X13 - Value. See table block descr for details.
2.11.1.15	X14	1714	0	32767	7000	Table 0 - X14 - Value. See table block descr for details.
2.11.1.16	X15	1715	0	32767	7500	Table 0 - X15 - Value. See table block descr for details.
2.11.1.17	X16	1716	0	32767	8000	Table 0 - X16 - Value. See table block descr for details.
2.11.1.18	X17	1717	0	32767	8500	Table 0 - X17 - Value. See table block descr for details.
2.11.1.19	X18	1718	0	32767	9000	Table 0 - X18 - Value. See table block descr for details.
2.11.1.20	X19	1719	0	32767	9500	Table 0 - X19 - Value. See table block descr for details.
2.11.1.21	X20	1720	0	32767	10000	Table 0 - X20 - Value. See table block descr for details.
2.11.1.22	X21	1721	0	32767	10500	Table 0 - X21 - Value. See table block descr for details.
2.11.1.23	X22	1722	0	32767	11000	Table 0 - X22 - Value. See table block descr for details.
2.11.1.24	X23	1723	0	32767	11500	Table 0 - X23 - Value. See table block descr for details.
2.11.1.25	X24	1724	0	32767	12000	Table 0 - X24 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.1.26	X25	1725	0	32767	12500	Table 0 - X25 - Value. See table block descr for details.
2.11.1.27	X26	1726	0	32767	13000	Table 0 - X26 - Value. See table block descr for details.
2.11.1.28	X27	1727	0	32767	13500	Table 0 - X27 - Value. See table block descr for details.
2.11.1.29	X28	1728	0	32767	14000	Table 0 - X28 - Value. See table block descr for details.
2.11.1.30	X29	1729	0	32767	14500	Table 0 - X29 - Value. See table block descr for details.
2.11.1.31	X30	1730	0	32767	15000	Table 0 - X30 - Value. See table block descr for details.
2.11.1.32	X31	1731	0	32767	15500	Table 0 - X31 - Value. See table block descr for details.
2.11.1.33	X32	1732	0	32767	16000	Table 0 - X32 - Value. See table block descr for details.
2.11.1.34	X33	1733	0	32767	16500	Table 0 - X33 - Value. See table block descr for details.
2.11.1.35	X34	1734	0	32767	17000	Table 0 - X34 - Value. See table block descr for details.
2.11.1.36	X35	1735	0	32767	17500	Table 0 - X35 - Value. See table block descr for details.
2.11.1.37	X36	1736	0	32767	18000	Table 0 - X36 - Value. See table block descr for details.
2.11.1.38	X37	1737	0	32767	18500	Table 0 - X37 - Value. See table block descr for details.
2.11.1.39	X38	1738	0	32767	19000	Table 0 - X38 - Value. See table block descr for details.
2.11.1.40	X39	1739	0	32767	19500	Table 0 - X39 - Value. See table block descr for details.
2.11.1.41	X40	1740	0	32767	20000	Table 0 - X40 - Value. See table block descr for details.
2.11.1.42	X41	1741	0	32767	20500	Table 0 - X41 - Value. See table block descr for details.
2.11.1.43	X42	1742	0	32767	21000	Table 0 - X42 - Value. See table block descr for details.
2.11.1.44	X43	1743	0	32767	21500	Table 0 - X43 - Value. See table block descr for details.
2.11.1.45	X44	1744	0	32767	22000	Table 0 - X44 - Value. See table block descr for details.
2.11.1.46	X45	1745	0	32767	22500	Table 0 - X45 - Value. See table block descr for details.
2.11.1.47	X46	1746	0	32767	23000	Table 0 - X46 - Value. See table block descr for details.
2.11.1.48	X47	1747	0	32767	23500	Table 0 - X47 - Value. See table block descr for details.
2.11.1.49	Y0	1748	-3276.7	3276.7	10.0	Table 0 - Y0 - Value. See table block descr for details.
2.11.1.50	Y1	1749	-3276.7	3276.7	10.0	Table 0 - Y1 - Value. See table block descr for details.
2.11.1.51	Y2	1750	-3276.7	3276.7	10.0	Table 0 - Y2 - Value. See table block descr for details.
2.11.1.52	Y3	1751	-3276.7	3276.7	10.0	Table 0 - Y3 - Value. See table block descr for details.
2.11.1.53	Y4	1752	-3276.7	3276.7	10.0	Table 0 - Y4 - Value. See table block descr for details.
2.11.1.54	Y5	1753	-3276.7	3276.7	10.0	Table 0 - Y5 - Value. See table block descr for details.
2.11.1.55	Y6	1754	-3276.7	3276.7	10.0	Table 0 - Y6 - Value. See table block descr for details.
2.11.1.56	Y7	1755	-3276.7	3276.7	10.0	Table 0 - Y7 - Value. See table block descr for details.
2.11.1.57	Y8	1756	-3276.7	3276.7	10.0	Table 0 - Y8 - Value. See table block descr for details.
2.11.1.58	Y9	1757	-3276.7	3276.7	10.0	Table 0 - Y9 - Value. See table block descr for details.
2.11.1.59	Y10	1758	-3276.7	3276.7	10.0	Table 0 - Y10 - Value. See table block descr for details.
2.11.1.60	Y11	1759	-3276.7	3276.7	10.0	Table 0 - Y11 - Value. See table block descr for details.
2.11.1.61	Y12	1760	-3276.7	3276.7	10.0	Table 0 - Y12 - Value. See table block descr for details.
2.11.1.62	Y13	1761	-3276.7	3276.7	10.0	Table 0 - Y13 - Value. See table block descr for details.
2.11.1.63	Y14	1762	-3276.7	3276.7	10.0	Table 0 - Y14 - Value. See table block descr for details.
2.11.1.64	Y15	1763	-3276.7	3276.7	10.0	Table 0 - Y15 - Value. See table block descr for details.
2.11.1.65	Y16	1764	-3276.7	3276.7	10.0	Table 0 - Y16 - Value. See table block descr for details.
2.11.1.66	Y17	1765	-3276.7	3276.7	10.0	Table 0 - Y17 - Value. See table block descr for details.
2.11.1.67	Y18	1766	-3276.7	3276.7	10.0	Table 0 - Y18 - Value. See table block descr for details.
2.11.1.68	Y19	1767	-3276.7	3276.7	10.0	Table 0 - Y19 - Value. See table block descr for details.
2.11.1.69	Y20	1768	-3276.7	3276.7	10.0	Table 0 - Y20 - Value. See table block descr for details.
2.11.1.70	Y21	1769	-3276.7	3276.7	10.0	Table 0 - Y21 - Value. See table block descr for details.
2.11.1.71	Y22	1770	-3276.7	3276.7	10.0	Table 0 - Y22 - Value. See table block descr for details.
2.11.1.72	Y23	1771	-3276.7	3276.7	10.0	Table 0 - Y23 - Value. See table block descr for details.
2.11.1.73	Y24	1772	-3276.7	3276.7	10.0	Table 0 - Y24 - Value. See table block descr for details.
2.11.1.74	Y25	1773	-3276.7	3276.7	10.0	Table 0 - Y25 - Value. See table block descr for details.
2.11.1.75	Y26	1774	-3276.7	3276.7	10.0	Table 0 - Y26 - Value. See table block descr for details.
2.11.1.76	Y27	1775	-3276.7	3276.7	10.0	Table 0 - Y27 - Value. See table block descr for details.
2.11.1.77	Y28	1776	-3276.7	3276.7	10.0	Table 0 - Y28 - Value. See table block descr for details.
2.11.1.78	Y29	1777	-3276.7	3276.7	10.0	Table 0 - Y29 - Value. See table block descr for details.
2.11.1.79	Y30	1778	-3276.7	3276.7	10.0	Table 0 - Y30 - Value. See table block descr for details.
2.11.1.80	Y31	1779	-3276.7	3276.7	10.0	Table 0 - Y31 - Value. See table block descr for details.
2.11.1.81	Y32	1780	-3276.7	3276.7	10.0	Table 0 - Y32 - Value. See table block descr for details.
2.11.1.82	Y33	1781	-3276.7	3276.7	10.0	Table 0 - Y33 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.1.83	Y34	1782	-3276.7	3276.7	10.0	Table 0 - Y34 - Value. See table block descr for details.
2.11.1.84	Y35	1783	-3276.7	3276.7	10.0	Table 0 - Y35 - Value. See table block descr for details.
2.11.1.85	Y36	1784	-3276.7	3276.7	10.0	Table 0 - Y36 - Value. See table block descr for details.
2.11.1.86	Y37	1785	-3276.7	3276.7	10.0	Table 0 - Y37 - Value. See table block descr for details.
2.11.1.87	Y38	1786	-3276.7	3276.7	10.0	Table 0 - Y38 - Value. See table block descr for details.
2.11.1.88	Y39	1787	-3276.7	3276.7	10.0	Table 0 - Y39 - Value. See table block descr for details.
2.11.1.89	Y40	1788	-3276.7	3276.7	10.0	Table 0 - Y40 - Value. See table block descr for details.
2.11.1.90	Y41	1789	-3276.7	3276.7	10.0	Table 0 - Y41 - Value. See table block descr for details.
2.11.1.91	Y42	1790	-3276.7	3276.7	10.0	Table 0 - Y42 - Value. See table block descr for details.
2.11.1.92	Y43	1791	-3276.7	3276.7	10.0	Table 0 - Y43 - Value. See table block descr for details.
2.11.1.93	Y44	1792	-3276.7	3276.7	10.0	Table 0 - Y44 - Value. See table block descr for details.
2.11.1.94	Y45	1793	-3276.7	3276.7	10.0	Table 0 - Y45 - Value. See table block descr for details.
2.11.1.95	Y46	1794	-3276.7	3276.7	10.0	Table 0 - Y46 - Value. See table block descr for details.
2.11.1.96	Y47	1795	-3276.7	3276.7	10.0	Table 0 - Y47 - Value. See table block descr for details.
2.11.2	Table1					Menu Name
2.11.2.1	X0	1796	0	32767	0	Table 1 - X0 - Value. See table block descr for details.
2.11.2.2	X1	1797	0	32767	1	Table 1 - X1 - Value. See table block descr for details.
2.11.2.3	X2	1798	0	32767	2	Table 1 - X2 - Value. See table block descr for details.
2.11.2.4	X3	1799	0	32767	3	Table 1 - X3 - Value. See table block descr for details.
2.11.2.5	X4	1800	0	32767	4	Table 1 - X4 - Value. See table block descr for details.
2.11.2.6	X5	1801	0	32767	5	Table 1 - X5 - Value. See table block descr for details.
2.11.2.7	X6	1802	0	32767	6	Table 1 - X6 - Value. See table block descr for details.
2.11.2.8	X7	1803	0	32767	7	Table 1 - X7 - Value. See table block descr for details.
2.11.2.9	X8	1804	0	32767	8	Table 1 - X8 - Value. See table block descr for details.
2.11.2.10	X9	1805	0	32767	9	Table 1 - X9 - Value. See table block descr for details.
2.11.2.11	X10	1806	0	32767	10	Table 1 - X10 - Value. See table block descr for details.
2.11.2.12	X11	1807	0	32767	11	Table 1 - X11 - Value. See table block descr for details.
2.11.2.13	X12	1808	0	32767	12	Table 1 - X12 - Value. See table block descr for details.
2.11.2.14	X13	1809	0	32767	13	Table 1 - X13 - Value. See table block descr for details.
2.11.2.15	X14	1810	0	32767	14	Table 1 - X14 - Value. See table block descr for details.
2.11.2.16	X15	1811	0	32767	15	Table 1 - X15 - Value. See table block descr for details.
2.11.2.17	X16	1812	0	32767	16	Table 1 - X16 - Value. See table block descr for details.
2.11.2.18	X17	1813	0	32767	17	Table 1 - X17 - Value. See table block descr for details.
2.11.2.19	X18	1814	0	32767	18	Table 1 - X18 - Value. See table block descr for details.
2.11.2.20	X19	1815	0	32767	19	Table 1 - X19 - Value. See table block descr for details.
2.11.2.21	X20	1816	0	32767	20	Table 1 - X20 - Value. See table block descr for details.
2.11.2.22	X21	1817	0	32767	21	Table 1 - X21 - Value. See table block descr for details.
2.11.2.23	X22	1818	0	32767	22	Table 1 - X22 - Value. See table block descr for details.
2.11.2.24	X23	1819	0	32767	23	Table 1 - X23 - Value. See table block descr for details.
2.11.2.25	X24	1820	0	32767	24	Table 1 - X24 - Value. See table block descr for details.
2.11.2.26	X25	1821	0	32767	25	Table 1 - X25 - Value. See table block descr for details.
2.11.2.27	X26	1822	0	32767	26	Table 1 - X26 - Value. See table block descr for details.
2.11.2.28	X27	1823	0	32767	27	Table 1 - X27 - Value. See table block descr for details.
2.11.2.29	X28	1824	0	32767	28	Table 1 - X28 - Value. See table block descr for details.
2.11.2.30	X29	1825	0	32767	29	Table 1 - X29 - Value. See table block descr for details.
2.11.2.31	X30	1826	0	32767	30	Table 1 - X30 - Value. See table block descr for details.
2.11.2.32	X31	1827	0	32767	31	Table 1 - X31 - Value. See table block descr for details.
2.11.2.33	X32	1828	0	32767	32	Table 1 - X32 - Value. See table block descr for details.
2.11.2.34	X33	1829	0	32767	33	Table 1 - X33 - Value. See table block descr for details.
2.11.2.35	X34	1830	0	32767	34	Table 1 - X34 - Value. See table block descr for details.
2.11.2.36	X35	1831	0	32767	35	Table 1 - X35 - Value. See table block descr for details.
2.11.2.37	X36	1832	0	32767	36	Table 1 - X36 - Value. See table block descr for details.
2.11.2.38	X37	1833	0	32767	37	Table 1 - X37 - Value. See table block descr for details.
2.11.2.39	X38	1834	0	32767	38	Table 1 - X38 - Value. See table block descr for details.
2.11.2.40	X39	1835	0	32767	39	Table 1 - X39 - Value. See table block descr for details.
2.11.2.41	X40	1836	0	32767	40	Table 1 - X40 - Value. See table block descr for details.
2.11.2.42	X41	1837	0	32767	41	Table 1 - X41 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.2.43	X42	1838	0	32767	42	Table 1 - X42 - Value. See table block descr for details.
2.11.2.44	X43	1839	0	32767	43	Table 1 - X43 - Value. See table block descr for details.
2.11.2.45	X44	1840	0	32767	44	Table 1 - X44 - Value. See table block descr for details.
2.11.2.46	X45	1841	0	32767	45	Table 1 - X45 - Value. See table block descr for details.
2.11.2.47	X46	1842	0	32767	46	Table 1 - X46 - Value. See table block descr for details.
2.11.2.48	X47	1843	0	32767	47	Table 1 - X47 - Value. See table block descr for details.
2.11.2.49	Y0	1844	0	32767	1000	Table 1 - Y0 - Value. See table block descr for details.
2.11.2.50	Y1	1845	0	32767	1000	Table 1 - Y1 - Value. See table block descr for details.
2.11.2.51	Y2	1846	0	32767	1000	Table 1 - Y2 - Value. See table block descr for details.
2.11.2.52	Y3	1847	0	32767	1000	Table 1 - Y3 - Value. See table block descr for details.
2.11.2.53	Y4	1848	0	32767	1000	Table 1 - Y4 - Value. See table block descr for details.
2.11.2.54	Y5	1849	0	32767	1000	Table 1 - Y5 - Value. See table block descr for details.
2.11.2.55	Y6	1850	0	32767	1000	Table 1 - Y6 - Value. See table block descr for details.
2.11.2.56	Y7	1851	0	32767	1000	Table 1 - Y7 - Value. See table block descr for details.
2.11.2.57	Y8	1852	0	32767	1000	Table 1 - Y8 - Value. See table block descr for details.
2.11.2.58	Y9	1853	0	32767	1000	Table 1 - Y9 - Value. See table block descr for details.
2.11.2.59	Y10	1854	0	32767	1000	Table 1 - Y10 - Value. See table block descr for details.
2.11.2.60	Y11	1855	0	32767	1000	Table 1 - Y11 - Value. See table block descr for details.
2.11.2.61	Y12	1856	0	32767	1000	Table 1 - Y12 - Value. See table block descr for details.
2.11.2.62	Y13	1857	0	32767	1000	Table 1 - Y13 - Value. See table block descr for details.
2.11.2.63	Y14	1858	0	32767	1000	Table 1 - Y14 - Value. See table block descr for details.
2.11.2.64	Y15	1859	0	32767	1000	Table 1 - Y15 - Value. See table block descr for details.
2.11.2.65	Y16	1860	0	32767	1000	Table 1 - Y16 - Value. See table block descr for details.
2.11.2.66	Y17	1861	0	32767	1000	Table 1 - Y17 - Value. See table block descr for details.
2.11.2.67	Y18	1862	0	32767	1000	Table 1 - Y18 - Value. See table block descr for details.
2.11.2.68	Y19	1863	0	32767	1000	Table 1 - Y19 - Value. See table block descr for details.
2.11.2.69	Y20	1864	0	32767	1000	Table 1 - Y20 - Value. See table block descr for details.
2.11.2.70	Y21	1865	0	32767	1000	Table 1 - Y21 - Value. See table block descr for details.
2.11.2.71	Y22	1866	0	32767	1000	Table 1 - Y22 - Value. See table block descr for details.
2.11.2.72	Y23	1867	0	32767	1000	Table 1 - Y23 - Value. See table block descr for details.
2.11.2.73	Y24	1868	0	32767	1000	Table 1 - Y24 - Value. See table block descr for details.
2.11.2.74	Y25	1869	0	32767	1000	Table 1 - Y25 - Value. See table block descr for details.
2.11.2.75	Y26	1870	0	32767	1000	Table 1 - Y26 - Value. See table block descr for details.
2.11.2.76	Y27	1871	0	32767	1000	Table 1 - Y27 - Value. See table block descr for details.
2.11.2.77	Y28	1872	0	32767	1000	Table 1 - Y28 - Value. See table block descr for details.
2.11.2.78	Y29	1873	0	32767	1000	Table 1 - Y29 - Value. See table block descr for details.
2.11.2.79	Y30	1874	0	32767	1000	Table 1 - Y30 - Value. See table block descr for details.
2.11.2.80	Y31	1875	0	32767	1000	Table 1 - Y31 - Value. See table block descr for details.
2.11.2.81	Y32	1876	0	32767	1000	Table 1 - Y32 - Value. See table block descr for details.
2.11.2.82	Y33	1877	0	32767	1000	Table 1 - Y33 - Value. See table block descr for details.
2.11.2.83	Y34	1878	0	32767	1000	Table 1 - Y34 - Value. See table block descr for details.
2.11.2.84	Y35	1879	0	32767	1000	Table 1 - Y35 - Value. See table block descr for details.
2.11.2.85	Y36	1880	0	32767	1000	Table 1 - Y36 - Value. See table block descr for details.
2.11.2.86	Y37	1881	0	32767	1000	Table 1 - Y37 - Value. See table block descr for details.
2.11.2.87	Y38	1882	0	32767	1000	Table 1 - Y38 - Value. See table block descr for details.
2.11.2.88	Y39	1883	0	32767	1000	Table 1 - Y39 - Value. See table block descr for details.
