Serial Communications



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WARNING: The owner, installer, and user are responsible for the correct installation and use of the SR44, and must ensure that only qualified personnel install the SR44. The owner, installer, and user must ensure that the installation, operation and maintenance of the SR44 complies with the relevant Codes of Practice, Regulations, and Statutory Requirements. The Manufacturer or his agent do not assume any liability, expressed or implied, for any consequence resulting from inappropriate, negligent, or incorrect installation, application, use or adjustment of the product or circuit design, or from the mismatch of the SR44 to a motor. To prevent an electrical shock hazard, the SR44 must be properly connected to a safety ground. The SR44 is not designed for use in hazardous areas. Use in such an area may invalidate the hazardous area certification.

6.1 – Overview

The SR44 has built-in serial communication capability that is a compatible subset of the widely recognized Modbus RTU protocol (slave), and the SR44 may be connected to a PC or suitable PLC network via an optional SR44-RS485 interface card.



Serial communication requires an optional interface card (SR44-RS485), which includes a "Local/Remote" switch to easily switch starter control from communication to keypad. Serial communication is valid only in the "Remote" position, and the local keypad powers down. In the "Local" position, the local keypad powers up and controls the soft starter, and all serial communication is ignored.

6.2 – Quick Start

Work should only be carried out on the SR44 with all electrical power disconnected

- 1) Communication settings:
 - a) 9600 baud, 8 data bits, 1 stop bit, no parity.
 - b) network station number = 1.
- 2) Before Connecting a Comm interface, use the standard keypad to make any changes for your bus system:
 - a) Set Parameter 1 to the required network station number (slave address).
 - b) If not continously polling the unit at least once every 5 seconds, set P-126 to 0, turning off comms timeout trip
 - c) Make any changes to Parameter 121, bit 6.
 - 0 = 1 Stop bit.
 - 1 = 2 Stop bits
 - d) Store changes to EEROM (save RAM).
- 3) The Local/Remote switch must be set to "Remote" to use the optional communication interface SR44-RS485. When this switch is set to "Local", serial communication is ignored and the integrated local keypad controls the soft starter. (Refer to "Chapter 7: Optional Hardware" for information about installing and using the optional Local/Remote switch.)
- 4) Register and coil addresses start at zero.

SR44 has a Modbus offset of one address for registers and bits. PLC programs should target one address higher than desired, e.g., PLC targets SR44 address 40019 to read/write to/from address 40018 (P-18).

Allowed address ranges are Register numbers 0...127, EEPROM Registers 1000...1127, Coils (flags) 0...1024.

(Refer to the "Parameter Memory Addresses" section of this chapter for more information.)

6.2 – Quick Start (continued)

- 5) Function 06 (Write Single Register) Parameters in the SR44 are 8-bit bytes which are written to by 16-bit Modbus words. Only the low byte of the Modbus word in the PLC gets sent to the SR44 parameter.
- 6) Function 05 (Write Single Coil) This function is used to set or clear a single bit within the Read/Write parameters between 0 through 127. (Only the bits within parameters designated as Read/Write can be preset with this function; Parameters 18, 51, 52, 53, 54, 86, 95, 96, 121, & 127)
- 7) Function 03 (Read Holding Registers) This function reads 8-bit bytes back to the PLC. If more than one byte is requested from the SR44, the PLC program will have to separate 16-bit Modbus words into the 8-bit SR44 bytes.
- 8) SR44 Status Bits (User Flags) are read as holding registers, i.e., read register 9 to read Status2 bits. For status bit writes, bits are mapped one-to-one, e.g., the Kickstart flag bit 0 of User Flags 1 (P51) is bit no 51 * 8 + 0 = bit 408. (Refer to the "Specifications" section of this chapter for supported Modbus function codes.)

6.3 – Specifications

- 1. Refer to Modicon Modbus Protocol Reference Guide PI-MBUS-300 at www.modbus.org for full protocol specification.
- 2. Baud rate is 9600.
- 3. 8 data bits, no parity, 1 stop (default) or 8 data bits, no parity, two stop bits.
- 4. Modbus timeout is 3.5 character times. The in message timeout is also 3.5 character times, unlike the standard which is 1.5 character times. Further, it is possible that the SR44 will be delayed in responding to a request if it is checking a fault condition.
- 5. Broadcast is not supported.
- 6. SR44 parameters retain their normal numbers (0-127).
- 7. Status bits (flags) are bit positions starting at parameter 0 bit 0.
- 8. Register numbers are 0...127.
- 9. Coils (flags) 0...1024.
- Offline EEROM Registers are 1000...1127. (Non-volatile registers where the "Permanent Store" parameters are saved.)
- 11. Supports the following Modbus functions:

Function 03 read holding registers up to 4 words (8 parameters) in number.

Function 05 write single coil.

Function 06 write single register (byte).

Function 07 exception status.

- Error 01 illegal function (write to read-only parameter).
- Error 02 illegal data address (bad parameter number).
- Error 03 illegal data (trying to read or write too much data).
- Error 06 slave busy.
- Error 07 negative acknowledge.

6.4 – Parameter Memory Addresses

			Parame	eter Me	emory	Addresses				
	Modk	ous *	Param	neter Bi	t #s **					
Parameter Number	Address	Byte	Individual Bit	Decimal	Hex	Name / Function	Type ***			
0	40000					dummy parameter	R			
1	40001				Station No	R/W				
2	40002					Language	R/W			
3	40003			n/a		Program Type	R			
4	40004			11/a		Software Ver	R			
5	40005					Password	R/W			
6	40006					Firing Mode	R/W			
7	40007					Protection	R/W			
			-	-	-	Status 1				
			0 (1)	64	40	Stopped				
			1 (2)	65	41	Starting				
			2 (4)	66	42	Current Limit				
8	40008	High	3 (8)	67	43	Top of Ramp	R			
		riigii	4 (16)	68	44	Dwell				
			5 (32)	69	45	Full Conduction				
			6 (64)	70	46	Energy Saving				
			7 (128)	71	47	Stopping				
			-	-	-	Status 2				
			0 (1)	72	48	Alarm				
			1 (2)	73	49	Overload Integrating				
			2 (4)	74	4A	Stall				
9	40009		3 (8)	75	4B	Forced Override	R			
			4 (16)	76	4C	Noise				
			5 (32)	77	4D	Inhibit Start				
			6 (64)	78	4E	DC I/p Level Reached				
			7 (128)	79	4F	Reserved				
				-		6 (Write Single Register), c d Holding Registers).	r to			
** Par	** Parameter Bit #s apply only to Function 05 (Write Single Coil).									
*** Ту	pe: R =	Read C	Only; R/	W = Rea	d/Write					
Table of	continue	d next p	oage.							

