Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

Allen-Bradley Ultra 3000

Information Sheet for Crimson v2.0

Compatible Devices

- Allen-Bradley Ultra 3000

Verified Device

- Allen-Bradley Ultra 3000

Driver Options
None

Device Options
The programmer enters the desired device address, and selects whether the entered address is for a single device, or to be used as a broadcast.
NOTE: The connected drive may be reassigned to other groups by creating additional devices with varying group addresses, and entering the address in function 3 of Broadcast Address in the Communication Section.
Address changes take effect only after the drive is reset.

Important Information

Please review this document in its entirety for important information about certain selections.

No attempt is made to verify any data value being written. It is the responsibility of the programmer to ensure valid data are written. For selections being written whose data is only 2 or 4 characters, the driver will send only the least significant 2 or 4 hex bytes. For example, Analog Operating Mode/Analog Position Scale has 4 data bytes. Entering 74565 (hex 12345) will send 9029 (hex 2345).
See Appendix A, or refer to Allen-Bradley specification "Host Commands for Serial Communication" for proper data formats.

Accessible Data

NAME	DESCRIPTION	VALID FUNCTION CODES
	GENERAL...	**Section Header**
C000	Product Type	0
C001	Power Up Status	0
C002	Firmware Version	0
C179	Development Firmware Version	0
C003	Boot Firmware Version	0
C004	Factory Defaults->User Parameters	1
C016	Position Window Size	0,1,2,3,4,5,6,7,8,9
C017	Position Window Time	0,1,2,3,4,5,6,7,8,9
C022	Zero Speed Limit	0,1,2,3,4,5,6,7,8,9
C023	Speed Window Size	0,1,2,3,4,5,6,7,8,9
C025	Up to Speed Limit	0,1,2,3,4,5,6,7,8,9
C02F	Forward Current Limit	0,1,2,3,4,5,6,7,8,9
C030	Reverse Current Limit	0,1,2,3,4,5,6,7,8,9
C043	Override Mode	0,1,2,3,4,5,6,7,8,9
C05A	Operation Mode	0,1,2,3,4,5,6,7,8,9
C061	Host Control Mode	0,1,8,9
C06A	Reset Drive	1
C06B	Drive Enable/Disable	0,1,8,9
C06C	Setpoint Current	0,1,8,9
C06D	Setpoint Velocity	0,1,8,9
C06E	Setpoint Acceleration	0,1,8,9
C06F	Reset Faults	1
C15D	Position Comparator	0,1,2,3,4,5,6,7,8,9,A,B
C15E	Position Comparator Polarity	0,1,2,3,4,5,6,7,8,9,A,B
C193	Machine Cycle Size	0,1,2,3,4,5,6,7,8,9
C194	Position Rollover Enable/Disable	0,1,2,3,4,5,6,7,8,9

	COMMUNICATION...	**Section Header**
C052	Drive Address	0,2,3,6,7,8,9
C053	Broadcast Address	0,2,3,6,8,9

	ANALOG OPERATING MODE...	**Section Header**
C028	Analog Position Scale	0,1,2,3,4,5,6,7,8,9
C029	Analog Position Offset	0,1,2,3,4,5,6,7,8,9
C118	Analog Velocity Scale	0,1,2,3,4,5,6,7,8,9
C047	Analog Velocity Offset	0,1,2,3,4,5,6,7,8,9
C119	Analog Current Scale	0,1,2,3,4,5,6,7,8,9
C049	Analog Current Offset	0,1,2,3,4,5,6,7,8,9
C05D	Analog Acceleration Limit	0,1,2,3,4,5,6,7,8,9
C05E	Analog Deceleration Limit	0,1,2,3,4,5,6,7,8,9
C0A8	Analog Acceleration Enable/Disable	0,1,2,3,4,5,6,7,8,9

	PRESET OPERATING MODE...	**Section Header**
C05B	Preset Velocity	0,1,2,3,4,5,6,7,8,9,A,B
C05C	Preset Current	0,1,2,3,4,5,6,7,8,9,A,B
C05F	Preset Velocity Acceleration Limit	0,1,2,3,4,5,6,7,8,9
C060	Preset Velocity Deceleration Limit	0,1,2,3,4,5,6,7,8,9
C0A9	Velocity Accel/Decel Limit Enable/Disable	0,1,2,3,4,5,6,7,8,9
C00D	Preset Position	0,1,2,3,4,5,6,7,8,9,A,B
C00E	Preset Position Velocity	0,1,2,3,4,5,6,7,8,9,A,B
C02B	Preset Position Acceleration	0,1,2,3,4,5,6,7,8,9,A,B
C093	Preset Position Deceleration	0,1,2,3,4,5,6,7,8,9,A,B