2.11.2.89	Y40	1884	0	32767	1000	Table 1 - Y40 - Value. See table block descr for details.
2.11.2.90	Y41	1885	0	32767	1000	Table 1 - Y41 - Value. See table block descr for details.
2.11.2.91	Y42	1886	0	32767	1000	Table 1 - Y42 - Value. See table block descr for details.
2.11.2.92	Y43	1887	0	32767	1000	Table 1 - Y43 - Value. See table block descr for details.
2.11.2.93	Y44	1888	0	32767	1000	Table 1 - Y44 - Value. See table block descr for details.
2.11.2.94	Y45	1889	0	32767	1000	Table 1 - Y45 - Value. See table block descr for details.
2.11.2.95	Y46	1890	0	32767	1000	Table 1 - Y46 - Value. See table block descr for details.
2.11.2.96	Y47	1891	0	32767	1000	Table 1 - Y47 - Value. See table block descr for details.
2.11.3	Table2					Menu Name
2.11.3.1	X0	1892	0	32767	0	Table 2 - X0 - Value. See table block descr for details.
2.11.3.2	X1	1893	0	32767	500	Table 2 - X1 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.3.3	X2	1894	0	32767	1000	Table 2 - X2 - Value. See table block descr for details.
2.11.3.4	X3	1895	0	32767	1500	Table 2 - X3 - Value. See table block descr for details.
2.11.3.5	X4	1896	0	32767	2000	Table 2 - X4 - Value. See table block descr for details.
2.11.3.6	X5	1897	0	32767	2500	Table 2 - X5 - Value. See table block descr for details.
2.11.3.7	X6	1898	0	32767	3000	Table 2 - X6 - Value. See table block descr for details.
2.11.3.8	X7	1899	0	32767	3500	Table 2 - X7 - Value. See table block descr for details.
2.11.3.9	X8	1900	0	32767	4000	Table 2 - X8 - Value. See table block descr for details.
2.11.3.10	X9	1901	0	32767	4500	Table 2 - X9 - Value. See table block descr for details.
2.11.3.11	X10	1902	0	32767	5000	Table 2 - X10 - Value. See table block descr for details.
2.11.3.12	X11	1903	0	32767	5500	Table 2 - X11 - Value. See table block descr for details.
2.11.3.13	X12	1904	0	32767	6000	Table 2 - X12 - Value. See table block descr for details.
2.11.3.14	X13	1905	0	32767	6500	Table 2 - X13 - Value. See table block descr for details.
2.11.3.15	X14	1906	0	32767	7000	Table 2 - X14 - Value. See table block descr for details.
2.11.3.16	X15	1907	0	32767	7500	Table 2 - X15 - Value. See table block descr for details.
2.11.3.17	X16	1908	0	32767	8000	Table 2 - X16 - Value. See table block descr for details.
2.11.3.18	X17	1909	0	32767	8500	Table 2 - X17 - Value. See table block descr for details.
2.11.3.19	X18	1910	0	32767	9000	Table 2 - X18 - Value. See table block descr for details.
2.11.3.20	X19	1911	0	32767	9500	Table 2 - X19 - Value. See table block descr for details.
2.11.3.21	X20	1912	0	32767	10000	Table 2 - X20 - Value. See table block descr for details.
2.11.3.22	X21	1913	0	32767	10500	Table 2 - X21 - Value. See table block descr for details.
2.11.3.23	X22	1914	0	32767	11000	Table 2 - X22 - Value. See table block descr for details.
2.11.3.24	X23	1915	0	32767	11500	Table 2 - X23 - Value. See table block descr for details.
2.11.3.25	X24	1916	0	32767	12000	Table 2 - X24 - Value. See table block descr for details.
2.11.3.26	X25	1917	0	32767	12500	Table 2 - X25 - Value. See table block descr for details.
2.11.3.27	X26	1918	0	32767	13000	Table 2 - X26 - Value. See table block descr for details.
2.11.3.28	X27	1919	0	32767	13500	Table 2 - X27 - Value. See table block descr for details.
2.11.3.29	X28	1920	0	32767	14000	Table 2 - X28 - Value. See table block descr for details.
2.11.3.30	X29	1921	0	32767	14500	Table 2 - X29 - Value. See table block descr for details.
2.11.3.31	X30	1922	0	32767	15000	Table 2 - X30 - Value. See table block descr for details.
2.11.3.32	X31	1923	0	32767	15500	Table 2 - X31 - Value. See table block descr for details.
2.11.3.33	X32	1924	0	32767	16000	Table 2 - X32 - Value. See table block descr for details.
2.11.3.34	X33	1925	0	32767	16500	Table 2 - X33 - Value. See table block descr for details.
2.11.3.35	X34	1926	0	32767	17000	Table 2 - X34 - Value. See table block descr for details.
2.11.3.36	X35	1927	0	32767	17500	Table 2 - X35 - Value. See table block descr for details.
2.11.3.37	X36	1928	0	32767	18000	Table 2 - X36 - Value. See table block descr for details.
2.11.3.38	X37	1929	0	32767	18500	Table 2 - X37 - Value. See table block descr for details.
2.11.3.39	X38	1930	0	32767	19000	Table 2 - X38 - Value. See table block descr for details.
2.11.3.40	X39	1931	0	32767	19500	Table 2 - X39 - Value. See table block descr for details.
2.11.3.41	X40	1932	0	32767	20000	Table 2 - X40 - Value. See table block descr for details.
2.11.3.42	X41	1933	0	32767	20500	Table 2 - X41 - Value. See table block descr for details.
2.11.3.43	X42	1934	0	32767	21000	Table 2 - X42 - Value. See table block descr for details.
2.11.3.44	X43	1935	0	32767	21500	Table 2 - X43 - Value. See table block descr for details.
2.11.3.45	X44	1936	0	32767	22000	Table 2 - X44 - Value. See table block descr for details.
2.11.3.46	X45	1937	0	32767	22500	Table 2 - X45 - Value. See table block descr for details.
2.11.3.47	X46	1938	0	32767	23000	Table 2 - X46 - Value. See table block descr for details.
2.11.3.48	X47	1939	0	32767	23500	Table 2 - X47 - Value. See table block descr for details.
2.11.3.49	Y0	1940	-3276.7	3276.7	10.0	Table 2 - Y0 - Value. See table block descr for details.
2.11.3.50	Y1	1941	-3276.7	3276.7	10.0	Table 2 - Y1 - Value. See table block descr for details.
2.11.3.51	Y2	1942	-3276.7	3276.7	10.0	Table 2 - Y2 - Value. See table block descr for details.
2.11.3.52	Y3	1943	-3276.7	3276.7	10.0	Table 2 - Y3 - Value. See table block descr for details.
2.11.3.53	Y4	1944	-3276.7	3276.7	10.0	Table 2 - Y4 - Value. See table block descr for details.
2.11.3.54	Y5	1945	-3276.7	3276.7	10.0	Table 2 - Y5 - Value. See table block descr for details.
2.11.3.55	Y6	1946	-3276.7	3276.7	10.0	Table 2 - Y6 - Value. See table block descr for details.
2.11.3.56	Y7	1947	-3276.7	3276.7	10.0	Table 2 - Y7 - Value. See table block descr for details.
2.11.3.57	Y8	1948	-3276.7	3276.7	10.0	Table 2 - Y8 - Value. See table block descr for details.
2.11.3.58	Y9	1949	-3276.7	3276.7	10.0	Table 2 - Y9 - Value. See table block descr for details.
2.11.3.59	Y10	1950	-3276.7	3276.7	10.0	Table 2 - Y10 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.3.60	Y11	1951	-3276.7	3276.7	10.0	Table 2 - Y11 - Value. See table block descr for details.
2.11.3.61	Y12	1952	-3276.7	3276.7	10.0	Table 2 - Y12 - Value. See table block descr for details.
2.11.3.62	Y13	1953	-3276.7	3276.7	10.0	Table 2 - Y13 - Value. See table block descr for details.
2.11.3.63	Y14	1954	-3276.7	3276.7	10.0	Table 2 - Y14 - Value. See table block descr for details.
2.11.3.64	Y15	1955	-3276.7	3276.7	10.0	Table 2 - Y15 - Value. See table block descr for details.
2.11.3.65	Y16	1956	-3276.7	3276.7	10.0	Table 2 - Y16 - Value. See table block descr for details.
2.11.3.66	Y17	1957	-3276.7	3276.7	10.0	Table 2 - Y17 - Value. See table block descr for details.
2.11.3.67	Y18	1958	-3276.7	3276.7	10.0	Table 2 - Y18 - Value. See table block descr for details.
2.11.3.68	Y19	1959	-3276.7	3276.7	10.0	Table 2 - Y19 - Value. See table block descr for details.
2.11.3.69	Y20	1960	-3276.7	3276.7	10.0	Table 2 - Y20 - Value. See table block descr for details.
2.11.3.70	Y21	1961	-3276.7	3276.7	10.0	Table 2 - Y21 - Value. See table block descr for details.
2.11.3.71	Y22	1962	-3276.7	3276.7	10.0	Table 2 - Y22 - Value. See table block descr for details.
2.11.3.72	Y23	1963	-3276.7	3276.7	10.0	Table 2 - Y23 - Value. See table block descr for details.
2.11.3.73	Y24	1964	-3276.7	3276.7	10.0	Table 2 - Y24 - Value. See table block descr for details.
2.11.3.74	Y25	1965	-3276.7	3276.7	10.0	Table 2 - Y25 - Value. See table block descr for details.
2.11.3.75	Y26	1966	-3276.7	3276.7	10.0	Table 2 - Y26 - Value. See table block descr for details.
2.11.3.76	Y27	1967	-3276.7	3276.7	10.0	Table 2 - Y27 - Value. See table block descr for details.
2.11.3.77	Y28	1968	-3276.7	3276.7	10.0	Table 2 - Y28 - Value. See table block descr for details.
2.11.3.78	Y29	1969	-3276.7	3276.7	10.0	Table 2 - Y29 - Value. See table block descr for details.
2.11.3.79	Y30	1970	-3276.7	3276.7	10.0	Table 2 - Y30 - Value. See table block descr for details.
2.11.3.80	Y31	1971	-3276.7	3276.7	10.0	Table 2 - Y31 - Value. See table block descr for details.
2.11.3.81	Y32	1972	-3276.7	3276.7	10.0	Table 2 - Y32 - Value. See table block descr for details.
2.11.3.82	Y33	1973	-3276.7	3276.7	10.0	Table 2 - Y33 - Value. See table block descr for details.
2.11.3.83	Y34	1974	-3276.7	3276.7	10.0	Table 2 - Y34 - Value. See table block descr for details.
2.11.3.84	Y35	1975	-3276.7	3276.7	10.0	Table 2 - Y35 - Value. See table block descr for details.
2.11.3.85	Y36	1976	-3276.7	3276.7	10.0	Table 2 - Y36 - Value. See table block descr for details.
2.11.3.86	Y37	1977	-3276.7	3276.7	10.0	Table 2 - Y37 - Value. See table block descr for details.
2.11.3.87	Y38	1978	-3276.7	3276.7	10.0	Table 2 - Y38 - Value. See table block descr for details.
2.11.3.88	Y39	1979	-3276.7	3276.7	10.0	Table 2 - Y39 - Value. See table block descr for details.
2.11.3.89	Y40	1980	-3276.7	3276.7	10.0	Table 2 - Y40 - Value. See table block descr for details.
2.11.3.90	Y41	1981	-3276.7	3276.7	10.0	Table 2 - Y41 - Value. See table block descr for details.
2.11.3.91	Y42	1982	-3276.7	3276.7	10.0	Table 2 - Y42 - Value. See table block descr for details.
2.11.3.92	Y43	1983	-3276.7	3276.7	10.0	Table 2 - Y43 - Value. See table block descr for details.
2.11.3.93	Y44	1984	-3276.7	3276.7	10.0	Table 2 - Y44 - Value. See table block descr for details.
2.11.3.94	Y45	1985	-3276.7	3276.7	10.0	Table 2 - Y45 - Value. See table block descr for details.
2.11.3.95	Y46	1986	-3276.7	3276.7	10.0	Table 2 - Y46 - Value. See table block descr for details.
2.11.3.96	Y47	1987	-3276.7	3276.7	10.0	Table 2 - Y47 - Value. See table block descr for details.
2.12	Identification					Menu Name
2.12.1	Flux Curve a	1355	0.0	250.0		Flux linearisation point. Init := 100
2.12.2	Flux Curve b	1356	0.0	250.0		Flux linearisation point. Init := 200
2.12.3	Flux Curve c	1357	0.0	250.0		Flux linearisation point. Init := 300
2.12.4	Flux Curve d	1358	0.0	250.0		Flux linearisation point. Init := 400
2.12.5	Flux Curve e	1359	0.0	250.0		Flux linearisation point. Init := 500
2.12.6	Flux Curve f	1360	0.0	250.0		Flux linearisation point. Init := 600
2.12.7	Flux Curve g	1361	0.0	250.0		Flux linearisation point. Init := 700
2.12.8	Flux Curve h	1362	0.0	250.0		Flux linearisation point. Init := 800
2.12.9	Flux Curve i	1363	0.0	250.0		Flux linearisation point. Init := 900
2.12.10	Flux Curve j	1364	0.0	250.0		Flux linearisation point. Init := 1000
2.12.11	Flux Curve k	1365	0.0	250.0		Flux linearisation point. Init := 1100
2.12.12	Flux Curve l	1366	0.0	250.0		Flux linearisation point. Init := 1200
2.12.13	Flux Curve m	1367	0.0	250.0		Flux linearisation point. Init := 1300
2.12.14	Flux Curve n	1368	0.0	250.0		Flux linearisation point. Init := 1400
2.12.15	Flux Curve o	1369	0.0	250.0		Flux linearisation point. Init := 1500
2.12.16	Mk Flux Time	660	0	60000		[W] Time for magnetize the motor 1 equals 1 ms. Init := 200
2.12.17	Mk Flux Voltage	661	0	30000		[W] Magnetizing voltage. 10000 equals nominal voltage of the motor. Init := 201
2.12.18	Meas Rs V Drop	662	0	30000		[W] Measured Voltage drop at stator resistanse between two phases with nom current of motor. Unit: 256=10%.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.12.19	Mk Flux V Hw Dt	663	0	30000		[W] Magnetizing voltage with hardware dead time compensation. 10000 equals nominal voltage of the motor. Init := 140
2.12.20	Ir Add 0 Pt V	664	0	30000		[W] IrAddVoltage for Zero frequency.
2.12.21	Ir Add Gen Scl	665	0	30000		[W] Scaling factor for generator side IR-compensation (0 ... 200%).
2.12.22	Ir Add Mtr Scl	667	0	30000		[W] Scaling factor for motor side IR-compensation (0 ... 200%). Init := 100
2.12.23	Pwr IU Offset	668	-32000	32000		[W] offset value of U-phase current measurement. 1000=unit nom.
2.12.24	Pwr IV Offset	669	-32000	32000		[W] offset value of V-phase current measurement. 1000=unit nom.
2.12.25	Pwr IW Offset	670	-32000	32000		[W] offset value of W-phase current measurement. 1000=unit nom.
2.12.26	Speed Step	1252	-50.0	50.0		Speed step used for Identification
2.12.27	Torque Step	1253	-300.0	300.0		Torque step used for Identification
2.13	Motor					Menu Name
2.13.1	Self Tune Motor	631	0	Ident_Limit		Identification status. 0 = No Action, 1= No Run, 2 = Run
2.13.2	Motor Nom Current	113	MotorCurrentMi n	MotorCurrent Max		[W] Motor nominal current, I[A] = MotorNomCurrent/CurrentScale//Range[1...65535]//if CurrentScale=10 then 100 equals 10.0 A
2.13.3	Motor Nom Voltg	110	180	690	480	[W] Motor nominal voltage in Volts
2.13.4	Motor Nom Freq	111	8.00	70.00	6.00	[W] Motor nominal frequency in Hz
2.13.5	Motor Nom Speed	112	24	32000	1740	[W] Motor nominal speed in rpm
2.13.6	Motor Ctrl Mode	600	0	ControlModeM ax		0 = Open Loop Frequency control//1 = Open Loop Speed control//2 = Open Loop Torque control//3 = Closed Loop Speed control (NXP only)//4 = Closed Loop Torque control (NXP only)//5 = Advanced Open Loop Frequency control (NXP only)//6 = Advanced Open Loop Speed control (NXP only)//
2.13.7	Motor Ctrl Mode2	521	0	ControlModeM ax		0 = Open Loop Frequency control//1 = Open Loop Speed control//2 = Open Loop Torque control//3 = Closed Loop Speed control (NXP only)//4 = Closed Loop Torque control (NXP only)//5 = Advanced Open Loop Frequency control (NXP only)//6 = Advanced Open Loop Speed control (NXP only)
2.13.8	MotorType	0	0	1		0 = Induction motor, 1 = perm magnet//1 = Permanent magnet synchronous motor
2.13.9	DC-Brake Current	507	MotorC urrentMi n	UnitVTCURRENT		
2.13.10	Stop DC-BrakeFr	515	0.10	10.00		[W] Dc-brake is allowed under this frequency limit, If FreqScale=100 then 5000 equals 50.00 Hz.
2.13.11	FluxBrakeCurrent	519	MotorC urrentMi n	UnitVTCURRENT		[W] Flux brake current[A]=FluxBrakeCurrent/CurrentScale, if CurrentScale=10 then 100 equals 10.0 A Default=MotorNomCurrent.
2.13.12	Voltage at FWP	603	10.00	200.00		[W] Motor voltage (%*NotorNomVoltage) at field weakening point//(1000...10500) equals (10.0 ...105.00) % * MotorNomVoltage
2.13.13	U/f Mid Freq	604	0.00	FieldWeakeni ngPoint	5.00	[W] Programmable U/F curve middle point, f[Hz] = UFMidPoint/FreqScale//Range[0...FieldWeakeningPoint]//If FreqScale=100 then 5000 equals 50.00 Hz
2.13.14	U/f Mid Voltg	605	0.00	100.00		[W] Motor voltage (%*MotorNomVoltage) at programmable U/F curve middle point//(1000...10500) equals (10.0 ...105.00) % * MotorNomVoltage
2.13.15	Zero Freq Voltg	606	0.00	40.00		[W] Motor voltage (%*MotorNomVoltage) at programmable U/F curve zero point//(1000...10500) equals (10.0 ...105.00) % * MotorNomVoltage
2.13.16	Switching Freq	601	1.0	SwitchingFreq Max		[W] Switching frequency in 0.1 kHz, Range[1...400]
2.13.17	MagnCurrent	612	0.00	100.00		Rated magnetizing current for the motor. It is used to adjust the motor voltage in no-load condition.
2.13.18	Slip Adjust	619	0	500		The motor name plate speed is used to calculate nominal slip. This value should be used to adjust motor voltage when loaded. Reducing the slip adjust value increases the motor voltage when loaded.
2.13.19	Start Magn Curr	627	MotorC urrentMi n	UnitVTCURRENT		Mode 5 starting magnetizing current
2.13.20	Stop St Magn I	0	0.0	100.0	50.0	Stop state magnetisation (0...1000) = 0 ... 100% of nominal magnetising current
2.13.21	Stop St Magn Tim	0	0	32000	0	Maximum time for stop state magnetisation in s, (0...32000), 0=not in use, negative=infinite
2.13.22	Startup Trq Sel	621	0	3		Startup torque is used to reduce erratic motion after start. Torque Memory is used in crane applications. Startup Torque FWD/REV can be used in other applications to help speed controller.//0 = Not Used//1 = TorqMemory//2 = Torque Ref//3 = Torq.Fwd/Rev//