Modbus * Parameter Bit #s ** Name / Function ** 8000 900 <			Paran	neter N	lemory A	ddres	ses (continued)		
Image: constraint of the second se	5	Modb	ous *	Para	neter Bit	#s **			
10 40010 0 (1) 80 50 Relay K1 Status 1 (2) 81 51 Relay K2 Status 2 (4) 82 52 (unused) R 3 (8) 83 53 (unused) (unused) R R 4 (16) 84 54 Input 1 Status S S (unused) R 11 40011 5 (32) 85 55 (unused) R/W 14 40012 7 (128) 87 57 (unused) R/W 14 40014 7 (128) 87 57 (unused) R/W 15 40016 R/W Start Time R/W Start Time R/W 16 40016 101 144 90 Auto Config R/W 17 40017 - - Auto Config R/W 12 143 90 Auto Ramp R/W 12 145 91 Auto Stop G G	Paramete Number	Address	Byte	Individual Bit	Decimal	Hex	Name / Function	Type ***	
10 40010 1(2) 81 51 Relay K2 Status 2(4) 82 52 (unused) R 3(8) 83 53 (unused) R 4(16) 84 54 Input 1 Status R 5(32) 85 55 (unused) R 11 40011 40012 R R 12 40012 R Start Ped R/W 14 40014 R/W Start Time R/W 14 40016 R/W Kick Ped R/W 14 40016 R/W Kick Ped R/W 17 40017 N/a Kick Time R/W 16 40016 R/W Stop Ped R/W 12 40017 - - Auto Config R/W 12 1414 90 Auto Config R/W R/W 12 1416 92 Auto SadC R/W R/W <				-	_	-	Status 3		
10 40010 2 (4) 82 52 (unused) 3 (8) 83 53 (unused) R 4 (16) 84 54 Input 1 Status R 5 (32) 85 55 (unused) R 11 40010 6 (64) 86 56 (unused) 12 40012 7 (128) 87 57 (unused) 14 40014 Kick Ped R/W Kick Ped R/W 14 40016 High N/a Kick Ped R/W 15 40015 - - Auto Config R/W 16 40016 - - - Auto Config R/W 16 40017 - - Auto Config R/W K/W 17 40017 144 90 Auto Ramp R/W K/W 17 40018 - - - Auto SadC K/W 12(2) 145 <				0 (1)	80	50	Relay K1 Status		
10 40010 3 (8) 83 53 (unused) R 4 (16) 84 54 Input 1 Status 53 (unused) 5 (32) 85 55 (unused) (unused) (unused) 11 40011 (unused) (unused) (unused) (unused) 12 40012 (unused) (unused) (unused) (unused) 14 40014 (unused) (unused) (unused) (unused) 14 40014 (unused) (unused) (unused) (unused) 15 40015 (unused) (unused) (unused) (unused) (unused) 16 40016 (unused) (unused) (unused) (unused) (unused) (unused) 17 40017 (unused) (unused) (unused) (unused) (unused) (unused) 16 40018 (unused) (unused) (unused) (unused) (unused) (unused) 1(12) <t< th=""><th></th><td></td><td></td><td>1 (2)</td><td>81</td><td>51</td><td>Relay K2 Status</td><td></td></t<>				1 (2)	81	51	Relay K2 Status		
4 (16) 84 54 Input 1 Status 5 (32) 85 55 (unused) 6 (64) 86 56 (unused) 7 (128) 87 57 (unused) 14 40012 7 (128) 87 57 (unused) 13 40013 7 (128) 87 57 (unused) 14 40014 7 (128) 87 57 (unused) 14 40015 7 (128) 87 57 (unused) 15 40015 7 (128) 87 57 (unused) RW 16 40016 144 90 Start Time RW 17 40017 144 90 Auto Config RW 16 40018 - - - Auto SMC RW 12(2) 145 91 Auto SMC RW RW 11(2) 145 94 Auto and start 7 RW 19 4001				2 (4)	82	52	(unused)		
1 5 (32) 85 55 (unused) 6 (64) 86 56 (unused) 7 (128) 87 57 (unused) 12 40012 7 (128) 87 57 (unused) 14 40014 Kick Ped R/W 14 40014 Kick Ped R/W 15 40015 R/W 16 40016 R/W 17 40017 R/W 16 40016 R/W 17 40017 17 40017 1(2) 144 90 1(2) 145 91 1(2) 145 91	10	40010		3 (8)	83	53	(unused)	R	
6 (64) 86 56 (unused) 11 40011 7 (128) 87 57 (unused) 12 40012 Start Ped R/W 13 40013 Image: start Ped image: start Ped image: start Ped image: start Piterine R/W 14 40014 Monte image: start Ped image: start Piterine R/W 16 40015 Monte image: start Piterine R/W 17 40017 Monte image: start Piterine R/W 18 40018 Monte image: start Piterine R/W 19 40018 - - - Auto Config R/W 10 144 90 Auto Config R/W R/W 12 140 144 90 Auto Ramp R/W 12 140 144 90 Auto Ramp R/W 12 140 144 90 Auto Ramp R/W 13 3(8) 147 93 Auto Iog R/W 14 16 148 94 Auto Iog R/W 17 128				4 (16)	84	54	Input 1 Status		
11 40011 12 40012 13 40013 14 40014 15 40015 16 40016 17 40017 16 40016 17 40017 18 40018 40018 - 19 40019 20 40019 19 40019 20 40020 40018 - 19 40019 20 40020 3002 - 20 40020 40018 - 40019 - 40018 - 40018 - 40018 - 40018 - 40018 - 40018 - 40018 - 40018 - 40019 - 40019 - 40019 - 40019 - 40019 - 400				5 (32)	85	55	(unused)		
11 40011 Image: start Ped R/W 12 40012 Start Ped R/W 13 40013 Start Time R/W 14 40014 Kick Ped R/W 15 40015 R/W Kick Ped R/W 16 40016 N/M Stop Ped R/W 17 40017 - - Auto Config R/W 18 40018 - - Auto Config R/W 12 12 144 90 Auto Ramp R/W 12 12 145 91 Auto SMC R/W 12 12 145 91 Auto Bypass R/W 14 16 148 94 Auto add SMC R/W 15 3(8) 147 93 Auto add SMC R/W 19 40019 5(32) 149 95 Auto add SMC R/W 19 40020 151 97 Auto Pedestal R/W 19 40020 N/M Reference PF R<				6 (64)	86	56	(unused)		
12 40012 3 40013 14 40014 14 40014 15 40015 16 40016 17 40017 11				7 (128)	87	57	(unused)		
13 40013 14 40014 15 40015 16 40016 17 40017 17 40017 18 40018 40018 - - - 0 11 14 90 16 40016 17 40017 - - 0 11 14 90 16 40016 - - 0 144 90 112 144 90 0 11 144 90 112 145 91 Auto Config 1 12 145 91 Auto Bypass 3 (8) 147 93 Auto log 4 16 148 94 Auto end stop 5 (32) 149 95 Auto end start 7 7(128) 151 97 Auto Pedestal 19 40020 16(4) <t< th=""><th>11</th><td>40011</td><td></td><td></td><td></td><td></td><td>Start Ped</td><td>R/W</td></t<>	11	40011					Start Ped	R/W	
14 40014 15 40015 16 40016 17 40017 17 40017 18 40018 40018 - - - 0 11 12 144 90 Auto Config 0 11 12 145 91 Auto Bypass 14 100 12 145 92 Auto Bypass 3 147 93 Auto add 40018 5 5 149 95 Auto stop 6 150 96 40019 5 5 151 97 7 128 151 97 91 Auto Pedestal R/W 19 40019 N/A Reference PF R 10 40020 N/A Reference PF R 10 1023 1003 Read Registers).	12	40012					Start Time	R/W	
15 40015 16 40016 17 40017 17 40017 18 40018 40018 - 12 11 13 40017 14 11 15 11 16 11 17 40017 17 10017 18 11 18 40018 19 40019 10 144 15 91 16 1402 16 148 16 148 16 148 16 148 17 93 18 40018 19 40019 20 40020 21 40021 17 128 151 97 151 97 151 97 151 97 151 97 151 97 151 97	13	40013	1				Kick Ped	R/W	
16 40016 High Stop Ped R/W 17 40017 - Stop Time R/W 18 40018 - - Auto Config R/W 18 40018 - - Auto Config R/W 18 40018 - - Auto Config R/W 10(1) 144 90 Auto Ramp R/W 11(2) 145 91 Auto 3MC R/W 2(4) 146 92 Auto Bypass R/W 3(8) 147 93 Auto ond stop Sop Sop 5(32) 149 95 Auto stop Sop Sop R/W 19 40019 5(32) 149 95 Auto end start Top Rate R/W 20 40020 7(128) 151 97 Auto Pedestal R/W 21 40021 n/a Internal PF R Delay Angle R 22 40022 <th>14</th> <td>40014</td> <td></td> <td></td> <td>n/a</td> <td></td> <td>Kick Time</td> <td>R/W</td>	14	40014			n/a		Kick Time	R/W	
Image: High Stop Time R/W 17 40017 High Stop Time R/W 18 40017 - - Auto Config R/W 18 40018 - - - Auto Bypass R/W 18 40018 - 1(2) 145 91 Auto Bypass R/W 18 40018 3 (8) 147 93 Auto Jog R/W 10 148 94 Auto Bypass R/W R/W 19 40019 5 (32) 149 95 Auto stop 10 1021 151 97 Auto Pedestal R/W 20 40020 16(64) 150 96 Auto Pedestal R 21 40021 n/a Internal PF R R 23 40023 N/A Stop Time R R * ModLogad Grad N/A Reference PF R 23 <td< th=""><th>15</th><td>40015</td><td></td><td></td><td></td><td></td><td>Dwell Time</td><td>R/W</td></td<>	15	40015					Dwell Time	R/W	
17 40017 Stop lime R/W 18 40018 - - Auto Config 0(1) 144 90 Auto Ramp 8 8 1 <	16	40016	High				Stop Ped	R/W	
18 40018 0 (1) 144 90 Auto Ramp 1 (2) 145 91 Auto 3MC 2 (4) 146 92 Auto Bypass 3 (8) 147 93 Auto olog 4 (16) 148 94 Auto end stop 5 (32) 149 95 Auto stop 6 (64) 150 96 Auto end start 7 (128) 151 97 Auto Pedestal 19 40020 0pt Rate R/W 20 40020 n/a Nato Pedestal R 21 40021 n/a Max Angle R 22 40022 n/a Max Angle R 3 40023 N/A Max Angle R ** Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). Not Write *** Npe: R = Read Only; R/W = Read/Write Single Coil). Single Coil).	17	40017	riigii				Stop Time	R/W	
1 1 145 91 Auto 3MC 2 146 92 Auto Bypass R/W 3 3 147 93 Auto Jog R/W 40018 4 146 92 Auto Bypass R/W 3 3 147 93 Auto Iog R/W 4 146 148 94 Auto end stop E 5 32 149 95 Auto stop E 6 640 150 96 Auto end start T 7 128 151 97 Auto Pedestal R/W 40020 40020 N/A Reference PF R R 1 40021 N/A Max Angle R 20 40023 R Max Angle R 1 40021 N/A Max Angle R 21 40023 R Max Angle R 1 R R Max Angle				-	_	-	Auto Config		
18 40018 ² (4) ¹⁴⁶ ⁹² ⁴ (16) ¹⁴⁸ ⁹⁴ ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁸ ⁹⁴ ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁸ ⁹⁴ ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁸ ⁹⁴ ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁸ ⁹⁴ ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁸ ⁹⁴ ⁴ (16) ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ⁴ (16) ¹⁴⁹ ⁹⁵ ⁴ (16) ⁴ (16) ¹⁴⁹ ¹⁴⁰ ¹⁴⁰ ⁴ (16) ¹⁴⁰				0 (1)	144	90	Auto Ramp		
18 40018 3 (8) 147 93 Auto Jog R/W 4 (16) 148 94 Auto end stop 5 (32) 149 95 Auto stop Auto end stat Presson Presson <td< th=""><th></th><td></td><td></td><td>1 (2)</td><td>145</td><td>91</td><td>Auto 3MC</td><td colspan="2"></td></td<>				1 (2)	145	91	Auto 3MC		
4 (16) 148 94 Auto end stop 5 (32) 149 95 Auto stop 6 (64) 150 96 Auto end start 7 (128) 151 97 Auto Pedestal 19 40019 7 (128) 151 97 Auto Pedestal 20 40020 7 (128) 151 97 Auto Pedestal R/W 21 40021 n/a Internal PF R 23 40023 Max Angle R * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). m/a Register). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				2 (4)	146	92	Auto Bypass		
5 (32) 149 95 Auto stop 6 (64) 150 96 Auto end start 7 (128) 151 97 Auto Pedestal 19 40019 Opt Rate R/W 20 40020 Internal PF R 21 40021 Max Angle R 23 40023 Max Angle R * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). *** Parameter Bit #s apply only to Function 05 (Write Single Coil). **** Type: R = Read Only; R/W = Read/Write	18	40018		3 (8)	147	93	Auto Jog	R/W	
6 (64) 150 96 Auto end start 19 40019 7 (128) 151 97 Auto Pedestal 20 40020 Price Price R R/W 21 40021 Price Price R R 22 40022 Price Price R R 23 40023 Price Price R R * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). Price R * Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				4 (16)	148	94	Auto end stop		
19 40019 20 40020 21 40021 22 40022 23 40023 40023 Internal PF Reference PF R Delay Angle R ** Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). *** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				5 (32)	149	95	Auto stop		
19 40019 20 40020 21 40021 22 40022 23 40023 40023 Internal PF R Delay Angle R Max Angle * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				6 (64)	150	96	Auto end start		
20 40020 Reference PF R 21 40021 n/a Internal PF R 22 40022 Delay Angle R 23 40023 Max Angle R * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). *** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				7 (128)	151	97	Auto Pedestal		
21 40021 n/a Internal PF R 22 40022 Delay Angle R 23 40023 Max Angle R * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). or only ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** *** Type: R = Read Only; R/W = Read/Write	19	40019					Opt Rate	R/W	
22 40022 23 40023 * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write	20	40020					Reference PF	R	
23 40023 Max Angle R * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). R ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write	21				n/a		Internal PF	R	
 * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write 	22	40022					Delay Angle	R	
the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write	23	40023					Max Angle	R	
$\mathbf{Y} \mathbf{p} \mathbf{c} \cdot \mathbf{K} = \mathbf{K} \mathbf{c} \mathbf{a} \mathbf{u} \mathbf{v} \mathbf{f} \mathbf{w} \mathbf{c} \mathbf{c} \mathbf{a} \mathbf{v} \mathbf{v} \mathbf{f} \mathbf{c}$	the	first para	meter	of Functi	on 03 (Rea	ad Hold	ling Registers).	to only	
Table continued next page.	*** Ту	pe: R =	Read C	Dnly; R/	W = Read/	Write			
	Table of	continue	d next µ	oage.					