	FOLLOWER OPERATING MODE...	**Section Header**
C01B	Master Gear Ratio	0,1,2,3,4,5,6,7,8,9,A,B
C01A	Motor Gear Ratio	0,1,2,3,4,5,6,7,8,9,A,B
C0AB	Rotation Direction	0,1,2,3,4,5,6,7,8,9
C01D	Slew Limit	0,1,2,3,4,5,6,7,8,9
C01E	Slew Limit Enable/Disable	0,1,2,3,4,5,6,7,8,9

	INDEXING OPERATING MODE...	**Section Header**
C058	Auto-start Indexing	0,1,2,3,4,5,6,7,8,9
C070	Start Index	1
C0B8	Host Index	0,1,8,9
C0AE	Index Type	0,1,2,3,4,5,6,7,8,9,A,B
C0AF	Index Distance/Position	0,1,2,3,4,5,6,7,8,9,A,B
C0B0	Index Registration Distance	0,1,2,3,4,5,6,7,8,9,A,B
C0B1	Index Velocity	0,1,2,3,4,5,6,7,8,9,A,B
C0B2	Index Acceleration	0,1,2,3,4,5,6,7,8,9,A,B
C0B3	Index Deceleration	0,1,2,3,4,5,6,7,8,9,A,B
C0B4	Index Dwell	0,1,2,3,4,5,6,7,8,9,A,B
C0B5	Index Count	0,1,2,3,4,5,6,7,8,9,A,B
C0B6	Index Termination	0,1,2,3,4,5,6,7,8,9,A,B
C0B7	Index Pointer	0,1,2,3,4,5,6,7,8,9,A,B
C0B9	Index Abort Deceleration	0,1,2,3,4,5,6,7,8,9

	OVERTRAVEL...	**Section Header**
C0D8	Positive Soft Position Limit	0,1,2,3,4,5,6,7,8,9
C0D9	Negative Soft Position Limit	0,1,2,3,4,5,6,7,8,9
C0DA	Positive Deceleration Distance	0,1,2,3,4,5,6,7,8,9
C0DB	Negative Deceleration Distance	0,1,2,3,4,5,6,7,8,9
C0DD	Soft Travel Enable/Disable	0,1,2,3,4,5,6,7,8,9

	HOMING...	**Section Header**
C071	Define Home	1
C0C4	Auto-start Homing	0,1,2,3,4,5,6,7,8,9
C0C5	Homing Type	0,1,2,3,4,5,6,7,8,9
C0C6	Homing Velocity	0,1,2,3,4,5,6,7,8,9
C0C7	Homing Acceleration	0,1,2,3,4,5,6,7,8,9
C0C8	Offset Move Distance	0,1,2,3,4,5,6,7,8,9
C0C9	Home Position	0,1,2,3,4,5,6,7,8,9
C0CD	Start Homing	1
C0CA	Homing Backoff Enable/Disable	0,1,2,3,4,5,6,7,8,9
C0CB	Home Sensor Polarity	0,1,2,3,4,5,6,7,8,9
C0CC	Homing Creep Velocity	0,1,2,3,4,5,6,7,8,9
C0D7	Homing Abort Deceleration	0,1,2,3,4,5,6,7,8,9
C15F	Home Current	0,1,2,3,4,5,6,7,8,9