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.13.23	StartupTorq FWD	633	-300.0	300.0		Startup Torque for forward direction if selected with StartUp Torq Sel.
2.13.24	StartupTorq REV	634	-300.0	300.0		Startup Torque for reverse direction if selected with StartUp Torq Sel.
2.13.25	0 Speed Current	625	0.0	250.0		At very low frequencies this parameter defines the constant current reference to the motor.
2.13.26	M5 Min Curr Ref	622	0.0	100.0		Minimum current to the motor in the current control frequency region. Larger value gives more torque, but increases losses.
2.13.27	FluxReference	623	0.0	100.0		Reference for flux below frequency limit. Larger value gives more torque, but increases losses.
2.13.28	M5 Freq 3	635	0.0	100.0		Corner frequency for transition to standard V/Hz control in % of motor nominal frequency.
2.13.29	OL TC Min Freq	636	0.00	FreqMax		Minimum operation frequency of open loop torque control,f[Hz].//Init := 300
2.13.30	Local Reference	0	-32767	32767	0	Not used.
2.13.31	Stop DC-BrakeTm	508	0.00	600.00		Time it takes to stop the drive in seconds.
2.13.32	Start DC-BrakeTm	516	0.00	600.00		[W] Dc brake time [ms] in ramp start. Init := 0
2.13.33	Start Magn Time	628	0.00	600.00		Dc brake time [ms] in ramp start.
2.13.34	Motor Cos Phi	120	0.30	1.00		:= 85
2.13.35	U/f Ratio Select	108	0	3		[W] U/F ratio selection, 0=linear, 1=squared, 2=programmable
2.13.36	U/f Optimization	109	0	1	Not defined	[W] U/F optimization selection, 0=none, 1=automatic torque boost
2.13.37	Flux Brake	520	0	1		[W] 1=flux brakeing is enabled.
2.13.38	Mtr Ctrl Sw	0	0	2000	1002	Selects between different motor control schemes. Default to Zero Bit.
2.13.39	U/f Boost	632	0.00	40.00		Used if Motor Control mode= 5 or 6
2.13.40	Cl Ovr Vlt Ref	0	100.00	200.00		CL OverVoltage Controller reference (10000 = 100.00%)
2.14	Comms					Menu Name
2.14.1	Fieldbus					Menu Name
2.14.1.1	FB_Bit08	0	0	2000	1002	First output field bus bit configuration point.
2.14.1.2	FB Bit09	0	0	2000	1002	Second field bus output bit configuration point.
2.14.1.3	FB Bit10	0	0	2000	1002	Third field bus output bit configuration point.
2.14.1.4	FB Bit11	0	0	2000	1002	Fourth field bus output bit configuration point.
2.14.1.5	FB Bit12	0	0	2000	1002	Fifth field bus output bit configuration point.
2.14.1.6	FB Bit13	0	0	2000	1002	Sixth field bus output bit configuration point.
2.14.1.7	FB Bit14	0	0	2000	1002	Seventh field bus output bit configuration point.
2.14.1.8	FB Bit15	0	0	2000	1002	Eighth field bus output bit configuration point.
2.14.1.9	FB AOUT1	0	0	2000	1200	Configuration to send to FBProcessDataOUT1
2.14.1.10	FB AOUT2	0	0	2000	1200	Configuration to send to FBProcessDataOUT2
2.14.1.11	FB AOUT3	0	0	2000	1200	Configuration to send to FBProcessDataOUT3
2.14.1.12	FB AOUT4	0	0	2000	1200	Configuration to send to FBProcessDataOUT4
2.14.1.13	FB AOUT5	0	0	2000	1200	Configuration to send to FBProcessDataOUT5
2.14.1.14	FB AOUT6	0	0	2000	1200	Configuration to send to FBProcessDataOUT6
2.14.1.15	FB AOUT7	0	0	2000	1200	Configuration to send to FBProcessDataOUT7
2.14.1.16	FB AOUT8	0	0	2000	1200	Configuration to send to FBProcessDataOUT8
2.14.2	System Bus					Menu Name
2.14.2.1	SBId	0	0	63	0	SystemBus identification number 0 through 63.
2.14.2.2	SBNextId	0	0	63	1	SystemBus next devices id number 0 - 63.
2.14.2.3	SB Mode	0	0	3	0	System bus mode. 0 = Disabled, 1= Master, 2 = Slave, 3 = Both (Not supported yet)
2.14.2.4	SB Out Int1	0	0	2000	1200	System Bus first configurable output to the slaves.
2.14.2.5	SB Out Int2	0	0	2000	1200	System Bus second configurable output to the slaves.
2.14.2.6	SB Bit Out1	0	0	2000	1002	If drive is a system bus master this is the first configurable bit output to slave sections.
2.14.2.7	SB Bit Out2	0	0	2000	1002	If drive is a system bus master this is the second configurable bit output to slave sections.
2.14.2.8	SB Bit Out3	0	0	2000	1002	If drive is a system bus master this is the third configurable bit output to slave sections.
2.14.2.9	SB Bit Out4	0	0	2000	1002	If drive is a system bus master this is the fourth configurable bit output to slave sections.
2.14.2.10	SB Bit Out5	0	0	2000	1002	If drive is a system bus master this is the fifth configurable bit output to slave sections.
2.14.2.11	SB Bit Out6	0	0	2000	1002	If drive is a system bus master this is the sixth configurable bit output to slave sections.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.14.2.12	SB Bit Out7	0	0	2000	1002	If drive is a system bus master this is the seventh configurable bit output to slave sections.
2.14.2.13	SB Bit Out8	0	0	2000	1002	If drive is a system bus master this is the eighth configurable bit output to slave sections.
2.14.2.14	SB Comm Flt Resp	0	0	3	3	Response to system bus error.
2.14.2.15	SB Comm Flt Tim	0	0.00	10.00	0.20	System bus communication fault timer. Default at 200 ms.
2.14.3	Can I/O					Menu Name
2.14.3.1	Can Out1	0	0	2000	1002	First Can digital output configuration point.
2.14.3.2	Can Out2	0	0	2000	1002	Second Can digital output configuration point.
2.14.3.3	Can Out3	0	0	2000	1002	Third Can digital output configuration point.
2.14.3.4	Can Out4	0	0	2000	1002	Fourth Can digital output configuration point.
2.14.3.5	Can AOut1	0	0	2000	1200	First Can analog output configuration point.
2.14.3.6	Can AOut2	0	0	2000	1200	Second Can analog output configuration point.
2.14.3.7	Can AOut3	0	0	2000	1200	Third Can analog output configuration point.
2.14.3.8	Can AOut4	0	0	2000	1200	Fourth Can analog output configuration point.
2.14.3.9	Can AIn1 Mlt	0	-327.67	327.67	1.00	Gain on first Can analog input. Default 1.00
2.14.3.10	Can AIn1 Off	0	-327.67	327.67	0.00	Offset for first Can analog input.
2.14.3.11	Can AIn1 TC	0	0.00	5.00	0.10	Low pass filter time constant for the first Can analog input. Default to 0.1 seconds
2.14.3.12	Can AIn2 Mlt	0	-327.67	327.67	1.00	Gain on second Can analog input. Default 1.00
2.14.3.13	Can AIn2 Off	0	-327.67	327.67	0.00	Offset for second Can analog input.
2.14.3.14	Can AIn2 TC	0	0.00	5.00	0.10	Low pass filter time constant for the second Can analog input. Default to 0.1 seconds
2.14.3.15	Can AIn3 Mlt	0	-327.67	327.67	1.00	Gain on third Can analog input. Default 1.00
2.14.3.16	Can AIn3 Off	0	-327.67	327.67	0.00	Offset for third Can analog input.
2.14.3.17	Can AIn3 TC	0	0.00	5.00	0.10	Low pass filter time constant for the third Can analog input. Default to 0.1 seconds
2.14.3.18	Can AIn4 Mlt	0	-327.67	327.67	1.00	Gain on fourth Can analog input. Default 1.00
2.14.3.19	Can AIn4 Off	0	-327.67	327.67	0.00	Offset for fourth Can analog input.
2.14.3.20	Can AIn4 TC	0	0.00	5.00	0.10	Low pass filter time constant for the fourth Can analog input. Default to 0.1 seconds
2.14.3.21	Can AOut1 Mlt	0	-327.67	327.67	1.00	Gain on first Can analog output. Default 1.00
2.14.3.22	Can AOut1 Off	0	-327.67	327.67	0.00	Offset for first Can analog output.
2.14.3.23	Can AOut1 TC	0	0.00	5.00	0.10	Low pass filter time constant for the first Can analog output. Default to 0.1 seconds
2.14.3.24	Can AOut2 Mlt	0	-327.67	327.67	1.00	Gain on second Can analog output. Default 1.00
2.14.3.25	Can AOut2 Off	0	-327.67	327.67	0.00	Offset for second Can analog output.
2.14.3.26	Can AOut2 TC	0	0.00	5.00	0.10	Low pass filter time constant for the second Can analog output. Default to 0.1 seconds
2.14.3.27	Can AOut3 Mlt	0	-327.67	327.67	1.00	Gain on third Can analog output. Default 1.00
2.14.3.28	Can AOut3 Off	0	-327.67	327.67	0.00	Offset for third Can analog output.
2.14.3.29	Can AOut3 TC	0	0.00	5.00	0.10	Low pass filter time constant for the third Can analog output. Default to 0.1 seconds
2.14.3.30	Can AOut4 Mlt	0	-327.67	327.67	1.00	Gain on fourth Can analog output. Default 1.00
2.14.3.31	Can AOut4 Off	0	-327.67	327.67	0.00	Offset for fourth Can analog output.
2.14.3.32	Can AOut4 TC	0	0.00	5.00	0.10	Low pass filter time constant for the fourth Can analog output. Default to 0.1 seconds
2.15	Constants					Menu Name
2.15.1	One Bit	1001	0	1		Always set TRUE.
2.15.2	Zero Bit	1002	0	0		Always FALSE.
2.15.3	Zero Analog	1200	0	0		Always zero integer.
2.15.4	One Analog	1201	1	1		Always one integer
2.15.5	Int Ten	1202	10	10		Always 10. Used for scaling
2.15.6	Int Hundred	1203	100	100		Always 100 integer. Used for scaling.
2.15.7	Int Thousand	1204	1000	1000		Always 1000. Used for scaling.
3	Keypad Control					Menu Name
3.1	Keypad Spd Dir	123	0	1		Keypad control direction.
3.2	Keypad_Spd_ref					
3.3	Keypad Trq Dir	0	0	1	0	Keypad control torque direction.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
3.4	Keypad Trq Ref					
4	Active Faults					Menu Name
5	Fault History					Menu Name
6	System Menu					Menu Name
7	Expander boards					Menu Name
7.1						Menu Name
7.2						Menu Name
7.3						Menu Name
7.4						Menu Name
7.5						Menu Name