		Para	ameter	Memory	Addres	ses (continued)		
	Modb	us *	Para	ameter Bi	t #s **			
Parameter Number	Address	Byte	Individual Bit	Decimal	Hex	Name / Function	Type ***	
24	40024					Reserved – Rated Amps (100s)	R	
25	40025					Reserved – Rated Amps	R	
26	40026					Current	R	
27	40027					Peak Start I	R	
28	40028					Low I Level	R/W	
29	40029					Low I Time	R/W	
30	40030			n/a		C/L Level	R/W	
31	40031			11/d		C/L Time	R/W	
32	40032					Shear Level	R/W	
33	40033					Shear Time	R/W	
34	40034					Ovld Level	R/W	
35	40035					Ovld Delay	R/W	
36	40036					% Overload	R	
37	40037					Reserved	-	
			- 0 (1)	- 304	- 130	UserFlags 5 – Reserved (unused)	-	
		High	1 (2)	305	131	Reserved	-	
			2 (4)	306	132	Reserved	-	
38	40038		3 (8)	307	133	(unused)	n/a	
	10000		4 (16)	308	134	(unused)	-	
			5 (32)	309	135	(unused)	-	
			6 (64)	310	136	(unused)	-	
			7 (128)	311	137	(unused)	-	
39	40039		, (120)	011	107	PF Angle	R	
40	40040					Supply Volts	R	
41	40041					Reserved	_	
42	40042					Reserved	_	
43	40043			n/a		Reserved	_	
44	40044					Reserved	_	
45	40045					Reserved	_	
46	40046					Reserved	_	
47	40047					Reserved	_	
* Mod	dbus addi			ly to Funct 03 (Read F		rite Single Register), or to onl	y the	
				-		ite Single Coil).		
*** Ту	vpe: R =	Read C	Dnly; R/	W = Read/	Write			
Table of	continue	d next p	oage.					