	MOTOR...	**Section Header**
C037	Encoder Lines/Revolution	0,1,2,3,4,5,6,7,8,9
C038	Maximum Rotary Speed	0,1,2,3,4,5,6,7,8,9
C039	Intermittent Current	0,1,2,3,4,5,6,7,8,9
C03A	Continuous Current	0,1,2,3,4,5,6,7,8,9
C03B	Torque Constant	0,1,2,3,4,5,6,7,8,9
C03C	Inertia	0,1,2,3,4,5,6,7,8,9
C03D	Resistance	0,1,2,3,4,5,6,7,8,9
C03E	Inductance	0,1,2,3,4,5,6,7,8,9
C03F	Thermostat	0,1,2,3,4,5,6,7,8,9
C040	Commutation Type	0,1,2,3,4,5,6,7,8,9
C041	Poles/Revolution	0,1,2,3,4,5,6,7,8,9
C042	Hall Offset	0,1,2,3,4,5,6,7,8,9
C0AA	Motor Thermal Protection Enable	0,1,2,3,4,5,6,7,8,9
C095	Standard Motor Flag	0,1,2,3,4,5,6,7,8,9
C0DE	Motor Type	0,1,2,3,4,5,6,7,8,9
C0DF	Encoder Type	0,1,2,3,4,5,6,7,8,9
C0E0	Startup Commutation	0,1,2,3,4,5,6,7,8,9
C0E1	Encoder Lines/Motor	0,1,2,3,4,5,6,7,8,9
C0E2	Force Constant	0,1,2,3,4,5,6,7,8,9
C0E3	Electrical Cycle Length	0,1,2,3,4,5,6,7,8,9
C0E4	Motor Mass	0,1,2,3,4,5,6,7,8,9
C11F	Total Moving Mass	0,1,2,3,4,5,6,7,8,9
C0E5	Flux Saturation	0,1,2,3,4,5,6,7,8,9,A,B
C0E6	Maximum Linear Speed	0,1,2,3,4,5,6,7,8,9
C0E8	Thermal Resistance - Winding to Encoder	0,1,2,3,4,5,6,7,8,9
C0E7	Thermal Resistance - Winding to Ambient	0,1,2,3,4,5,6,7,8,9
C0EA	Thermal Capacitance - Winding to Encoder	0,1,2,3,4,5,6,7,8,9
C0E9	Thermal Capacitance - Winding to Ambient	0,1,2,3,4,5,6,7,8,9
C0EC	Rated Voltage	0,1,2,3,4,5,6,7,8,9
C10D	Integral Limits	0,1,2,3,4,5,6,7,8,9
C159	Automatic Motor Identification	0,1,2,3,4,5,6,7,8,9

	TUNING...	**Section Header**
C011	Position Loop Kp Gain	0,1,2,3,4,5,6,7,8,9
C012	Position Loop Ki Gain	0,1,2,3,4,5,6,7,8,9
C013	Position Loop Kd Gain	0,1,2,3,4,5,6,7,8,9
C014	Position Loop Kff Gain	0,1,2,3,4,5,6,7,8,9
C015	Position Loop Izone	0,1,2,3,4,5,6,7,8,9
C01F	Velocity Loop P Gain	0,1,2,3,4,5,6,7,8,9
C020	Velocity Loop I Gain	0,1,2,3,4,5,6,7,8,9
C021	Velocity Loop D Gain	0,1,2,3,4,5,6,7,8,9
C02D	Low Pass Filter Bandwidth	0,1,2,3,4,5,6,7,8,9
C02E	Low Pass Filter Enable/Disable	0,1,2,3,4,5,6,7,8,9

	ENCODER...	**Section Header**
C02C	Position Feedback Source	0,1,2,3,4,5,6,7,8,9
C101	Encoder Ratio Motor	0,1,2,3,4,5,6,7,8,9
C102	Encoder Ratio Load	0,1,2,3,4,5,6,7,8,9
C103	Load Encoder Type	0,1,2,3,4,5,6,7,8,9
C100	Load Encoder Lines Per Revolution	0,1,2,3,4,5,6,7,8,9
C0FF	Load Encoder Lines Per Meter	0,1,2,3,4,5,6,7,8,9
C0ED	Motor Encoder Interpolation	0,1,2,3,4,5,6,7,8,9
C0EE	Encoder Output Type	0,1,2,3,4,5,6,7,8,9
C0EF	Maximum Encoder Output Frequency	0,1,2,3,4,5,6,7,8,9
C059	Encoder Output Divider	0,1,2,3,4,5,6,7,8,9
C01C	Marker Output Gating	0,1,2,3,4,5,6,7,8,9

	DIGITAL I/O...	**Section Header**
C044	Output Override	0,1
C045	Brake Active Delay	0,1,2,3,4,5,6,7,8,9
C046	Brake Inactive Delay	0,1,2,3,4,5,6,7,8,9
C069	Input Functions	0,1,2,3,4,5,6,7,A,B
C0CE	Output Functions	0,1,2,3,4,5,6,7,A,B