APPENDIX C

ALPHABETICAL CROSS-REFERENCE

NAME	ID	MENU
	1072	1.2.76
	1073	1.2.77
	1074	1.2.78
0 Speed Current	625	2.13.25
3 Wire St En	0	2.9.4
A_FB_AIN1	1611	1.6.2.1
A_FB_AIN10	1620	1.6.2.10
A_FB_AIN2	1612	1.6.2.2
A_FB_AIN3	1613	1.6.2.3
A_FB_AIN4	1614	1.6.2.4
A_FB_AIN5	1615	1.6.2.5
A_FB_AIN6	1616	1.6.2.6
A_FB_AIN7	1617	1.6.2.7
A_FB_AIN8	1618	1.6.2.8
A_FB_AIN9	1619	1.6.2.9
Abs Fil Spd	1519	1.3.66
ABS RJT Ref	1570	1.3.25
Accel Comp	1566	1.3.58
Accel Comp Tc	0	2.3.16
Accel Inp	0	2.8.5
Accel Time 1	103	2.3.1
Accel.Compens.	626	2.4.9
Acceleration Tim	0	1.3.32
Active Flt Last	37	1.3.56
AI 1	0	1.5.1
AI 2	0	1.5.3
AI 3	0	1.5.5
AI 4	0	1.5.7
AI1 Type	0	1.5.2
AI2 Type	0	1.5.4
AI3 Type	0	1.5.6
AI4 Type	0	1.5.8
AIN1	1601	1.5.9
AIN1 Fault	0	1.5.13
AIN1 Gain	0	2.10.3.2
AIN1 Off	0	2.10.3.3
AIN1 Slot ID	0	2.10.3.1
AIN1 Tc	0	2.10.3.4
AIN2	1602	1.5.10
AIN2 Fault	0	1.5.14
AIN2 Gain	0	2.10.3.6
AIN2 Off	0	2.10.3.7
AIN2 Slot ID	0	2.10.3.5
AIN2 Tc	0	2.10.3.8
AIN3	1603	1.5.11
AIN3 Fault	0	1.5.15

NAME	ID	MENU
AIN3 Gain	0	2.10.3.10
AIN3 Off	0	2.10.3.11
AIN3 Slot ID	0	2.10.3.9
AIN3 Tc	0	2.10.3.12
AIN4	1604	1.5.12
AIN4 Fault	0	1.5.16
AIN4 Gain	0	2.10.3.14
AIN4 Off	0	2.10.3.15
AIN4 Slot ID	0	2.10.3.13
AIN4 Tc	0	2.10.3.16
AOUT1 Cal	0	2.10.4.3
AOUT1 ID	0	2.10.4.1
AOUT1 Slot ID	0	2.10.4.5
AOUT1 TC	0	2.10.4.4
AOUT1 Val	1590	1.5.17
AOUT1 Zero	0	2.10.4.2
AOUT2 Cal	0	2.10.4.8
AOUT2 ID	0	2.10.4.6
AOUT2 Slot ID	0	2.10.4.10
AOUT2 TC	0	2.10.4.9
AOUT2 Val	1591	1.5.18
AOUT2 Zero	0	2.10.4.7
At Zero Spd	1127	1.2.53
At Zero Time	0	2.7.9
Auto Rst ExtF T	725	2.1.40
Auto Rst Mtr OT	726	2.1.39
Auto Rst OC Trls	722	2.1.38
Auto Rst OV Trls	721	2.1.37
Auto Rst StartM	719	2.1.35
Auto Rst SVTime	718	2.1.34
Auto Rst Uload T	738	2.1.41
Auto Rst UV Trls	720	2.1.36
Auto Rst Wait	717	2.1.33
Brake Chopper	1509	1.3.36
Brake Chopper	0	2.9.7
BrakeResistor	1511	1.3.38
C_Enc2_Add	0	2.10.5.9
C1 Overflow	1124	1.2.30
C1_1	0	1.5.21
C1_2	0	1.5.22
C1_3	0	1.5.23
C2 Overflow	1126	1.2.31
C2_1	0	1.5.24
C2_2	0	1.5.25
C2_3	0	1.5.26
Can Aln 1	1640	1.8.1

NAME	ID	MENU
Can AIn 2	1641	1.8.2
Can AIn 3	1642	1.8.3
Can AIn 4	1643	1.8.4
Can AIn1 Mlt	0	2.14.3.9
Can AIn1 Off	0	2.14.3.10
Can AIn1 TC	0	2.14.3.11
Can AIn2 Mlt	0	2.14.3.12
Can AIn2 Off	0	2.14.3.13
Can AIn2 TC	0	2.14.3.14
Can AIn3 Mlt	0	2.14.3.15
Can AIn3 Off	0	2.14.3.16
Can AIn3 TC	0	2.14.3.17
Can AIn4 Mlt	0	2.14.3.18
Can AIn4 Off	0	2.14.3.19
Can AIn4 TC	0	2.14.3.20
Can AOut1	0	2.14.3.5
Can AOut1 Mlt	0	2.14.3.21
Can AOut1 Off	0	2.14.3.22
Can AOut1 TC	0	2.14.3.23
Can AOut2	0	2.14.3.6
Can AOut2 Mlt	0	2.14.3.24
Can AOut2 Off	0	2.14.3.25
Can AOut2 TC	0	2.14.3.26
Can AOut3	0	2.14.3.7
Can AOut3 Mlt	0	2.14.3.27
Can AOut3 Off	0	2.14.3.28
Can AOut3 TC	0	2.14.3.29
Can AOut4	0	2.14.3.8
Can AOut4 Mlt	0	2.14.3.30
Can AOut4 Off	0	2.14.3.31
Can AOut4 TC	0	2.14.3.32
Can Bus Flt	1029	1.8.9
Can Comm flt Res	0	2.1.44
Can In 1	1030	1.8.5
Can In 2	1031	1.8.6
Can In 3	1032	1.8.7
Can In 4	1033	1.8.8
Can Out1	0	2.14.3.1
Can Out2	0	2.14.3.2
Can Out3	0	2.14.3.3
Can Out4	0	2.14.3.4
CI Ovr Mtr Lim	0	2.5.21
CI Ovr Vlt En	0	2.9.17
CI Ovr Vlt Kp	0	2.4.35
CI Ovr Vlt Kp0	0	2.4.36
CI Ovr Vlt Ref	0	2.13.40
CI Ovr Vlt Ti	0	2.4.37
CM0	1100	1.2.61
CM0	1100	1.4.19
CM1	1101	1.2.62
CM1	1101	1.4.20
CM2	1102	1.2.63
CM2	1102	1.4.21
CM3	1103	1.4.22
CM3	1103	1.2.64
Cntrl Inhib	1099	1.2.2
Cntrl Mode	1506	1.3.19
Coast Stop	0	2.7.8
Com WD	0	2.1.43

NAME	ID	MENU
Con Mode	1251	2.2.19
Con Mode Inp	0	2.8.35
Control Place	1505	1.3.18
Counter1	0	2.10.5.14
Counter1	1528	1.5.27
Counter1 Dec	1294	2.10.5.10
Counter1 Hld	0	2.10.5.12
Counter1 Mult	1295	2.10.5.11
Counter1 Res	0	2.10.5.13
Counter2	1529	1.5.28
Counter2	0	2.10.5.19
Counter2 Dec	1296	2.10.5.15
Counter2 Hld	0	2.10.5.17
Counter2 Mult	1297	2.10.5.16
Counter2 Res	0	2.10.5.18
Curr Cntrl Ti	0	2.4.13
Current Scale	0	1.3.65
CurrentControlKp	617	2.4.12
DC Brk Cmd	0	2.7.10
DC_Link V Unfil	44	1.3.8
DC-Brake Current	507	2.13.9
DCBrake Mlt	1293	2.6.3
DCBrake Scl Inp	0	2.8.11
DCVoltage	7	1.3.7
Decel Time	0	2.8.6
Decel Time 1	104	2.3.2
DecelerationTime	0	1.3.33
DIN 1	1011	1.4.1
DIN 2	1012	1.4.2
DIN 3	1013	1.4.3
DIN 4	1014	1.4.4
DIN 5	1015	1.4.5
DIN 6	1016	1.4.6
DIN 7	1017	1.4.7
DIN 8	1018	1.4.8
DIN1 Slot ID	0	2.10.1.1
DIN123 Status	15	1.4.9
DIN2 Slot ID	0	2.10.1.2
DIN3 Slot ID	0	2.10.1.3
DIN4 Slot ID	0	2.10.1.4
DIN456 Status	16	1.4.10
DIN5 Slot ID	0	2.10.1.5
DIN6 Slot ID	0	2.10.1.6
DIN7 Slot ID	0	2.10.1.7
DIN8 Slot ID	0	2.10.1.8
Disable Ramp	0	2.7.11
DOUT1 ID	0	2.10.2.1
DOUT1 Inv	0	2.10.2.3
DOUT1 Slot ID	0	2.10.2.2
DOUT2 ID	0	2.10.2.4
DOUT2 Inv	0	2.10.2.6
DOUT2 Slot ID	0	2.10.2.5
DOUT3 ID	0	2.10.2.7
DOUT3 Inv	0	2.10.2.9
DOUT3 Slot ID	0	2.10.2.8
DOUT4 ID	0	2.10.2.10
DOUT4 Slot ID	0	2.10.2.11
DOUT5 ID	0	2.10.2.12
DOUT5 Inv	0	2.10.2.14

NAME	ID	MENU
DOUT5 Slot ID	0	2.10.2.13
DOUT6 ID	0	2.10.2.15
DOUT6 Inv	0	2.10.2.17
DOUT6 Slot ID	0	2.10.2.16
Drive OK	1088	1.2.1
DUT Max Spd	1250	2.5.25
Earth Fault	703	2.1.16
Enc1 Div	0	2.10.5.4
Enc1 Mlt	0	2.10.5.3
Enc1 Slot ID	0	2.10.5.1
Enc1 Tc	0	2.10.5.5
Enc1_Out	1609	1.5.19
Enc2 Div	0	2.10.5.7
Enc2 Mlt	0	2.10.5.6
Enc2 Slot ID	0	2.10.5.2
Enc2 Tc	0	2.10.5.8
Enc2_Out	1610	1.5.20
Encoder1FiltTime	618	2.10.5.20
ESS Dn	1104	1.2.55
ESS En	1105	1.2.56
ESS Int Gn	1249	2.4.38
ESS Lit	0	1.2.57
ESS Lit Stpt	0	2.8.36
ESS Lit Stpt	1248	2.2.20
ESS Not Lit	1107	1.2.58
Est DC Nom V	1567	1.3.37
Ext Fault	0	1.2.36
Ext Fault Inp	0	2.1.10
Ext Flt Resp	701	2.1.11
Ext Warn	0	1.2.37
Fast Stop	0	2.7.7
Fast Stop Tim	503	2.3.4
Fault Reset	0	2.1.1
Fault Start En	0	2.9.12
FB AOUT1	0	2.14.1.9
FB AOUT2	0	2.14.1.10
FB AOUT3	0	2.14.1.11
FB AOUT4	0	2.14.1.12
FB AOUT5	0	2.14.1.13
FB AOUT6	0	2.14.1.14
FB AOUT7	0	2.14.1.15
FB AOUT8	0	2.14.1.16
FB Bit00	1040	1.6.1.1
FB Bit01	1041	1.6.1.2
FB Bit02	1042	1.6.1.3
FB Bit03	1043	1.6.1.4
FB Bit04	1044	1.6.1.5
FB Bit05	1045	1.6.1.6
FB Bit06	1046	1.6.1.7
FB Bit07	1047	1.6.1.8
FB Bit09	0	2.14.1.2
FB Bit10	0	2.14.1.3
FB Bit11	0	2.14.1.4
FB Bit12	0	2.14.1.5
FB Bit13	0	2.14.1.6
FB Bit14	0	2.14.1.7
FB Bit15	0	2.14.1.8
FB Data Out 1	1622	1.6.3.1
FB Data Out 2	1623	1.6.3.2