		Para	ameter	Memory	Addres	ses (continued)					
<u> </u>	Modb	ous *	Para	meter Bi	t #s **						
Parameter Number	Address	Byte	Individual Bit Decimal Hex		Hex	Name / Function	Type ***				
48	40048				1	Reserved	-				
49	40049			n/a		Reserved	-				
50	40050					Reserved	-				
			-	-	-	User Flags 1					
			0 (1)	408	198	Kickstart					
			1 (2)	409	199	Current Limit Timeout Sel'd					
			2 (4)	410	19A	Overload Selected					
51	40051		3 (8)	411	19B	Shearpin Selected	R/V				
			4 (16)	412	19C	Under Current Selected	1				
			5 (32)	413	19D	Thermistor Selected	1				
			6 (64)	_	_	(Unused)	1				
			7 (128)	415	19F	Terminal Starting					
	40052		-	_	_	User Flags 2					
			0 (1)	416	1A0	Low Voltage Soft-Stop	-				
		L Li aula	1 (2)	417	1A1	Not Global Enable 1	1				
		40052				High	2 (4)	418	1A2	Not Global Enable 2	-
52			052	3 (8)	419	1A3	Pod Start/Stop	R/V			
			4 (16)	420	1A4	Board Start/Stop					
			5 (32)	421	1A5	Main Contactor					
			6 (64)	422	1A6	Second Parm Set	1				
			7 (128)	423	1A7	Zero Start Time					
			-	-	_	User Flags 3					
			0 (1)	424	1A8	pf1 pol	1				
			1 (2)	425	1A9	pf2 pol					
			2 (4)	426	1AA	User Current Limit					
53	40053		3 (8)	427	1AB	User Trip	R/V				
			4 (16)	428	1AC	Invert Controller Input					
			5 (32)	429	1AD	Cooling (Inhibit Restart)					
			6 (64)	_	-	(Unused)	1				
			7 (128)	_	-	(Unused)	1				
first	⁻ paramet	er of F	unction 0	3 (Read F	lolding Re	-	ly the				
						rite Single Coil).					
	pe: R = I continue		-	/ = Read/\	write						