	ANALOG I/O...	**Section Header**
C04B	Output Configuration	0,1,2,3,4,5,6,7,8,9
C04C	Output Offset	0,1,2,3,4,5,6,7,8,9
C04D	Output Scale	0,1,2,3,4,5,6,7,8,9
C04E	Output Override Enable/Disable	0,1,8,9
C04F	Output Override Value	0,1,8,9

	MONITOR...	Section Header
C073	Drive Status	0
C075	Run Status	0
C076	Digital Input Status	0
C077	Digital Output Status	0
C094	Encoder Status	0
C18F	Encoder Temperature	0
C0AC	Index Number	0
C0AD	Monitor Index Count	0
C079	Reset Peaks	1
C07A	Analog Command Input	0
C07C	Analog Current Limit Input	0
C07D	Analog Output	0
C07E	Motor Position	0
C07F	Auxiliary Encoder Position	0
C080	Position Command	0
C081	Position Error	0
C082	Positive Peak Position Error	0
C083	Negative Peak Position Error	0
C084	Velocity Command	0
C085	Velocity Motor	0
C086	Velocity Error	0
C087	Current Command	0
C088	Average Current	0
C089	Positive Peak Current Command	0
C08A	Negative Peak Current Command	0
C08B	Bus Voltage	0
C08D	Current Feedback	0
C08E	U-Phase Current	0
C08F	W-Phase Current	0
C092	Motor Temperature	0
C108	Drive Temperature	0
C024	Operating Mode	0

	FAULT...	Section Header
C018	Position Error Limit	0,1,2,3,4,5,6,7,8,9
C019	Position Error Time	0,1,2,3,4,5,6,7,8,9
C10E	Overspeed Limit	0,1,2,3,4,5,6,7,8,9
C10F	Velocity Error Limit	0,1,2,3,4,5,6,7,8,9
C027	Velocity Error Time	0,1,2,3,4,5,6,7,8,9
C031	User Current Limit	0,1,2,3,4,5,6,7,8,9
C074	Fault Status	0
C19E	Extended Fault Status	0
CEXC	Latest Exception Code	INTERNAL
CEXP	Parameter of Latest Exception	INTERNAL

NOTE – DRIVE NAME and MOTOR MODEL have certain special characteristics. See explanation after example screenshots.

	DRIVE NAME…	**Section Header**
C601	Drive Name – Characters 1 – 4	0,1,2,3,4,5,6,7
C602	Drive Name – Characters 5 – 8	0,1,2,3,4,5,6,7
C603	Drive Name – Characters 9 – 12	0,1,2,3,4,5,6,7
C604	Drive Name – Characters 13 – 16	0,1,2,3,4,5,6,7
C605	Drive Name – Characters 17 – 20	0,1,2,3,4,5,6,7
C606	Drive Name – Characters 21 – 24	0,1,2,3,4,5,6,7
C607	Drive Name – Characters 25 – 28	0,1,2,3,4,5,6,7
C608	Drive Name – Characters 29 – 32	0,1,2,3,4,5,6,7
C006	Send Stored Text to Drive Name	1

	MOTOR MODEL…	**Section Header**
CEB1	Motor Model - Characters 1 - 4	0,1,2,3,6,7
CEB2	Motor Model - Characters 5 - 8	0,1,2,3,6,7
CEB3	Motor Model - Characters 9 – 12	0,1,2,3,6,7
CEB4	Motor Model - Characters 13 – 16	0,1,2,3,6,7
CEB5	Motor Model - Characters 17 – 20	0,1,2,3,6,7
CEB6	Motor Model - Characters 21 – 24	0,1,2,3,6,7
CEB7	Motor Model - Characters 25 – 28	0,1,2,3,6,7
CEB8	Motor Model - Characters 29 – 32	0,1,2,3,6,7
C0EB	Send Stored Text to Motor Model	1

The NAME, represented by Cxxx, is the parameter code for the item.
The DESCRIPTION is the operation of the parameter.
The VALID FUNCTION CODES describes which function codes are permissible for the parameter.
The **BOLD** items, with **VALID FUNCTION CODES** specifying **Section Header**, permit the selection of a group of related parameters, as specified in the Allen-Bradley document "Host Commands for Serial Communication".
Double-click the header to open the list of items for that group.