NAME	ID	MENU
FB Data Out 3	1624	1.6.3.3
FB Data Out 4	1625	1.6.3.4
FB Data Out 5	1626	1.6.3.5
FB Data Out 6	1627	1.6.3.6
FB Data Out 7	1628	1.6.3.7
FB Data Out 8	1629	1.6.3.8
FB Fault Act	0	1.2.41
FB Fix Cntrl Wrd	1621	1.6.1.9
FB Spd Ref	1632	1.6.2.11
FB_Bit08	0	2.14.1.1
FBComm.FaultResp	733	2.1.31
Field WeakngPnt	602	2.2.9
Final Freq Ref	1540	1.3.29
Final Iq Trq Ref	1539	1.3.62
Final Trq Ref	1542	1.3.10
Flux Brake	520	2.13.37
Flux Curve a	1355	2.12.1
Flux Curve b	1356	2.12.2
Flux Curve c	1357	2.12.3
Flux Curve d	1358	2.12.4
Flux Curve e	1359	2.12.5
Flux Curve f	1360	2.12.6
Flux Curve g	1361	2.12.7
Flux Curve h	1362	2.12.8
Flux Curve i	1363	2.12.9
Flux Curve j	1364	2.12.10
Flux Curve k	1365	2.12.11
Flux Curve l	1366	2.12.12
Flux Curve m	1367	2.12.13
Flux Curve n	1368	2.12.14
Flux Curve o	1369	2.12.15
FluxBrakeCurrent	519	2.13.11
FluxReference	623	2.13.27
Fly Strt Flt	0	2.9.3
Freq Delta	1508	1.3.34
Freq Error	0	1.3.31
Freq Max	102	2.5.1
Freq out	1	1.3.30
Freq Ramp Out	1568	1.3.35
Freq Ref 3	0	1.3.27
Freq Ref Act	1571	1.3.28
Freq Ref LP TC	1309	2.3.8
Freq Reference	1507	1.3.24
FreqRamp	0	2.6.10
FreqReference	25	1.3.26
Gen I Lim En	0	2.9.11
Gen I Lim Ki	0	2.4.26
Gen I Lim Kp	0	2.4.27
Gener Trq Lim	1306	2.5.5
Goto ESS	1108	1.2.59
Goto Spd	1109	1.2.60
Id Ref Actual	1546	1.3.14
Ident Warn	0	1.2.40
IGBT Temp Fault	0	1.2.35
In Ess	1061	1.2.65
In Rem Spd	1062	1.2.66
In Rem Trq	1063	1.2.67
Input Ph. Superv	730	2.1.13
Int Hundred	1203	2.15.6

NAME	ID	MENU
Int Ten	1202	2.15.5
Int Thousand	1204	2.15.7
Iq Ref Actual	1545	1.3.13
Ir Add 0 Pt V	664	2.12.20
Ir Add Gen Scl	665	2.12.21
Ir Add Mtr Scl	667	2.12.22
Jog enable	1094	1.2.15
Jog F En	1093	1.2.16
Jog F Input	0	2.7.3
Jog F Ref	0	2.8.3
Jog F Speed	1256	2.2.3
Jog FR Input	1087	1.2.18
Jog R En	1092	1.2.17
Jog R Input	0	2.7.4
Jog R Ref	0	2.8.4
Jog R Speed	1257	2.2.4
Keypad Spd Dir	123	3.1
Keypad Trq Dir	0	3.3
Keypad Trq Ref		3.4
Keypad_Spd_ref		3.2
Lit Spd Inp	0	2.8.37
Lit Speed	1247	2.2.21
Loc Trq Bit	0	2.7.43
Local Reference	0	2.13.30
Local Stop Flt	1112	1.2.24
Loss Tbl Gn	1246	2.6.13
Loss Tbl Inp	0	2.8.38
Loss Tbl Out	1518	1.3.67
LS Scl Div	0	2.6.2
LS to Freq	0	2.6.1
M Spd Stpt	1245	2.2.22
M Trq Stpt	1244	2.2.23
M5 Freq 3	635	2.13.28
M5 Min Curr Ref	622	2.13.26
MagnCurrent	612	2.13.17
Main Trq Inp	0	2.8.40
Maint Bit	0	2.7.44
Maint Spd Inp	0	2.8.39
Maint Spd Mode	0	2.7.45
Master Ref	0	2.8.1
Max ESS Lim	1243	2.5.27
Max Spd RPM	1292	2.5.24
MC AtSpeed	1118	1.2.7
MC Fault	1116	1.2.5
MC Ready	1115	1.2.4
MC Reverse	1086	1.2.6
MC Run	1098	1.2.3
MC Warning	1117	1.2.8
MD Bit In1	1050	1.7.9
MD Bit In2	1051	1.7.10
MD Bit In3	1052	1.7.11
MD Bit In4	1053	1.7.12
MD Bit In5	1054	1.7.13
MD Bit In6	1055	1.7.14
MD Bit In7	1056	1.7.15
MD Bit In8	1057	1.7.16
MD Drive OK	1058	1.7.17
MD One Bit	1059	1.7.18
MD Run Enable	1060	1.7.19

NAME	ID	MENU
MD WD OK	1172	1.7.2
Meas Rs V Drop	662	2.12.18
Min ESS Lim	0	2.5.26
Min Frequency	101	2.5.2
Mk Flux Time	660	2.12.16
Mk Flux V Hw Dt	663	2.12.19
Mk Flux Voltage	661	2.12.17
Mot Therm 0 Spd	706	2.1.19
MotAmbTempFactor	705	2.1.18
Motor Cos Phi	120	2.13.34
Motor Ctrl Mode	600	2.13.6
Motor Ctrl Mode2	521	2.13.7
Motor Current	3	1.3.2
Motor Duty Cycle	708	2.1.21
Motor Nom Currnt	113	2.13.2
Motor Nom Freq	111	2.13.4
Motor Nom Speed	112	2.13.5
Motor Nom Voltg	110	2.13.3
Motor Power	5	1.3.5
Motor Speed	2	1.3.1
Motor Torque	4	1.3.4
Motor Voltage	6	1.3.6
MotorCurLimit	1526	1.3.42
Motoring Trq Lim	1305	2.5.4
MotorType	0	2.13.8
Mtr Ctrl Sw	0	2.13.38
Mtr Cur ID	45	1.3.57
Mtr Cur Lim Scl	0	2.8.10
Mtr Cur Limit	1291	2.5.3
Mtr Cur Unfil	1113	1.3.3
Mtr I Lim En	0	2.9.10
Mtr I Lim Ki	0	2.4.24
Mtr I Lim Kp	0	2.4.25
Mtr OT Fault	0	1.2.38
Mtr OT Warn	0	1.2.39
Mtr Therm TC	707	2.1.20
Mtr Torq Unfil	1125	1.3.21
MtrCalcTemp	9	1.3.16
MtrRegStatus	1525	1.3.41
Mx Spd Lim	0	2.8.41
Neg Freq Limit	1301	2.5.18
Neg Iq Cur Lim	1544	1.3.12
Neg Spd Ref	1129	1.2.23
Not DIN 1	1021	1.4.11
Not DIN 2	1022	1.4.12
Not DIN 3	1023	1.4.13
Not DIN 4	1024	1.4.14
Not DIN 5	1025	1.4.15
Not DIN 6	1026	1.4.16
Not DIN 7	1027	1.4.17
Not DIN 8	1028	1.4.18
OC Fault	0	1.2.33
OL TC Min Freq	636	2.13.29
One Analog	1201	2.15.4
One Bit	1001	2.15.1
OV Fault	0	1.2.34
OV Reg Kd	0	2.4.17
OV Reg Ki	0	2.4.16
OV Reg Ki	0	2.4.20

NAME	ID	MENU
OV Reg Kp	0	2.4.14
OV Reg Kp Add	0	2.4.15
Over Temp Warn	1114	1.2.25
Overspeed Resp	0	2.1.12
Oervolt Contr	607	2.9.8
Ovr Spd Inp	0	2.8.9
Ovr Spd Stp	1258	2.5.8
Panel Fault ACT	0	1.2.29
Panel Ref Src	121	2.2.6
Param Set En	0	2.9.13
Param Set Sel	0	2.7.17
PC Control	1121	1.2.20
Phase Supv F	702	2.1.15
Pos Freq Limit	1300	2.5.17
Pos Iq Cur Lim	1543	1.3.11
ProcessPITrimRef	1521	1.3.40
Pwr IU Offset	668	2.12.23
Pwr IV Offset	669	2.12.24
Pwr IW Offset	670	2.12.25
Regen Trq Lim	1517	1.3.68
Rem Bit	0	2.7.46
Rem Spd Bit	0	2.7.47
Rem Spd Inp	0	2.8.42
Rem Spd Stpt	1237	2.2.24
Rem Trq Inp	0	2.8.43
Rem Trq Stpt	1235	2.2.25
Remote Ref Src	122	2.2.7
Reverse	1128	1.2.11
Reverse Inp	0	2.7.5
RJT Enable	1097	1.2.13
RJT Ref	1504	1.3.23
Rmp Act Lim	0	2.9.2
Rotor Flux	1541	1.3.9
Rotor TC	1547	1.3.15
Run Enable	1096	1.2.12
Run Input	0	2.7.1
Run OK	1091	1.2.9
Run Speed	1254	2.2.1
RunRequest	1090	1.2.19
S1	1064	1.2.68
S2	1065	1.2.69
S3	1066	1.2.70
S4	1067	1.2.71
SB Bit Out1	0	2.14.2.6
SB Bit Out2	0	2.14.2.7
SB Bit Out3	0	2.14.2.8
SB Bit Out4	0	2.14.2.9
SB Bit Out5	0	2.14.2.10
SB Bit Out6	0	2.14.2.11
SB Bit Out7	0	2.14.2.12
SB Bit Out8	0	2.14.2.13
SB Comm Flt	1173	1.7.21
SB Comm Flt Resp	0	2.14.2.14
SB Comm Flt Tim	0	2.14.2.15
SB Comm Lost	0	1.7.20
SB In Cntl Word	1530	1.7.3
SB In Freq Ref	1531	1.7.4
SB In Int1	1532	1.7.5
SB In Int2	1533	1.7.6

NAME	ID	MENU
SB In Trq Ref	1535	1.7.7
SB Mode	0	2.14.2.3
SB Out Cntl Word	1534	1.7.8
SB Out Int1	0	2.14.2.4
SB Out Int2	0	2.14.2.5
SB WD Pulse	0	1.7.1
SBId	0	2.14.2.1
SBNextId	0	2.14.2.2
SC Comm Fault	0	1.2.28
SC Control Word	0	1.3.20
SC Reverse	1123	1.2.22
SC Spd Ref	1527	1.3.43
SC Start	1122	1.2.21
SC Trq Chain Sel	0	2.9.14
Self Tune Motor	631	2.13.1
Skip S Rev	0	2.9.1
Slack Up	0	2.8.7
Slip Adjust	619	2.13.18
Smooth Ratio	500	2.3.3
Smooth Ratio 2	501	2.3.5
Sp ABS In	0	2.8.23
Sp ABS Out	1558	1.3.49
Sp Add Val	1327	2.6.8
Sp Add1 In1	0	2.8.18
Sp Add1 In2	0	2.8.19
Sp Add1 Out	1555	1.3.46
Sp And1 In1	0	2.7.30
Sp And1 In2	0	2.7.31
Sp And1 NIn3	0	2.7.32
Sp And1 Out	1164	1.2.49
Sp And2 In1	0	2.7.33
Sp And2 In2	0	2.7.34
Sp And2 NIn3	0	2.7.35
Sp And2 Out	1165	1.2.50
Sp Cmp1 Eq	1152	1.2.43
Sp Cmp1 In	0	2.8.31
Sp Cmp1 Out	1153	1.2.44
Sp Cmp1 Thres	0	2.8.32
Sp Cmp1_Hyst	1345	2.2.17
Sp Cmp1_Stpt	1346	2.2.18
Sp Dly1 In	0	2.7.24
Sp Dly1 Out	1156	1.2.45
Sp Dly1 TOFF	1349	2.3.11
Sp Dly1 TON	1350	2.3.12
Sp Inv1 In	0	2.7.28
Sp Inv1 Out	1161	1.2.47
Sp Inv2 In	0	2.7.29
Sp Inv2 Out	1162	1.2.48
Sp Lim Inp	0	2.8.33
Sp Lim Max	1353	2.5.22
Sp Lim Min	1354	2.5.23
Sp Lim Out	1574	1.3.53
Sp LP Fil In	0	2.8.22
Sp LP Fil Out	1557	1.3.48
Sp LP Fil TC	1329	2.3.10
Sp Ltch1 H1	0	2.7.25
Sp Ltch1 H2	0	2.7.26
Sp Ltch1 L	0	2.7.27
Sp Ltch1 Out	1158	1.2.46

NAME	ID	MENU
Sp MD1 Div	0	2.8.14
Sp MD1 Dv	1323	2.6.4
Sp MD1 Mlt	1324	2.6.5
Sp MD1 Mul	0	2.8.15
Sp MD1 Out	1553	1.3.44
Sp MD1 Val	0	2.8.12
Sp MD2 Div	0	2.8.16
Sp MD2 Dv	1325	2.6.6
Sp MD2 Mlt	1326	2.6.7
Sp MD2 Mul	0	2.8.17
Sp MD2 Out	1554	1.3.45
Sp MD2 Val	0	2.8.13
Sp Or1 In1	0	2.7.36
Sp Or1 In2	0	2.7.37
Sp Or1 NIn3	0	2.7.38
Sp Or1 Out	1167	1.2.51
Sp Or2 In1	0	2.7.39
Sp Or2 In2	0	2.7.40
Sp Or2 NIn3	0	2.7.41
Sp Or2 Out	1168	1.2.52
Sp Sel1 En1	0	2.7.22
Sp Sel1 In0	0	2.8.27
Sp Sel1 In1	0	2.8.28
Sp Sel1 Out	1561	1.3.51
Sp Sel1 ST0	1337	2.2.13
Sp Sel1 ST1	1338	2.2.14
Sp Sel2 En1	0	2.7.23
Sp Sel2 In0	0	2.8.29
Sp Sel2 In1	0	2.8.30
Sp Sel2 Out	1562	1.3.52
Sp Sel2 ST0	1339	2.2.15
Sp Sel2 ST1	1340	2.2.16
Sp Sub Val	1328	2.6.9
Sp Sub1 In1	0	2.8.20
Sp Sub1 In2	0	2.8.21
Sp Sub1 Out	1565	1.3.47
Sp Sum1 EnA	0	2.7.19
Sp Sum1 EnB	0	2.7.20
Sp Sum1 EnC	0	2.7.21
Sp Sum1 InA	0	2.8.24
Sp Sum1 InB	0	2.8.25
Sp Sum1 InC	0	2.8.26
Sp Sum1 Out	1559	1.3.50
Sp Sum1 StA	1330	2.2.10
Sp Sum1 StB	1331	2.2.11
Sp Sum1 StC	1332	2.2.12
Spd Cmp Fil TC	0	2.3.13
Spd Cntrl F0	0	2.4.3
Spd Cntrl F1	0	2.4.4
Spd Cntrl Kp F0	0	2.4.5
Spd Cntrl Kp FW	0	2.4.6
Spd Cntrl Kp T0	0	2.4.7
Spd Cntrl T0	0	2.4.8
Spd Cntrl Word	1516	1.3.69
Spd Cont Ki	638	2.4.31
Spd Cont Kp	637	2.4.30
Spd Decimal	0	2.5.11
Spd Err Bnd Frq	0	2.4.10
Spd Err Fil TC	0	2.3.18