6.4 – Parameter	Memory Addresses	(continued)
-----------------	------------------	-------------

		Para	meter N	Vlemory	Addresse	es (continued)	
	Modk	ous *	Para	ameter Bi	t #s **		
Parameter Number	Address	Byte	Individual Bit	Decimal	Hex	Name / Function	Type ***
			-	-	-	I/O Polarity	
			0 (1)	432	1B0	K1 Polarity	
			1 (2)	433	1B1	K2 Polarity	
			2 (4)	-	-	(Unused)	
54	40054		3 (8)	-	_	(Unused)	R/W
			4 (16)	436	1B4	l/p 1 Polarity	
			5 (32)	-	-	(Unused)	
			6 (64)	-	-	(Unused)	
			7 (128)	-	-	(Unused)	
55	40055					Reserved	-
56	40056					Reserved	-
57	40057					K1 Map	R/W
58	40058					K1 Bit Mask	R/W
59	40059					K2 Map	R/W
60	40060					K2 Bit Mask	R/W
61	40061	High				Reserved	-
62	40062	lingii				Reserved	-
63	40063					Reserved	-
64	40064					Reserved	-
65	40065					i/p1 Map	R/W
66	40066			n/a		i/p1 bit Msk	R/W
67	40067					Reserved	-
68	40068					Reserved	-
69	40069					Reserved	-
70	40070					Reserved	-
71	40071					Cntactor Dly	R/W
72	40072					Trip Snstvty	R/W
73	40073					Last Trip	R
74	40074					2nd Last Trp	R
75	40075					3rd Last Trp	R
76	40076					4thLast Trp	R
77	40077					5th Last Trp	R
the	first para	meter	of Functi	on 03 (Rea	ad Holding	rite Single Register), or to Registers).	only
				/ to Functi V = Read/\		ite Single Coil).	
	continue		-				
TUDIC	Somuci		Juge.				

		Par	ramete	r Memor	y Addres	sses (continued)									
<u>ب</u>	Modb	ous *	Para	ameter Bi	t #s **										
Parameter Number	Address	Byte	Individual Bit	Decimal	Hex	Name / Function	Type ***								
78	40078					Protection 2	R/W								
79	40079					Start Ped 2	R/W								
80	40080					Start Time 2	R/W								
81	40081			n/a		Kick Ped 2	R/W								
82	40082			11/a		Kick Time 2	R/W								
83	40083					Dwell Time 2	R/W								
84	40084					Stop ped 2	R/W								
85	40085					Stop Time 2	R/W								
			-	-	-	AutoConfig 2									
			0 (1)	688	2B0	Auto Ramp									
			1 (2)	689	2B1	Auto 3MC									
			2 (4)	690	2B2	Auto Bypass									
86	40086	High	3 (8)	691	2B3	Auto Jog	R/W								
												4 (16)	692	2B4	Auto Endstop
			5 (32)	693	2B5	Auto Stop									
			6 (64)	694	2B6	Auto Endstart									
			7 (128)	695	2B7	Auto Pedestal									
87	40087					Low I 2	R/W								
88	40088					Low I time 2	R/W								
89	40089					C/L 2	R/W								
90	40090			n/a		C/L Time 2	R/W								
91	40091			n/a		Shearpin 2	R/W								
92	40092					Shear time 2	R/W								
93	40093					Ovld Level 2	R/W								
94	40094					Ovld Delay 2	R/W								
first	paramet	er of F	unction	03 (Read H	lolding Re		y the								
					-	ite Single Coil).									
			-	V = Read/V	write										
Iable (continue	a next p	bage.												