The left side of the dialog box shows the list of headers in the center, the names of parameters on the right, with the description.
The right side of the dialog box contains the function code selection buttons. This list is dynamic, enabling only those buttons that apply to the parameter currently selected.
For those commands requiring an Array Index Value, the box at the top of the right side is enabled for entry of the Index Value. To its right, in <>, is the permitted range of values.
Appropriate messages appear as selections are changed.

For programming convenience, function code "0 - Read Working Value", and function code "1 – Write Working Value", are combined into "0,1 – Read/Write

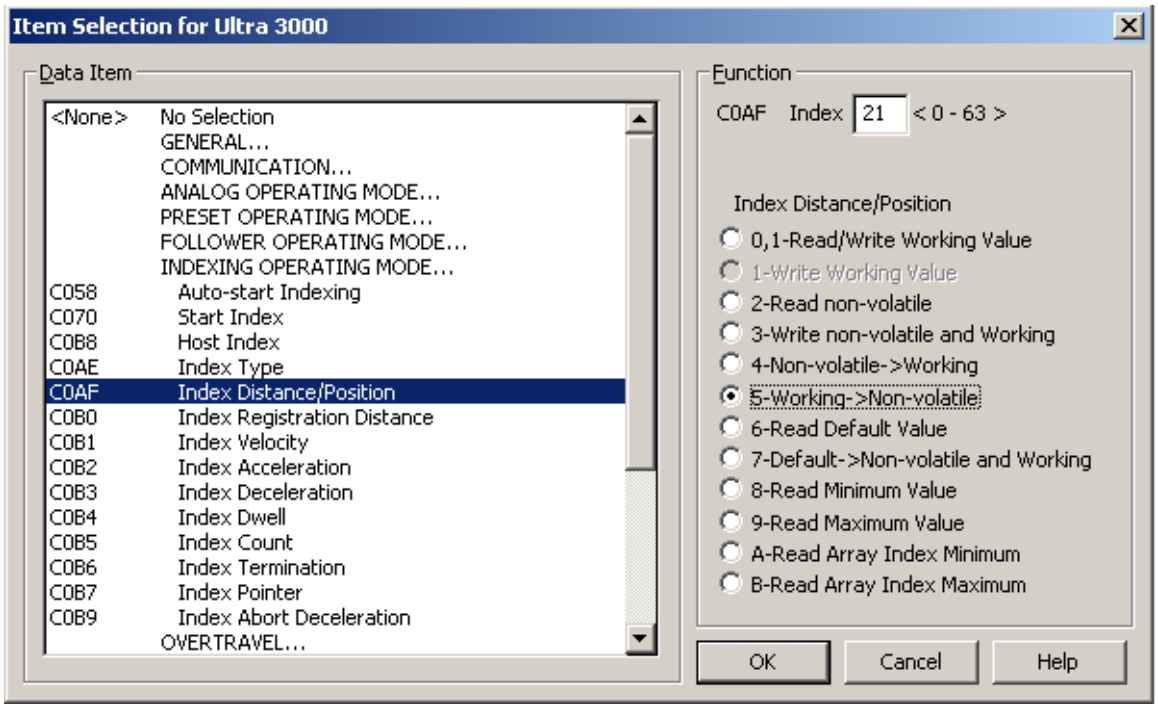
Working Value" for those parameters supporting both. The driver selects the proper code at runtime.
If the parameter supports only one of the two functions, the other function code performs no action.

No action is taken for a read of function codes 3,4,5,7, or for a write of function codes 2,6,8,9,A,B.