NAME	ID	MENU
Spd Err LP Freq	0	2.4.11
Spd Fdbk	0	2.8.8
Spd Hyst	0	2.5.10
Spd Ref	1515	1.3.70
Spd Slk Up	1273	2.2.5
Spd Tbl Tim	1514	1.3.71
Spd Tim Dn	1068	1.2.72
Spd Tim En	1069	1.2.73
Spd Timing	1070	1.2.74
Spd Trq Lim	1242	2.5.28
Speed Cntrl Out	1548	1.3.22
Speed Control Kp	613	2.4.1
Speed Control Ti	614	2.4.2
Speed Step	1252	2.12.26
SPI Fault Act	0	1.2.42
SPI Flt Resp	734	2.1.32
Stall Cur Lim	710	2.1.23
Stall Freq	712	2.1.25
Stall Protection	709	2.1.22
Stall Time	711	2.1.24
Start DC-BrakeTm	516	2.13.32
Start Function	505	2.9.5
Start Input	1089	1.2.10
Start Magn Curr	627	2.13.19
Start Magn Time	628	2.13.33
Startup Trq Sel	621	2.13.22
StartupTorq FWD	633	2.13.23
StartupTorq REV	634	2.13.24
Status Word	43	1.3.55
Step Ref	1520	1.3.39
Step Reverse	0	2.7.12
Stop 0 Spd Time	616	2.3.7
Stop DC-BrakeFr	515	2.13.10
Stop DC-BrakeTm	508	2.13.31
Stop Function	506	2.9.6
Stop Input	0	2.7.6
Stop St Magn I	0	2.13.20
Stop St Magn Tim	0	2.13.21
Strt 0 Spd Time	615	2.3.6
Sup Enable	0	2.7.13
Switching Freq	601	2.13.16
T1	1071	1.2.75
Tbl Trq Lim	0	1.3.76
TC Neg Freq Lim	1573	1.3.64
TC Pos Freq Lim	1572	1.3.63
TC Spd Lim Sel	0	2.9.16
Temp CL Param	0	2.4.32
Therm Fault Act	1119	1.2.26
Therm Prot F	704	2.1.17
Therm Warn Act	1120	1.2.27
Thermistor Inp	0	2.7.18
ThermistorF.Resp	732	2.1.30
Thread Enable	1095	1.2.14
Thread Input	0	2.7.2
Thread Ref	0	2.8.2
Thread Speed	1255	2.2.2
Torque Ref Select	0	2.9.15
Torque Speed Limit	644	2.5.14
Torque Reference	18	1.3.54

NAME	ID	MENU
Torque Step	1253	2.12.27
Trq Base Spd	1260	2.2.27
Trq Cntrl Ki	640	2.4.34
Trq Cntrl Kp	639	2.4.33
Trq Cntrl Word	1513	1.3.72
Trq Dir	0	2.7.15
Trq End Spd	1261	2.2.28
Trq I Gain	0	2.4.40
Trq I Res1	0	2.7.48
Trq I Res2	0	2.7.49
Trq Lim FWD	1307	2.5.6
Trq Lim Ki	611	2.4.29
Trq Lim Kp	610	2.4.28
Trq Lim Ref	1512	1.3.73
Trq Lim REV	1308	2.5.7
Trq Lp Fdbk	0	2.8.47
Trq LP Gain	0	2.4.39
Trq LP Max	0	2.5.29
Trq LP Min	0	2.5.30
Trq Lp Ref	0	2.8.46
Trq No Ramp	0	2.7.16
Trq P Gain	0	2.4.41
Trq PI Out	0	1.3.75
Trq Ref	0	2.8.34
Trq Ref 3	1537	1.3.60
Trq Ref 4	1538	1.3.61
Trq Ref Act	1536	1.3.59
Trq Ref DeadZone	0	2.5.16
Trq Ref En	0	2.7.14
Trq Ref Fil TC	0	2.3.17
Trq Ref Gn	1299	2.6.12
Trq Ref Hyst	0	2.5.15
Trq Ref Inp	0	2.8.44
Trq Ref Max	1274	2.5.12
Trq Ref Off	1298	2.6.11
Trq Ref Rate	1241	2.3.19
Trq Ref StA	1302	2.2.8
Trq Rmp Rate	1290	2.3.9
Trq Scl Div	1240	2.6.14
Trq Scl Mlt	1239	2.6.15
Trq Spd Tbl	1510	1.3.74
Trq_Ref_Min	1275	2.5.13
TT	1075	1.2.79
U/f Boost	632	2.13.39
U/f Mid Freq	604	2.13.13
U/f Mid Voltg	605	2.13.14
U/f Optimization	109	2.13.36
U/f Ratio Select	108	2.13.35
ULoad Protect F	713	2.1.26
Under Ld State T	716	2.1.29
Under Ld Trq 0	715	2.1.28
Under Ld Trq Nom	714	2.1.27
Unit Temperature	8	1.3.17
User Flt 1	0	2.1.2
User Flt 2	0	2.1.3
User Flt 3	0	2.1.4
User Flt 4	0	2.1.5
User Flt1 Resp	0	2.1.6
User Flt2 Resp	0	2.1.7

NAME	ID	MENU
User Flt3 Resp	0	2.1.8
User Flt4 Resp	0	2.1.9
UV Contrl	608	2.9.9
UV Fault	0	1.2.32
UV Reg I2	0	2.4.21
UV Reg Kd	0	2.4.22
UV Reg Kd2	0	2.4.23
UV Reg Kp	0	2.4.18
UV Reg Kp2	0	2.4.19
UVolt Fault Resp	727	2.1.14
Voltage at FWP	603	2.13.12
Wathcdog In	0	2.7.42
WD Com Dly	0	2.3.14
WD Flt Response	0	2.1.42
WD Init Dly Tim	0	2.3.15
WD Trip	0	1.2.54
Win Neg Width	0	2.5.20
Win Pos Width	0	2.5.19
WK Inp	0	2.8.45
WK Scaling	1238	2.6.16
WK Stpt	1234	2.2.26
X0	1892	2.11.3.1
X0	1796	2.11.2.1
X0	1700	2.11.1.1
X1	1701	2.11.1.2
X1	1797	2.11.2.2
X1	1893	2.11.3.2
X10	1902	2.11.3.11
X10	1806	2.11.2.11
X10	1710	2.11.1.11
X11	1711	2.11.1.12
X11	1903	2.11.3.12
X11	1807	2.11.2.12
X12	1808	2.11.2.13
X12	1712	2.11.1.13
X12	1904	2.11.3.13
X13	1809	2.11.2.14
X13	1905	2.11.3.14
X13	1713	2.11.1.14
X14	1810	2.11.2.15
X14	1714	2.11.1.15
X14	1906	2.11.3.15
X15	1811	2.11.2.16
X15	1907	2.11.3.16
X15	1715	2.11.1.16
X16	1812	2.11.2.17
X16	1908	2.11.3.17
X16	1716	2.11.1.17
X17	1909	2.11.3.18
X17	1813	2.11.2.18
X17	1717	2.11.1.18
X18	1718	2.11.1.19
X18	1910	2.11.3.19
X18	1814	2.11.2.19
X19	1815	2.11.2.20
X19	1719	2.11.1.20
X19	1911	2.11.3.20
X2	1702	2.11.1.3
X2	1798	2.11.2.3

NAME	ID	MENU
X2	1894	2.11.3.3
X20	1720	2.11.1.21
X20	1912	2.11.3.21
X20	1816	2.11.2.21
X21	1721	2.11.1.22
X21	1913	2.11.3.22
X21	1817	2.11.2.22
X22	1722	2.11.1.23
X22	1818	2.11.2.23
X22	1914	2.11.3.23
X23	1819	2.11.2.24
X23	1723	2.11.1.24
X23	1915	2.11.3.24
X24	1916	2.11.3.25
X24	1724	2.11.1.25
X24	1820	2.11.2.25
X25	1917	2.11.3.26
X25	1821	2.11.2.26
X25	1725	2.11.1.26
X26	1726	2.11.1.27
X26	1822	2.11.2.27
X26	1918	2.11.3.27
X27	1823	2.11.2.28
X27	1919	2.11.3.28
X27	1727	2.11.1.28
X28	1824	2.11.2.29
X28	1920	2.11.3.29
X28	1728	2.11.1.29
X29	1825	2.11.2.30
X29	1729	2.11.1.30
X29	1921	2.11.3.30
X3	1703	2.11.1.4
X3	1895	2.11.3.4
X3	1799	2.11.2.4
X30	1730	2.11.1.31
X30	1922	2.11.3.31
X30	1826	2.11.2.31
X31	1827	2.11.2.32
X31	1731	2.11.1.32
X31	1923	2.11.3.32
X32	1732	2.11.1.33
X32	1828	2.11.2.33
X32	1924	2.11.3.33
X33	1925	2.11.3.34
X33	1733	2.11.1.34
X33	1829	2.11.2.34
X34	1926	2.11.3.35
X34	1734	2.11.1.35
X34	1830	2.11.2.35
X35	1927	2.11.3.36
X35	1831	2.11.2.36
X35	1735	2.11.1.36
X36	1736	2.11.1.37
X36	1928	2.11.3.37
X36	1832	2.11.2.37
X37	1737	2.11.1.38
X37	1833	2.11.2.38
X37	1929	2.11.3.38
X38	1930	2.11.3.39

NAME	ID	MENU
X38	1738	2.11.1.39
X38	1834	2.11.2.39
X39	1835	2.11.2.40
X39	1739	2.11.1.40
X39	1931	2.11.3.40
X4	1800	2.11.2.5
X4	1896	2.11.3.5
X4	1704	2.11.1.5
X40	1836	2.11.2.41
X40	1932	2.11.3.41
X40	1740	2.11.1.41
X41	1933	2.11.3.42
X41	1741	2.11.1.42
X41	1837	2.11.2.42
X42	1838	2.11.2.43
X42	1934	2.11.3.43
X42	1742	2.11.1.43
X43	1839	2.11.2.44
X43	1935	2.11.3.44
X43	1743	2.11.1.44
X44	1840	2.11.2.45
X44	1744	2.11.1.45
X44	1936	2.11.3.45
X45	1745	2.11.1.46
X45	1841	2.11.2.46
X45	1937	2.11.3.46
X46	1746	2.11.1.47
X46	1938	2.11.3.47
X46	1842	2.11.2.47
X47	1747	2.11.1.48
X47	1939	2.11.3.48
X47	1843	2.11.2.48
X5	1801	2.11.2.6
X5	1705	2.11.1.6
X5	1897	2.11.3.6
X6	1706	2.11.1.7
X6	1802	2.11.2.7
X6	1898	2.11.3.7
X7	1803	2.11.2.8
X7	1707	2.11.1.8
X7	1899	2.11.3.8
X8	1804	2.11.2.9
X8	1900	2.11.3.9
X8	1708	2.11.1.9
X9	1709	2.11.1.10
X9	1805	2.11.2.10
X9	1901	2.11.3.10
Y0	1844	2.11.2.49
Y0	1940	2.11.3.49
Y0	1748	2.11.1.49
Y1	1941	2.11.3.50
Y1	1845	2.11.2.50
Y1	1749	2.11.1.50
Y10	1854	2.11.2.59
Y10	1758	2.11.1.59
Y10	1950	2.11.3.59
Y11	1855	2.11.2.60
Y11	1759	2.11.1.60
Y11	1951	2.11.3.60

NAME	ID	MENU
Y12	1760	2.11.1.61
Y12	1952	2.11.3.61
Y12	1856	2.11.2.61
Y13	1761	2.11.1.62
Y13	1953	2.11.3.62
Y13	1857	2.11.2.62
Y14	1762	2.11.1.63
Y14	1858	2.11.2.63
Y14	1954	2.11.3.63
Y15	1955	2.11.3.64
Y15	1763	2.11.1.64
Y15	1859	2.11.2.64
Y16	1764	2.11.1.65
Y16	1956	2.11.3.65
Y16	1860	2.11.2.65
Y17	1957	2.11.3.66
Y17	1765	2.11.1.66
Y17	1861	2.11.2.66
Y18	1958	2.11.3.67
Y18	1766	2.11.1.67
Y18	1862	2.11.2.67
Y19	1959	2.11.3.68
Y19	1863	2.11.2.68
Y19	1767	2.11.1.68
Y2	1942	2.11.3.51
Y2	1846	2.11.2.51
Y2	1750	2.11.1.51
Y20	1960	2.11.3.69
Y20	1768	2.11.1.69
Y20	1864	2.11.2.69
Y21	1769	2.11.1.70
Y21	1961	2.11.3.70
Y21	1865	2.11.2.70
Y22	1770	2.11.1.71
Y22	1866	2.11.2.71
Y22	1962	2.11.3.71
Y23	1963	2.11.3.72
Y23	1771	2.11.1.72
Y23	1867	2.11.2.72
Y24	1868	2.11.2.73
Y24	1964	2.11.3.73
Y24	1772	2.11.1.73
Y25	1869	2.11.2.74
Y25	1965	2.11.3.74
Y25	1773	2.11.1.74
Y26	1966	2.11.3.75
Y26	1774	2.11.1.75
Y26	1870	2.11.2.75
Y27	1871	2.11.2.76
Y27	1967	2.11.3.76
Y27	1775	2.11.1.76
Y28	1872	2.11.2.77
Y28	1968	2.11.3.77
Y28	1776	2.11.1.77
Y29	1777	2.11.1.78
Y29	1873	2.11.2.78
Y29	1969	2.11.3.78
Y3	1943	2.11.3.52
Y3	1847	2.11.2.52