		Pai	ramete	r Memor	y Addres	sses (continued)		
L	Modb	us *	Para	ameter Bi	t #s **			
Parameter Number	Paramet Numbe Address		Individual Bit	Decimal	Нех	Name / Function	Type ***	
			-	-	_	User Flags12		
			0 (1)	760	2F8	Kickstart (2)		
			1 (2)	761	2F9	Current Limit Timeout Sel'd (2)		
			2 (4)	762	2FA	Overload Selected (2)		
95	40095		3 (8)	763	2FB	Shearpin Selected (2)	R/W	
			4 (16)	764	2FC	Under Current Selected (2)]	
			5 (32)	765	2FD	Thermistor Selected (2)	1	
			6 (64)	-	-	(Unused)	1	
			7 (128)	767	2FF	Terminal Starting (2)	1	
			-	-	-	User Flags22		
			0 (1)	768	300	Low Voltage Soft-Stop (2)	1	
			1 (2)	769	301	Not Global Enable 1 (2)	1	
			2 (4)	770	302	Not Global Enable 2 (2)		
96	40096		3 (8)	771	303	Pod Start/Stop (2)	R/W	
		Lliab	4 (16)	772	304	Board Start/Stop (2)	1	
		High	5 (32)	773	305	Main Contactor (2)		
			6 (64)	774	306	Second Parm Set (2)	1	
			7 (128)	775	307	Zero Start Time (2)	1	
97	40097					U1 I/P srce	R/W	
98	40098					U1 I/P Mask	R/W	
99	40099					U1 O/P Dest	R/W	
100	40100					U1 O/P Mask	R/W	
101	40101					U2 I/P srce	R/W	
102	40102			2/2		U2 I/P Mask	R/W	
103	40103			n/a		U2 O/P Dest	R/W	
104	40104					U2 O/P Mask	R/W	
105	40105					Reserved	-	
106	40106					Reserved	-	
107	40107					Reserved	-	
108	40108					Reserved	-	
first	paramet	er of F	unction (03 (Read F	lolding Re		he	
						ite Single Coil).		
*** Тур	pe: R = I	Read O	nly; R/V	V = Read/\	Nrite			
Table of	continue	d next p	bage.					