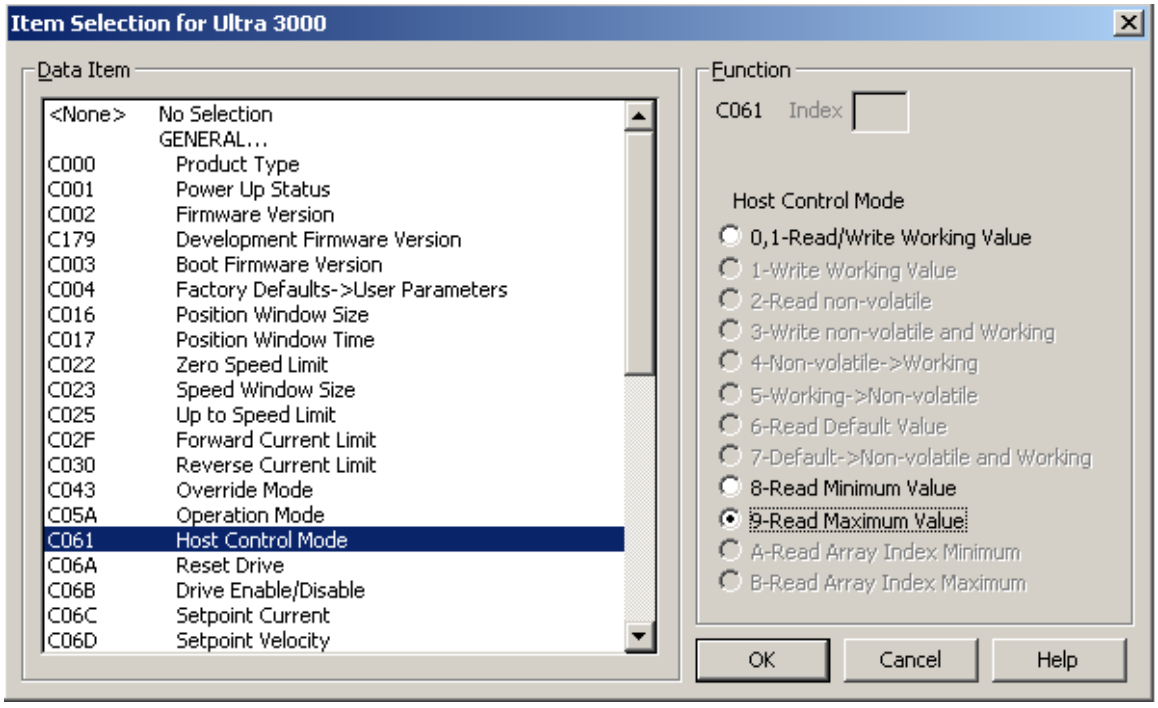
Function codes 4,5,7, and Resets, are commands only. Write a non-zero value to execute those operations.

INTERNAL values CEXC and CEXP display the most recent Exception Code (function cannot be performed by the drive), and the parameter that caused it. Writing any value to either CEXC or CEXP will reset both to 0.

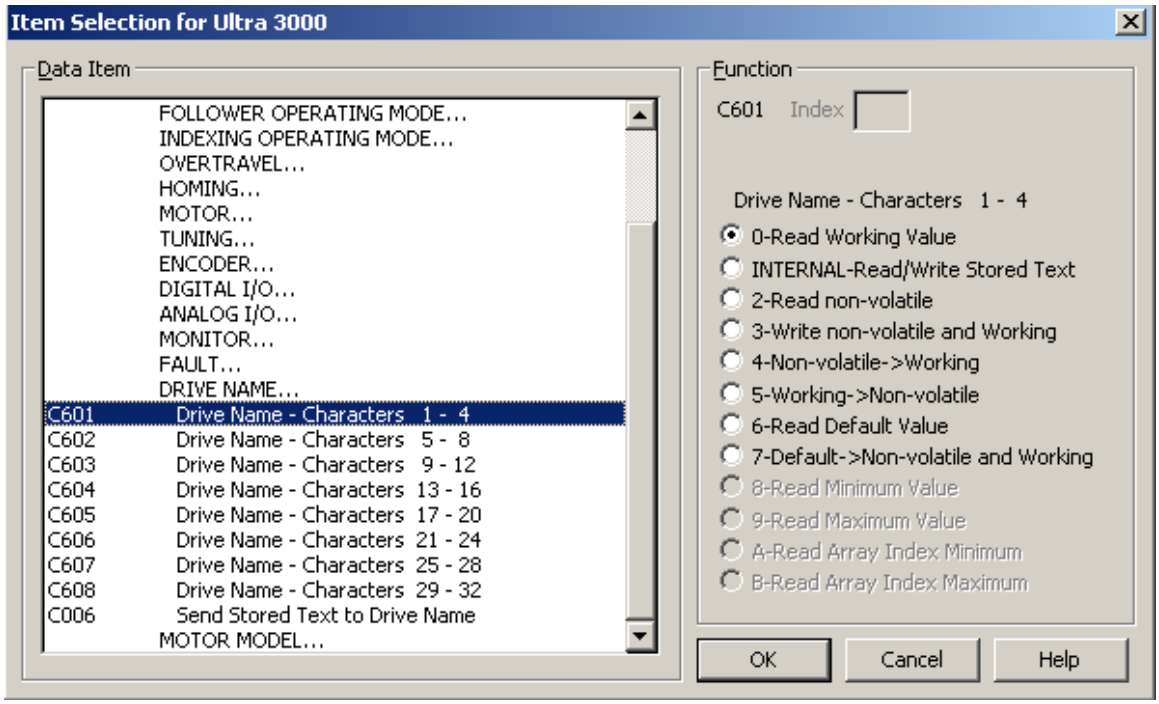
Example Programming Screen 1:
Menu = 'INDEXING OPERATING MODE…'
Item = 'Index Distance/Position'
Parameter = AF
Array Index Value = 21
Function = Write Working Value to Non-Volatile memory:



Example 2:
Menu = GENERAL…
Item = Host Control Mode
Parameter = 61
Array Index Value = None
Function = Read Maximum Value



SPECIAL CHARACTERISTICS OF DRIVE NAME AND MOTOR MODEL:



Function codes 4 and 5 are not supported by Motor Model. Otherwise, the two groups function identically.

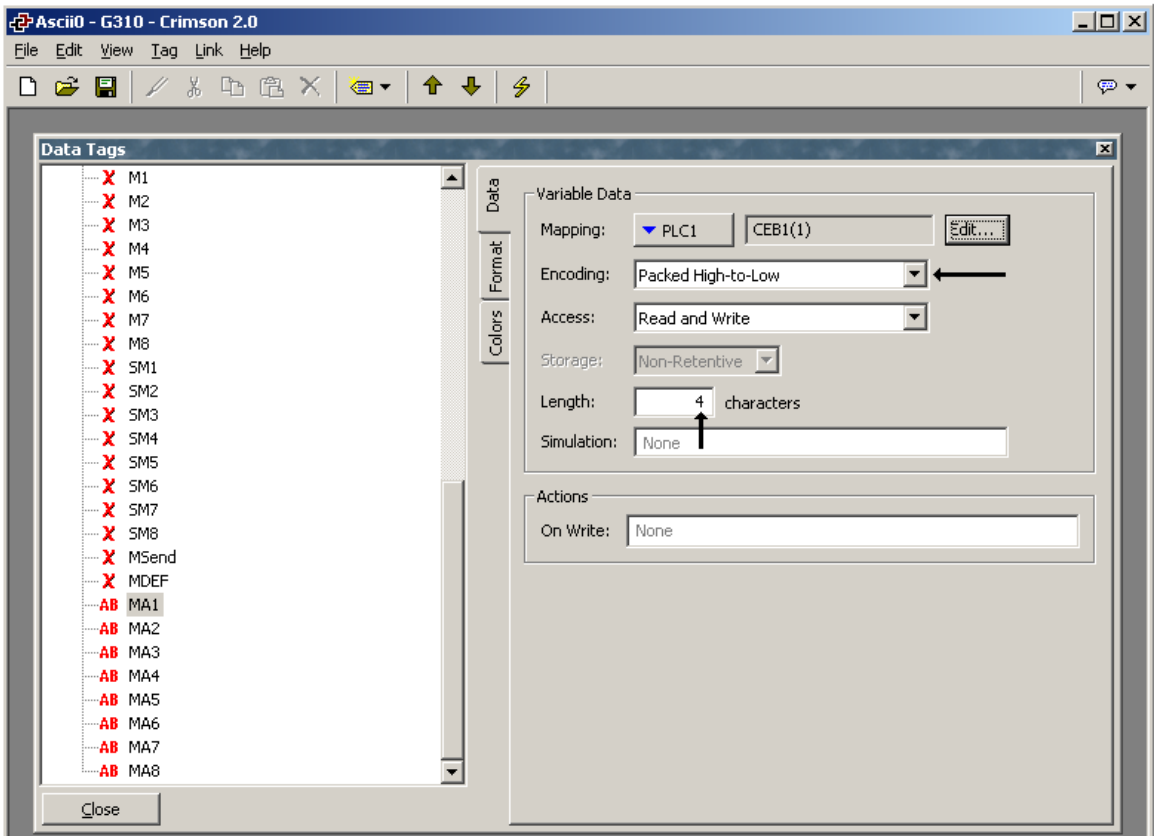
Note the second function code, labeled "INTERNAL-Read/Write Stored Text. The driver has internal space allocated for eight 32-bit integers that can be accessed by this function code. This selection does not get sent to the drive, rather, data is read from and written to the internal storage when this is selected. All other functions access the drive.