NAME	ID	MENU
Y3	1751	2.11.1.52
Y30	1874	2.11.2.79
Y30	1970	2.11.3.79
Y30	1778	2.11.1.79
Y31	1971	2.11.3.80
Y31	1779	2.11.1.80
Y31	1875	2.11.2.80
Y32	1972	2.11.3.81
Y32	1780	2.11.1.81
Y32	1876	2.11.2.81
Y33	1781	2.11.1.82
Y33	1973	2.11.3.82
Y33	1877	2.11.2.82
Y34	1878	2.11.2.83
Y34	1782	2.11.1.83
Y34	1974	2.11.3.83
Y35	1975	2.11.3.84
Y35	1783	2.11.1.84
Y35	1879	2.11.2.84
Y36	1880	2.11.2.85
Y36	1784	2.11.1.85
Y36	1976	2.11.3.85
Y37	1977	2.11.3.86
Y37	1881	2.11.2.86
Y37	1785	2.11.1.86
Y38	1786	2.11.1.87
Y38	1978	2.11.3.87
Y38	1882	2.11.2.87
Y39	1979	2.11.3.88
Y39	1787	2.11.1.88
Y39	1883	2.11.2.88
Y4	1848	2.11.2.53
Y4	1944	2.11.3.53
Y4	1752	2.11.1.53
Y40	1884	2.11.2.89
Y40	1980	2.11.3.89
Y40	1788	2.11.1.89
Y41	1981	2.11.3.90
Y41	1885	2.11.2.90
Y41	1789	2.11.1.90
Y42	1886	2.11.2.91
Y42	1790	2.11.1.91
Y42	1982	2.11.3.91
Y43	1887	2.11.2.92
Y43	1791	2.11.1.92
Y43	1983	2.11.3.92
Y44	1792	2.11.1.93
Y44	1984	2.11.3.93
Y44	1888	2.11.2.93
Y45	1793	2.11.1.94
Y45	1889	2.11.2.94
Y45	1985	2.11.3.94
Y46	1890	2.11.2.95
Y46	1986	2.11.3.95
Y46	1794	2.11.1.95
Y47	1891	2.11.2.96
Y47	1987	2.11.3.96
Y47	1795	2.11.1.96
Y5	1849	2.11.2.54

NAME	ID	MENU
Y5	1945	2.11.3.54
Y5	1753	2.11.1.54
Y6	1754	2.11.1.55
Y6	1850	2.11.2.55
Y6	1946	2.11.3.55
Y7	1947	2.11.3.56
Y7	1755	2.11.1.56
Y7	1851	2.11.2.56
Y8	1756	2.11.1.57
Y8	1852	2.11.2.57
Y8	1948	2.11.3.57
Y9	1757	2.11.1.58
Y9	1949	2.11.3.58
Y9	1853	2.11.2.58
Zero Analog	1200	2.15.3
Zero Bit	1002	2.15.2
Zero Detect	1259	2.5.9
Zero Freq Voltg	606	2.13.15

APPENDIX D

PARAMETER ID NUMBER CROSS-REFERENCE

ID	NAME	MENU
1	Freq out	1.3.30
2	Motor Speed	1.3.1
3	Motor Current	1.3.2
4	Motor Torque	1.3.4
5	Motor Power	1.3.5
6	Motor Voltage	1.3.6
7	DCVoltage	1.3.7
8	Unit Temperature	1.3.17
9	MtrCalcTemp	1.3.16
15	DIN123 Status	1.4.9
16	DIN456 Status	1.4.10
18	Torque Reference	1.3.54
25	FreqReference	1.3.26
37	Active Flt Last	1.3.56
43	Status Word	1.3.55
44	DC_link V Unfil	1.3.8
45	Mtr Cur ID	1.3.57
101	Min Frequency	2.5.2
102	Freq Max	2.5.1
103	Accel Time 1	2.3.1
104	Decel Time 1	2.3.2
108	U/f Ratio Select	2.13.35
109	U/f Optimization	2.13.36
110	Motor Nom Voltg	2.13.3
111	Motor Nom Freq	2.13.4
112	Motor Nom Speed	2.13.5
113	Motor Nom Currnt	2.13.2
120	Motor Cos Phi	2.13.34
121	Panel Ref Src	2.2.6
122	Remote Ref Src	2.2.7
123	Keypad Spd Dir	3.1
500	Smooth Ratio	2.3.3
501	Smooth Ratio 2	2.3.5
503	Fast Stop Tim	2.3.4
505	Start Function	2.9.5
506	Stop Function	2.9.6
507	DC-Brake Current	2.13.9
508	Stop DC-BrakeTm	2.13.31
515	Stop DC-BrakeFr	2.13.10
516	Start DC-BrakeTm	2.13.32
519	FluxBrakeCurrent	2.13.11
520	Flux Brake	2.13.37
521	Motor Ctrl Mode2	2.13.7
600	Motor Ctrl Mode	2.13.6
601	Switching Freq	2.13.16
602	Field WeakngPnt	2.2.9
603	Voltage at FWP	2.13.12
604	U/f Mid Freq	2.13.13
605	U/f Mid Voltg	2.13.14
606	Zero Freq Voltg	2.13.15

ID	NAME	MENU
607	Overvolt Contr	2.9.8
608	UV Contrl	2.9.9
610	Trq Lim Kp	2.4.28
611	Trq Lim Ki	2.4.29
612	MagnCurrent	2.13.17
613	Speed Control Kp	2.4.1
614	Speed Control Ti	2.4.2
615	Strt 0 Spd Time	2.3.6
616	Stop 0 Spd Time	2.3.7
617	CurrentControlKp	2.4.12
618	Encoder1FiltTime	2.10.5.20
619	Slip Adjust	2.13.18
621	Startup Trq Sel	2.13.22
622	M5 Min Curr Ref	2.13.26
623	FluxReference	2.13.27
625	0 Speed Current	2.13.25
626	Accel.Compens.	2.4.9
627	Start Magn Curr	2.13.19
628	Start Magn Time	2.13.33
631	Self Tune Motor	2.13.1
632	U/f Boost	2.13.39
633	StartupTorq FWD	2.13.23
634	StartupTorq REV	2.13.24
635	M5 Freq 3	2.13.28
636	OL TC Min Freq	2.13.29
637	Spd Cont Kp	2.4.30
638	Spd Cont Ki	2.4.31
639	Trq Cntrl Kp	2.4.33
640	Trq Cntrl Ki	2.4.34
644	Torq Speed Limit	2.5.14
660	Mk Flux Time	2.12.16
661	Mk Flux Voltage	2.12.17
662	Meas Rs V Drop	2.12.18
663	Mk Flux V Hw Dt	2.12.19
664	Ir Add 0 Pt V	2.12.20
665	Ir Add Gen Scl	2.12.21
667	Ir Add Mtr Scl	2.12.22
668	Pwr IU Offset	2.12.23
669	Pwr IV Offset	2.12.24
670	Pwr IW Offset	2.12.25
701	Ext Flt Resp	2.1.11
702	Phase Supv F	2.1.15
703	Earth Fault	2.1.16
704	Therm Prot F	2.1.17
705	MotAmbTempFactor	2.1.18
706	Mot Therm 0 Spd	2.1.19
707	Mtr Therm TC	2.1.20
708	Motor Duty Cycle	2.1.21
709	Stall Protection	2.1.22
710	Stall Cur Lim	2.1.23

ID	NAME	MENU
711	Stall Time	2.1.24
712	Stall Freq	2.1.25
713	ULoad Protect F	2.1.26
714	Under Ld Trq Nom	2.1.27
715	Under Ld Trq 0	2.1.28
716	Under Ld State T	2.1.29
717	Auto Rst Wait	2.1.33
718	Auto Rst SVTime	2.1.34
719	Auto Rst StartM	2.1.35
720	Auto Rst UV Trls	2.1.36
721	Auto Rst OV Trls	2.1.37
722	Auto Rst OC Trls	2.1.38
725	Auto Rst ExtF T	2.1.40
726	Auto Rst Mtr OT	2.1.39
727	UVolt Fault Resp	2.1.14
730	Input Ph. Superv	2.1.13
732	ThermistorF.Resp	2.1.30
733	FBComm.FaultResp	2.1.31
734	SPI Flt Resp	2.1.32
738	Auto Rst Uload T	2.1.41
1001	One Bit	2.15.1
1002	Zero Bit	2.15.2
1011	DIN 1	1.4.1
1012	DIN 2	1.4.2
1013	DIN 3	1.4.3
1014	DIN 4	1.4.4
1015	DIN 5	1.4.5
1016	DIN 6	1.4.6
1017	DIN 7	1.4.7
1018	DIN 8	1.4.8
1021	Not DIN 1	1.4.11
1022	Not DIN 2	1.4.12
1023	Not DIN 3	1.4.13
1024	Not DIN 4	1.4.14
1025	Not DIN 5	1.4.15
1026	Not DIN 6	1.4.16
1027	Not DIN 7	1.4.17
1028	Not DIN 8	1.4.18
1029	Can Bus Flt	1.8.9
1030	Can In 1	1.8.5
1031	Can In 2	1.8.6
1032	Can In 3	1.8.7
1033	Can In 4	1.8.8
1040	FB Bit00	1.6.1.1
1041	FB Bit01	1.6.1.2
1042	FB Bit02	1.6.1.3
1043	FB Bit03	1.6.1.4
1044	FB Bit04	1.6.1.5
1045	FB Bit05	1.6.1.6
1046	FB Bit06	1.6.1.7
1047	FB Bit07	1.6.1.8
1050	MD Bit In1	1.7.9
1051	MD Bit In2	1.7.10
1052	MD Bit In3	1.7.11
1053	MD Bit In4	1.7.12
1054	MD Bit In5	1.7.13
1055	MD Bit In6	1.7.14
1056	MD Bit In7	1.7.15
1057	MD Bit In8	1.7.16

ID	NAME	MENU
1058	MD Drive OK	1.7.17
1059	MD One Bit	1.7.18
1060	MD Run Enable	1.7.19
1061	In Ess	1.2.65
1062	In Rem Spd	1.2.66
1063	In Rem Trq	1.2.67
1064	S1	1.2.68
1065	S2	1.2.69
1066	S3	1.2.70
1067	S4	1.2.71
1068	Spd Tim Dn	1.2.72
1069	Spd Tim En	1.2.73
1070	Spd Timing	1.2.74
1071	T1	1.2.75
1072		1.2.76
1073		1.2.77
1074		1.2.78
1075	TT	1.2.79
1086	MC Reverse	1.2.6
1087	Jog FR Input	1.2.18
1088	Drive OK	1.2.1
1089	Start Input	1.2.10
1090	RunRequest	1.2.19
1091	Run OK	1.2.9
1092	Jog R En	1.2.17
1093	Jog F En	1.2.16
1094	Jog enable	1.2.15
1095	Thread Enable	1.2.14
1096	Run Enable	1.2.12
1097	RJT Enable	1.2.13
1098	MC Run	1.2.3
1099	Cntrl Inhib	1.2.2
1100	CM0	1.2.61
1100	CM0	1.4.19
1101	CM1	1.2.62
1101	CM1	1.4.20
1102	CM2	1.4.21
1102	CM2	1.2.63
1103	CM3	1.4.22
1103	CM3	1.2.64
1104	ESS Dn	1.2.55
1105	ESS En	1.2.56
1107	ESS Not Lit	1.2.58
1108	Goto ESS	1.2.59
1109	Goto Spd	1.2.60
1112	Local Stop Flt	1.2.24
1113	Mtr Cur Unfil	1.3.3
1114	Over Temp Warn	1.2.25
1115	MC Ready	1.2.4
1116	MC Fault	1.2.5
1117	MC Warning	1.2.8
1118	MC AtSpeed	1.2.7
1119	Therm Fault Act	1.2.26
1120	Therm Warn Act	1.2.27
1121	PC Control	1.2.20
1122	SC Start	1.2.21
1123	SC Reverse	1.2.22
1124	C1 Overflow	1.2.30
1125	Mtr Torq Unfil	1.3.21

ID	NAME	MENU
1126	C2 Overflow	1.2.31
1127	At Zero Spd	1.2.53
1128	Reverse	1.2.11
1129	Neg Spd Ref	1.2.23
1152	Sp Cmp1 Eq	1.2.43
1153	Sp Cmp1 Out	1.2.44
1156	Sp Dly1 Out	1.2.45
1158	Sp Ltch1 Out	1.2.46
1161	Sp Inv1 Out	1.2.47
1162	Sp Inv2 Out	1.2.48
1164	Sp And1 Out	1.2.49
1165	Sp And2 Out	1.2.50
1167	Sp Or1 Out	1.2.51
1168	Sp Or2 Out	1.2.52
1172	MD WD OK	1.7.2
1173	SB Comm Flt	1.7.21
1200	Zero Analog	2.15.3
1201	One Analog	2.15.4
1202	Int Ten	2.15.5
1203	Int Hundred	2.15.6
1204	Int Thousand	2.15.7
1234	WK Stpt	2.2.26
1235	Rem Trq Stpt	2.2.25
1237	Rem Spd Stpt	2.2.24
1238	WK Scaling	2.6.16
1239	Trq Scl Mlt	2.6.15
1240	Trq Scl Div	2.6.14
1241	Trq Ref Rate	2.3.19
1242	Spd Trq Lim	2.5.28
1243	Max ESS Lim	2.5.27
1244	M Trq Stpt	2.2.23
1245	M Spd Stpt	2.2.22
1246	Loss Tbl Gn	2.6.13
1247	Lit Speed	2.2.21
1248	ESS Lit Stpt	2.2.20
1249	ESS Int Gn	2.4.38
1250	DUT Max Spd	2.5.25
1251	Con Mode	2.2.19
1252	Speed Step	2.12.26
1253	Torque Step	2.12.27
1254	Run Speed	2.2.1
1255	Thread Speed	2.2.2
1256	Jog F Speed	2.2.3
1257	Jog R Speed	2.2.4
1258	Ovr Spd Stp	2.5.8
1259	Zero Detect	2.5.9
1260	Trq Base Spd	2.2.27
1261	Trq End Spd	2.2.28
1273	Spd Slk Up	2.2.5
1274	Trq Ref Max	2.5.12
1275	Trq_Ref_Min	2.5.13
1290	Trq Rmp Rate	2.3.9
1291	Mtr Cur Limit	2.5.3
1292	Max Spd RPM	2.5.24
1293	DCBrake Mlt	2.6.3
1294	Counter1 Dec	2.10.5.10
1295	Counter1 Mult	2.10.5.11
1296	Counter2 Dec	2.10.5.15
1297	Counter2 Mult	2.10.5.16