Modus Parmeter Bit #s ** Name / Function Image: partial state st			Para	ameter	Memory	/ Addres	sses (continued)			
Image: constraint of the second of	L	Modb	ous *	Para	ameter Bi	t #s **				
110 40110 N/A Bypass Lower Limit R/W 111 40111 - - - Status 4 - 0(1) 896 380 60 Hz - - - Status 4 - 112 40112 6(1) 896 380 60 Hz - - - - - Status 4 -<	Parameter Number	Address	Byte	Individual Bit	Decimal		Name / Function	Type ***		
111 40111 Reserved - 40112 - - - Status 4 - 1(2) 897 380 60 Hz - - 1(2) 897 380 Phase Rotation Sequence - - 2(4) 898 382 Shearpin - - - 3(8) 899 383 Under Current - - - 4(16) 900 384 Thermistor - - - 5(32) 901 385 Timeout - - - StopProfile R/W 114 40114 + + - StopProfile R/W - 117 40117 + - - - StopProfile R/W 118 40118 + - - - Status 5 - 119 40110 + - - - Status 5 - <	109	40109				1	Bypass Upper Limit	R/W		
112 40112 - - - Status 4 1(2) 997 380 Phase Rotation Sequence 2(4) 988 382 Shearpin 3(8) 999 383 Under Current 4(16) 900 384 Thermistor 5(32) 901 385 Timeout 6(64) 902 386 Overload 7(128) 903 387 Thermal Switch 7(128) 903 387 Thermal Switch 7(128) 903 387 Thermal Switch 114 40114 - - - 7(128) 903 387 Thermal Switch - 117 40117 - - StopProfile R/W 118 40118 - - Status 5 - 119 40119 - - Status 5 - 1(2) 961 421 Offline Command Fail - 1(2)	110	40110			n/a		Bypass Lower Limit	R/W		
112 0(1) 896 380 60 Hz 1(2) 897 380 Phase Rotation Sequence 2(4) 898 382 Shearpin 3(8) 899 383 Under Current 4(16) 900 384 Thermistor 5(32) 901 385 Timeout 6(64) 902 386 Overload 7(128) 903 387 Thermal Switch 114 40116 7(128) 903 387 Thermal Switch 115 40116 7(128) 903 387 Thermal Switch 117 40117 No Reserved - StopProfile R/W 118 40118 - - - Status 5 - 119 40119 - - - Status 5 - 1(2) 961 421 Offline Command Fail 2(4) 9(6) 426 (unused) 120 9(61 422	111	40111					Reserved	-		
112 1				-	-	-	Status 4			
112 40112 2 (4) 898 382 Shearpin N 3 (8) 899 383 Under Current N N 4 (16) 900 384 Thermistor N N 5 (32) 901 385 Timeout N N 113 40113 1(16) 902 386 Overload N 114 40114 1(12) 903 387 Thermal Switch N 115 40113 1(12) 903 387 Thermal Switch N 116 40114 1 N N N N N 117 40117 N N N N N N 118 40118 N N N N N N 119 40119 - - - Status 5 N N 119 40120 011 960 420 Over Temperature N N 110 961 421 Offline Command Fail 2 (4) 963				0 (1)	896	380	60 Hz			
112 40112 3 (8) 899 383 Under Current N 4(16) 900 384 Thermistor 5 (32) 901 385 Timeout 113 40113 5 (32) 901 385 Timeout - 114 40113 7 (128) 903 387 Thermal Switch - 115 40115 7 (128) 903 387 Thermal Switch - 116 40116 7 (128) 903 387 Thermal Switch - 116 40116 N/N Reserved - StopProfile R/W 117 40117 N/17 N/N Reserved - - 118 40118 - - - Status 5 - 119 40119 - - - Status 5 - - 110 960 420 Over Temperature - - - R 1119 40120 961 421 Offline Command Fail 2 (4) 9 (4) 424 (unused) <th></th> <td></td> <td></td> <td>1 (2)</td> <td>897</td> <td>380</td> <td>Phase Rotation Sequence</td> <td></td>				1 (2)	897	380	Phase Rotation Sequence			
113 40113 114 40113 115 40113 114 40114 115 40115 116 40116 117 40117 118 40118 119 40119 112 40120 113 4013 114 4014 4015 10 116 4016 117 4017 118 4018 119 4019 - - - - - - 119 40120 40120 961 - - - - - - 119 40120 40120 961 - - - - - - - - - - - - - - <th></th> <td rowspan="2">40112</td> <td></td> <td>2 (4)</td> <td>898</td> <td>382</td> <td>Shearpin</td> <td></td>		40112		2 (4)	898	382	Shearpin			
113 40113 5 (32) 901 385 Timeout 113 40113 (6 (64) 902 386 Overload 114 40114 (7 (128) 903 387 Thermal Switch 114 40114 (7 (128) 903 387 Thermal Switch 115 40115 (7 (128) 903 387 Thermal Switch 116 40116 (7 (128) 903 387 Thermal Switch 116 40116 (7 (128) 903 387 Thermal Switch - 117 40117 (117) 40117 N/W Reserved - - 118 40118 (101) 960 420 Over Temperature - 112 961 421 Offline Command Fail - - - 120 961 422 (unused) - - - 12 963 423 Fan Status - - -	112			3 (8)	899	383	Under Current	R		
113 40113 114 40114 115 40115 116 40116 117 40117 118 40118 117 40117 118 40118 119 40119 112 40119 113 40116 114 40116 116 40116 117 40117 118 40118 119 40119 1120 40119 1120 961 420 1120 961 421 1120 961 421 1120 963 423 1120 964 424 1120 965 425 1120 966 426 1120 966 426 1120 966 426 1120 966 426 1120 966 426 1120 967				4 (16)	900	384	Thermistor			
113 40113 114 40113 115 40115 116 40116 117 40117 118 40118 119 40119 119 40119 110 40117 118 40118 119 40119 110 40119 1110 40119 1111 40119 1111 40119 1119 40119 1110 40119 1111 40119 1111 40119 1111 40119 1111 40119 1111 40119 1111 40119 1111 40119 1111 40110 1111 40110 1111 40110 1111 40110 1111 40110 1111 40110 1111 40110 1111 40110				5 (32)	901	385	Timeout	_		
113 40113 114 40114 115 40115 116 40116 117 40117 118 40118 119 40119 119 40119 110 40119 1119 40119 1119 40119 1119 40119 1110 40119 1111 112 1119 40119 1119 40119 1110 111 1111 111 1111 111 1119 40119 1110 111 1110 111 1111 111 1111 111 1111 111 1110 111 1111 111 1111 111 1111 111 1111 111 1111 111 1111 111 1111 111 1111 111 1111 <td< th=""><th></th><td></td><td></td><td>6 (64)</td><td>902</td><td>386</td><td>Overload</td><td></td></td<>				6 (64)	902	386	Overload			
114 40114 115 40115 116 40116 117 40117 118 40118 119 40119 40119 - 119 40119 110 40119 1119 40119 1119 40119 1110 40119 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1119 40119 111 - 1111 1(2) 1110 1(2) 1110 960 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(2) 1111 1(1(2) 1111				7 (128)	903	387	Thermal Switch			
115 40115 High Last App R/W 116 40116 n/a Last App R/W 117 40117 40117 R/W Reserved - 118 40118 - System Use Only - - 119 40119 - - Status 5 - - 110 40119 - - Status 5 - - - 119 40120 960 420 Over Temperature -	113	40113	-			1	Reserved	-		
115 40115 40115 N/a Last App R/W 116 40116 n/a CoolingTime R/W 117 40117 Reserved - 118 40118 Reserved - 119 40119 Reserved - 119 40119 Reserved - 110 40119 Reserved - 1117 40119 Reserved - 119 40119 - System Use Only - 110 40119 960 420 Over Temperature - 1120 40120 961 421 Offline Command Fail R 120 40120 963 423 Fan Status R 4(16) 964 424 (unused) Gi (4) Gi (4) <t< th=""><th>114</th><td>40114</td><td>Lliab</td><td></td><td></td><td></td><td>StopProfile</td><td>R/W</td></t<>	114	40114	Lliab				StopProfile	R/W		
117 40117 118 40118 119 40119 119 40119 40119 - 119 40119 40120 - 110 40119 111 - 111 - 1111 -	115	40115	Fign				Last App	R/W		
118 40118 119 40119 119 40119 Status 5 0(1) 960 420 Over Temperature 1(2) 961 421 Offline Command Fail 2(4) 962 422 (unused) 5(32) 965 425 (unused) 5(32) 965 425 (unused) * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write	116	40116			n/a		CoolingTime	R/W		
119 40119 Reserved - 119 40119 - - - Reserved - 119 40119 - - - Status 5 - - 110 10 960 420 Over Temperature - - 110 40120 961 421 Offline Command Fail - - 111 2 961 422 (unused) - - - 1110 960 422 (unused) - - - - 1110 963 423 Fan Status - - - - 1110 964 424 (unused) -	117	40117					Reserved	-		
120 40120 - - Status 5 40120 0(1) 960 420 Over Temperature 1 (2) 961 421 Offline Command Fail 2 (4) 962 422 (unused) 3 (8) 963 423 Fan Status 4 (16) 964 424 (unused) 5 (32) 965 425 (unused) 6 (64) 966 426 (unused) 7 (128) 967 427 (unused) * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write	118	40118					System Use Only	_		
120 0 (1) 960 420 Over Temperature 1 (2) 961 421 Offline Command Fail 2 (4) 962 422 (unused) 3 (8) 963 423 Fan Status 4 (16) 964 424 (unused) 5 (32) 965 425 (unused) 6 (64) 966 426 (unused) 7 (128) 967 427 (unused) ** Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). *** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write	119	40119					Reserved	-		
120 40120 1 (2) 961 421 Offline Command Fail R 3 (8) 962 422 (unused) R A (16) 964 423 Fan Status R 4 (16) 964 424 (unused) Fan Status R 5 (32) 965 425 (unused) Fan Status R 6 (64) 966 426 (unused) Fan Status R 7 (128) 967 427 (unused) Fan Status Fan Status * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). Fan Status Fan Status *** Parameter Bit #s apply only to Function 05 (Write Single Coil). Fan Status Fan Status Fan Status				-	-	-	Status 5			
120 40120 ² (4) ⁹ 62 ⁴ 22 ² (unused) ³ (8) ⁹ 63 ⁴ 23 ⁴ Fan Status ⁴ (16) ⁹ 64 ⁴ 24 ⁴ (unused) ⁵ (32) ⁹ 65 ⁴ 25 ⁴ (unused) ⁶ (64) ⁹ 66 ⁴ 26 ⁴ (unused) ⁶ (64) ⁹ 66 ⁴ 26 ⁴ (unused) ⁷ (128) ⁹ 67 ⁴ 27 ⁴ (unused) ⁸ Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ^{***} Parameter Bit #s apply only to Function 05 (Write Single Coil). ^{***} Type: R = Read Only; R/W = Read/Write ^{***} Type: R = Read Only; R/W = Read/Write				0 (1)	960	420	Over Temperature			
120 40120 3 (8) 963 423 Fan Status R 4 (16) 964 424 (unused) 6 6 6 6 6 6 6 425 (unused) 6 6 6 6 6 6 6 7 7 7 128 967 427 (unused) 7 128 7 128<				1 (2)	961	421	Offline Command Fail			
4 (16) 964 424 (unused) 5 (32) 965 425 (unused) 6 (64) 966 426 (unused) 7 (128) 967 427 (unused) * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				2 (4)	962	422	(unused)			
* Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write	120	40120		3 (8)	963	423	Fan Status	R		
6 (64) 966 426 (unused) 7 (128) 967 427 (unused) * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				4 (16)	964	424	(unused)			
7 (128) 967 427 (unused) * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				5 (32)	965	425	(unused)			
 * Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write 				6 (64)	966	426	(unused)			
first parameter of Function 03 (Read Holding Registers). ** Parameter Bit #s apply only to Function 05 (Write Single Coil). *** Type: R = Read Only; R/W = Read/Write				7 (128)	967	427	(unused)			
	* Modbus addresses apply only to Function 06 (Write Single Register), or to only the first parameter of Function 03 (Read Holding Registers).									
Table continued next page.	*** Ту	<i>be: R</i> = <i>l</i>	Read O	nly; R/V	V = Read/\	Nrite				
, .	Table of	continue	d next j	bage.						