Function 3 'Write to nonvolatile and working' writes the INTERNAL data when its value is set to any nonzero value.

The last selection in the list, C006 or C0EB in Motor Model, is set to a non-zero value in order to write the internally stored data to the drive.

At startup, both the Drive Name, and the Motor Model, requests are sent to the drive. The characters received are put automatically into the internal storage. Therefore, once a drive has the Drive Name and Motor Model set, it is unnecessary to execute function 0 "Read Working Value". Reading the INTERNAL Stored Text will improve performance.

Additionally, when programming any of the Read functions for either of the two groups, it is useful to display them as strings. See figure, below:



Variable MA1 is assigned to a String. Note the settings at the arrows. Always set Encoding to Packed High-to-Low. Set Length to 4 characters to display one item. Set Length to 32 using only C601 or CEB1, to display the entire string.

To write the Drive Name, or Motor Model, it is necessary to pack four characters into each 32-bit word. In the above screenshot, SM1 is the integer value of CEB1(1), the internal storage of the first four characters. SM1 might have been set to the proper value using a program:

```
int i;
cstring c = "ABCD";
SM1 = 0;
for( i = 0; i < 4; i++ ) {
    SM1 <<= 8;
    SM1 += c[i];
    }
```

SM1 then equals hex 41424344.

Cable Information

RS-232

RLC UNIT	Ultra3000 CN3
2 (RxD)	3 (XMT)
5 (TxD)	2 (RCV)
3/4 (0V)	5 (COM)
	RCV+ (1) <–> XMT- (8)

RS-485 – 2 Wire

RLC UNIT	Ultra3000 CN3
1+4 (RXB + TXB)	RCV+ (1) <–> XMT+ (4)
2+3 (RXA + TXA)	RCV- (7) <–> XMT- (8)

RS-422 or RS485 – 4 Wire

RLC UNIT	Ultra3000 CN3
1 (TXB)	RCV+ (1)
2 (TXA)	RCV- (7)
3 (RXA)	XMT- (8)
4 (RXB)	XMT+ (4)

APPENDIX A – Parameter Size Reference for Write Functions

COMMANDS WRITE 1 to Execute	1 BYTE 0 - FF	2 BYTES 0 - FFFF	4 BYTES 0 - FFFFFFFF
C004	C017	C011	C015
C006	C01C	C012	C016
C06A	C01E	C013	C018
C06F	C02C	C014	C01D
C070	C02E	C019	C022
C071	C02F	C01F	C023
C079	C030	C020	C025
C0CD	C03F	C021	C03C
C0EB	C040	C027	C05D
	C041	C028	C05E
	C043	C029	C05F
	C04B	C02D	C060
	C052	C031	C06D
	C053	C037	C06E
	C058	C038	C0B9
	C05A	C039	C0D7
	C061	C03A	C0D8
	C06B	C03B	C0D9
	C095	C03D	C0DA
	C0A8	C03E	C0DB
	C0A9	C042	C0C6
	C0AA	C044	C0C7
	C0AB	C045	C0C8
	C0B8	C046	C0C9
	C0C4	C047	C0CC
	C0C5	C049	C0E1
	C0CA	C04C	C0E4
	C0CB	C04D	C0E7
	C0DD	C04F	C0E8
	C0DE	C059	C0E9
	C0DF	C06C	C0EA
	C0E0	C0E2	C0FF
	C0ED	C0E3	C10E
	C0EE	C0E6	C11F
	C0EF	C0EC	C193
	C103	C100	
	C10D	C101	
	C10F	C102	
	C159	C118	
	C194	C119	
		C15F	

Reading certain 1 and 2 Byte items that have Write function codes, return 1000000000, instead of 0, in order to allow setting the value to 0. Use only **Decimal** displays of fewer than 10 digits for these items.