ID	NAME	MENU
1298	Trq Ref Off	2.6.11
1299	Trq Ref Gn	2.6.12
1300	Pos Freq Limit	2.5.17
1301	Neg Freq Limit	2.5.18
1302	Trq Ref StA	2.2.8
1305	Motoring Trq Lim	2.5.4
1306	Gener Trq Lim	2.5.5
1307	Trq Lim FWD	2.5.6
1308	Trq Lim REV	2.5.7
1309	Freq Ref LP TC	2.3.8
1323	Sp MD1 Dv	2.6.4
1324	Sp MD1 Mlt	2.6.5
1325	Sp MD2 Dv	2.6.6
1326	Sp MD2 Mlt	2.6.7
1327	Sp Add Val	2.6.8
1328	Sp Sub Val	2.6.9
1329	Sp LP Fil TC	2.3.10
1330	Sp Sum1 StA	2.2.10
1331	Sp Sum1 StB	2.2.11
1332	Sp Sum1 StC	2.2.12
1337	Sp Sel1 ST0	2.2.13
1338	Sp Sel1 ST1	2.2.14
1339	Sp Sel2 ST0	2.2.15
1340	Sp Sel2 ST1	2.2.16
1345	Sp Cmp1_Hyst	2.2.17
1346	Sp Cmp1_Stpt	2.2.18
1349	Sp Dly1 TOFF	2.3.11
1350	Sp Dly1 TON	2.3.12
1353	Sp Lim Max	2.5.22
1354	Sp Lim Min	2.5.23
1355	Flux Curve a	2.12.1
1356	Flux Curve b	2.12.2
1357	Flux Curve c	2.12.3
1358	Flux Curve d	2.12.4
1359	Flux Curve e	2.12.5
1360	Flux Curve f	2.12.6
1361	Flux Curve g	2.12.7
1362	Flux Curve h	2.12.8
1363	Flux Curve i	2.12.9
1364	Flux Curve j	2.12.10
1365	Flux Curve k	2.12.11
1366	Flux Curve l	2.12.12
1367	Flux Curve m	2.12.13
1368	Flux Curve n	2.12.14
1369	Flux Curve o	2.12.15
1504	RJT Ref	1.3.23
1505	Control Place	1.3.18
1506	Cntrl Mode	1.3.19
1507	Freq Reference	1.3.24
1508	Freq Delta	1.3.34
1509	Brake Chopper	1.3.36
1510	Trq Spd Tbl	1.3.74
1511	BrakeResistor	1.3.38
1512	Trq Lim Ref	1.3.73
1513	Trq Cntrl Word	1.3.72
1514	Spd Tbl Tim	1.3.71
1515	Spd Ref	1.3.70
1516	Spd Cntrl Word	1.3.69
1517	Regen Trq Lim	1.3.68

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1518	Loss Tbl Out	1.3.67
1519	Abs Fil Spd	1.3.66
1520	Step Ref	1.3.39
1521	ProcessPITrimRef	1.3.40
1525	MtrRegStatus	1.3.41
1526	MotorCurLimit	1.3.42
1527	SC Spd Ref	1.3.43
1528	Counter1	1.5.27
1529	Counter2	1.5.28
1530	SB In Cntl Word	1.7.3
1531	SB In Freq Ref	1.7.4
1532	SB In Int1	1.7.5
1533	SB In Int2	1.7.6
1534	SB Out Cntl Word	1.7.8
1535	SB In Trq Ref	1.7.7
1536	Trq Ref Act	1.3.59
1537	Trq Ref 3	1.3.60
1538	Trq Ref 4	1.3.61
1539	Final Iq Trq Ref	1.3.62
1540	Final Freq Ref	1.3.29
1541	Rotor Flux	1.3.9
1542	Final Trq Ref	1.3.10
1543	Pos Iq Cur Lim	1.3.11
1544	Neg Iq Cur Lim	1.3.12
1545	Iq Ref Actual	1.3.13
1546	Id Ref Actual	1.3.14
1547	Rotor TC	1.3.15
1548	Speed Cntrl Out	1.3.22
1553	Sp MD1 Out	1.3.44
1554	Sp MD2 Out	1.3.45
1555	Sp Add1 Out	1.3.46
1557	Sp LP Fil Out	1.3.48
1558	Sp ABS Out	1.3.49
1559	Sp Sum1 Out	1.3.50
1561	Sp Sel1 Out	1.3.51
1562	Sp Sel2 Out	1.3.52
1565	Sp Sub1 Out	1.3.47
1566	Accel Comp	1.3.58
1567	Est DC Nom V	1.3.37
1568	Freq Ramp Out	1.3.35
1570	ABS RJT Ref	1.3.25
1571	Freq Ref Act	1.3.28
1572	TC Pos Freq Lim	1.3.63
1573	TC Neg Freq Lim	1.3.64
1574	Sp Lim Out	1.3.53
1590	AOUT1 Val	1.5.17
1591	AOUT2 Val	1.5.18
1601	AIN1	1.5.9
1602	AIN2	1.5.10
1603	AIN3	1.5.11
1604	AIN4	1.5.12
1609	Enc1_Out	1.5.19
1610	Enc2_Out	1.5.20
1611	A_FB_AIN1	1.6.2.1
1612	A_FB_AIN2	1.6.2.2
1613	A_FB_AIN3	1.6.2.3
1614	A_FB_AIN4	1.6.2.4
1615	A_FB_AIN5	1.6.2.5
1616	A_FB_AIN6	1.6.2.6

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1617	A_FB_AIN7	1.6.2.7
1618	A_FB_AIN8	1.6.2.8
1619	A_FB_AIN9	1.6.2.9
1620	A_FB_AIN10	1.6.2.10
1621	FB Fix Cntrl Wrd	1.6.1.9
1622	FB Data Out 1	1.6.3.1
1623	FB Data Out 2	1.6.3.2
1624	FB Data Out 3	1.6.3.3
1625	FB Data Out 4	1.6.3.4
1626	FB Data Out 5	1.6.3.5
1627	FB Data Out 6	1.6.3.6
1628	FB Data Out 7	1.6.3.7
1629	FB Data Out 8	1.6.3.8
1632	FB Spd Ref	1.6.2.11
1640	Can Ain 1	1.8.1
1641	Can Ain 2	1.8.2
1642	Can Ain 3	1.8.3
1643	Can Ain 4	1.8.4
1700	X0	2.11.1.1
1701	X1	2.11.1.2
1702	X2	2.11.1.3
1703	X3	2.11.1.4
1704	X4	2.11.1.5
1705	X5	2.11.1.6
1706	X6	2.11.1.7
1707	X7	2.11.1.8
1708	X8	2.11.1.9
1709	X9	2.11.1.10
1710	X10	2.11.1.11
1711	X11	2.11.1.12
1712	X12	2.11.1.13
1713	X13	2.11.1.14
1714	X14	2.11.1.15
1715	X15	2.11.1.16
1716	X16	2.11.1.17
1717	X17	2.11.1.18
1718	X18	2.11.1.19
1719	X19	2.11.1.20
1720	X20	2.11.1.21
1721	X21	2.11.1.22
1722	X22	2.11.1.23
1723	X23	2.11.1.24
1724	X24	2.11.1.25
1725	X25	2.11.1.26
1726	X26	2.11.1.27
1727	X27	2.11.1.28
1728	X28	2.11.1.29
1729	X29	2.11.1.30
1730	X30	2.11.1.31
1731	X31	2.11.1.32
1732	X32	2.11.1.33
1733	X33	2.11.1.34
1734	X34	2.11.1.35
1735	X35	2.11.1.36
1736	X36	2.11.1.37
1737	X37	2.11.1.38
1738	X38	2.11.1.39
1739	X39	2.11.1.40
1740	X40	2.11.1.41

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1741	X41	2.11.1.42
1742	X42	2.11.1.43
1743	X43	2.11.1.44
1744	X44	2.11.1.45
1745	X45	2.11.1.46
1746	X46	2.11.1.47
1747	X47	2.11.1.48
1748	Y0	2.11.1.49
1749	Y1	2.11.1.50
1750	Y2	2.11.1.51
1751	Y3	2.11.1.52
1752	Y4	2.11.1.53
1753	Y5	2.11.1.54
1754	Y6	2.11.1.55
1755	Y7	2.11.1.56
1756	Y8	2.11.1.57
1757	Y9	2.11.1.58
1758	Y10	2.11.1.59
1759	Y11	2.11.1.60
1760	Y12	2.11.1.61
1761	Y13	2.11.1.62
1762	Y14	2.11.1.63
1763	Y15	2.11.1.64
1764	Y16	2.11.1.65
1765	Y17	2.11.1.66
1766	Y18	2.11.1.67
1767	Y19	2.11.1.68
1768	Y20	2.11.1.69
1769	Y21	2.11.1.70
1770	Y22	2.11.1.71
1771	Y23	2.11.1.72
1772	Y24	2.11.1.73
1773	Y25	2.11.1.74
1774	Y26	2.11.1.75
1775	Y27	2.11.1.76
1776	Y28	2.11.1.77
1777	Y29	2.11.1.78
1778	Y30	2.11.1.79
1779	Y31	2.11.1.80
1780	Y32	2.11.1.81
1781	Y33	2.11.1.82
1782	Y34	2.11.1.83
1783	Y35	2.11.1.84
1784	Y36	2.11.1.85
1785	Y37	2.11.1.86
1786	Y38	2.11.1.87
1787	Y39	2.11.1.88
1788	Y40	2.11.1.89
1789	Y41	2.11.1.90
1790	Y42	2.11.1.91
1791	Y43	2.11.1.92
1792	Y44	2.11.1.93
1793	Y45	2.11.1.94
1794	Y46	2.11.1.95
1795	Y47	2.11.1.96
1796	X0	2.11.2.1
1797	X1	2.11.2.2
1798	X2	2.11.2.3
1799	X3	2.11.2.4

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1800	X4	2.11.2.5
1801	X5	2.11.2.6
1802	X6	2.11.2.7
1803	X7	2.11.2.8
1804	X8	2.11.2.9
1805	X9	2.11.2.10
1806	X10	2.11.2.11
1807	X11	2.11.2.12
1808	X12	2.11.2.13
1809	X13	2.11.2.14
1810	X14	2.11.2.15
1811	X15	2.11.2.16
1812	X16	2.11.2.17
1813	X17	2.11.2.18
1814	X18	2.11.2.19
1815	X19	2.11.2.20
1816	X20	2.11.2.21
1817	X21	2.11.2.22
1818	X22	2.11.2.23
1819	X23	2.11.2.24
1820	X24	2.11.2.25
1821	X25	2.11.2.26
1822	X26	2.11.2.27
1823	X27	2.11.2.28
1824	X28	2.11.2.29
1825	X29	2.11.2.30
1826	X30	2.11.2.31
1827	X31	2.11.2.32
1828	X32	2.11.2.33
1829	X33	2.11.2.34
1830	X34	2.11.2.35
1831	X35	2.11.2.36
1832	X36	2.11.2.37
1833	X37	2.11.2.38
1834	X38	2.11.2.39
1835	X39	2.11.2.40
1836	X40	2.11.2.41
1837	X41	2.11.2.42
1838	X42	2.11.2.43
1839	X43	2.11.2.44
1840	X44	2.11.2.45
1841	X45	2.11.2.46
1842	X46	2.11.2.47
1843	X47	2.11.2.48
1844	Y0	2.11.2.49
1845	Y1	2.11.2.50
1846	Y2	2.11.2.51
1847	Y3	2.11.2.52
1848	Y4	2.11.2.53
1849	Y5	2.11.2.54
1850	Y6	2.11.2.55
1851	Y7	2.11.2.56
1852	Y8	2.11.2.57
1853	Y9	2.11.2.58
1854	Y10	2.11.2.59
1855	Y11	2.11.2.60
1856	Y12	2.11.2.61
1857	Y13	2.11.2.62
1858	Y14	2.11.2.63

ID	NAME	MENU
1859	Y15	2.11.2.64
1860	Y16	2.11.2.65
1861	Y17	2.11.2.66
1862	Y18	2.11.2.67
1863	Y19	2.11.2.68
1864	Y20	2.11.2.69
1865	Y21	2.11.2.70
1866	Y22	2.11.2.71
1867	Y23	2.11.2.72
1868	Y24	2.11.2.73
1869	Y25	2.11.2.74
1870	Y26	2.11.2.75
1871	Y27	2.11.2.76
1872	Y28	2.11.2.77
1873	Y29	2.11.2.78
1874	Y30	2.11.2.79
1875	Y31	2.11.2.80
1876	Y32	2.11.2.81
1877	Y33	2.11.2.82
1878	Y34	2.11.2.83
1879	Y35	2.11.2.84
1880	Y36	2.11.2.85
1881	Y37	2.11.2.86
1882	Y38	2.11.2.87
1883	Y39	2.11.2.88
1884	Y40	2.11.2.89
1885	Y41	2.11.2.90
1886	Y42	2.11.2.91
1887	Y43	2.11.2.92
1888	Y44	2.11.2.93
1889	Y45	2.11.2.94
1890	Y46	2.11.2.95
1891	Y47	2.11.2.96
1892	X0	2.11.3.1
1893	X1	2.11.3.2
1894	X2	2.11.3.3
1895	X3	2.11.3.4
1896	X4	2.11.3.5
1897	X5	2.11.3.6
1898	X6	2.11.3.7
1899	X7	2.11.3.8
1900	X8	2.11.3.9
1901	X9	2.11.3.10
1902	X10	2.11.3.11
1903	X11	2.11.3.12
1904	X12	2.11.3.13
1905	X13	2.11.3.14
1906	X14	2.11.3.15
1907	X15	2.11.3.16
1908	X16	2.11.3.17
1909	X17	2.11.3.18
1910	X18	2.11.3.19
1911	X19	2.11.3.20
1912	X20	2.11.3.21
1913	X21	2.11.3.22
1914	X22	2.11.3.23
1915	X23	2.11.3.24
1916	X24	2.11.3.25
1917	X25	2.11.3.26

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1918	X26	2.11.3.27
1919	X27	2.11.3.28
1920	X28	2.11.3.29
1921	X29	2.11.3.30
1922	X30	2.11.3.31
1923	X31	2.11.3.32
1924	X32	2.11.3.33
1925	X33	2.11.3.34
1926	X34	2.11.3.35
1927	X35	2.11.3.36
1928	X36	2.11.3.37
1929	X37	2.11.3.38
1930	X38	2.11.3.39
1931	X39	2.11.3.40
1932	X40	2.11.3.41
1933	X41	2.11.3.42
1934	X42	2.11.3.43
1935	X43	2.11.3.44
1936	X44	2.11.3.45
1937	X45	2.11.3.46
1938	X46	2.11.3.47
1939	X47	2.11.3.48
1940	Y0	2.11.3.49
1941	Y1	2.11.3.50
1942	Y2	2.11.3.51
1943	Y3	2.11.3.52
1944	Y4	2.11.3.53
1945	Y5	2.11.3.54
1946	Y6	2.11.3.55
1947	Y7	2.11.3.56
1948	Y8	2.11.3.57
1949	Y9	2.11.3.58
1950	Y10	2.11.3.59
1951	Y11	2.11.3.60
1952	Y12	2.11.3.61
1953	Y13	2.11.3.62
1954	Y14	2.11.3.63
1955	Y15	2.11.3.64
1956	Y16	2.11.3.65
1957	Y17	2.11.3.66
1958	Y18	2.11.3.67
1959	Y19	2.11.3.68
1960	Y20	2.11.3.69
1961	Y21	2.11.3.70
1962	Y22	2.11.3.71
1963	Y23	2.11.3.72
1964	Y24	2.11.3.73
1965	Y25	2.11.3.74
1966	Y26	2.11.3.75
1967	Y27	2.11.3.76
1968	Y28	2.11.3.77
1969	Y29	2.11.3.78
1970	Y30	2.11.3.79
1971	Y31	2.11.3.80
1972	Y32	2.11.3.81
1973	Y33	2.11.3.82
1974	Y34	2.11.3.83
1975	Y35	2.11.3.84
1976	Y36	2.11.3.85

ID	NAME	MENU
1977	Y37	2.11.3.86
1978	Y38	2.11.3.87
1979	Y39	2.11.3.88
1980	Y40	2.11.3.89
1981	Y41	2.11.3.90
1982	Y42	2.11.3.91

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1983	Y43	2.11.3.92
1984	Y44	2.11.3.93
1985	Y45	2.11.3.94
1986	Y46	2.11.3.95
1987	Y47	2.11.3.96