			P	arame	ter M	emory Addresses (continued)			
<u> </u>	Modk	ous *	Param	eter Bit	#s **				
Parameter Number	Address	Byte	Individual Bit	Decimal	Нех	Name / Function	Type ***		
			-	-	-	UserFlags 4			
			0 (1)	-	-	Impact Load			
			1 (2)	969	429	(unused)			
			2 (4)	970	42A	Auto Soft Stop Smoothing			
121	40121		3 (8)	971	42B	Breaker Present	R/W		
			4 (16)	_	-	Optimise +			
			5 (32)	973	42D	Quick Ramp Times			
			6 (64)	974	42E	Two Stop Bits			
			7 (128) –		-	Auto Stop (2)			
122	40122					Stop Smooth	R/W		
123	40123					Temp/Alt Derate	R/W		
124	40124	High		n/a		OffLine Command			
125	40125					Bus BaudRate			
126	40126					Comms Trip			
			_	_	-	Trip Flags			
			0 (1)	1016	458	Trip 1 Enabled – Phase Loss			
			1 (2)	1017	459	Trip 8 Enabled – SCR Loss Motor (Motor-Side Thyristor Loss)			
			2 (4)	1018	45A	Trip 9 Enabled – Sensing Signal (Thyristor Sensing Trip Type A)			
127	40127		3 (8)	1019	45B	Trip 10 Enabled – SCR Shorted (Thyristor Sensing Trip Type B)	R/W		
			4 (16)	1020	45C	Trip 4 Enabled – SCR Firing (Thyristor Sensing Trip Type C)			
		-	5 (32)	1021	45D	Trip 5 Enabled – SCR Signal (Edge Sensing Trip)			
			6 (64)	1022	45E	Trip 6 Enabled – SCR Signal (Sensing Trip Type A)			
			7 (128)	1023	45F	Trip 7 Enabled – Sensing Signal (Sensing Trip Type B)			
Fund	ction 03	(Read I	Holding	Registers	s).	06 (Write Single Register), or to only the first parameter of 5 (Write Single Coil).			

*** Type: R = Read Only; R/W = Read/Write

6.5 – Serial Communication to SR44

SR44 parameters are stored in 8-bit bytes. Modbus reads the values from the slave as 16-bit words. Therefore two SR44 parameter bytes are packed into each Modbus word. The lowest parameter is in the data High of the word, and the next parameter is in the data Low. This also means that even when the read request is for one register, two SR44 parameters are read. Up to four contiguous words (8 parameters) may be read with one query.



SR44 has a Modbus offset of one address for registers and bits. PLC programs should target one address higher than desired, e.g., PLC targets SR44 address 40019 to read/write to/from address 40018 (P-18).

6.5.0 – Parameter Scaling

Certain parameters have non-unity scaling factors which must be applied when using serial communication to read and write the parameters. (Parameter scaling factors are shown in Chapter 5: Keypad Menu Items and Parameters.)

- Scaling applies only when using serial communication to read and write parameters.
- Scaling Factor = Maximum Parameter Value ÷ 255
- When READING from parameters, MULTIPLY the serial comm value by the scaling factor.
- When WRITING to parameters, DIVIDE your desired value by the scaling factor (multiply by the inverse of the scaling factor).

Parameter Scaling Example:

P-71 = Contactor Delay; Default value = 160 ms; Scaling Factor = 4

For default value = 160 ms: Keypad shows "160 ms"; Comms data reads "40" [multiply by 4 to get actual value of 160]

To change value to 200 ms: Enter "200" through keypad, or Write "50" through serial comm [divide by 4 to determine value to write] Keypad display will show "200 ms"; serial comm will read "50" [multiply by 4 to get actual value]

To change value to 240 ms: Enter "240" through keypad, or Write "60" through serial comm [divide by 4 to determine value to write] Keypad display will show "240 ms"; serial comm will read "60" [multiply by 4 to get actual value]



The minimum value that a scaled parameter can be changed is equal to that parameter's scaling factor.

Parameters referenced in the following examples:

Modbus Function 03 example 6.5.1:

- P-73 = Last Trip
- P-74 = 2nd Last Trip
- P-75 = 3rd Last Trip
- P-76 = 4th Last Trip
- P-77 = 5th Last Trip
- P-78 = Protection 2

Modbus Function 05 example 6.5.2:

• P-52 / B-6 = User Flags 2 / 2nd parameter set

Modbus Function 06 example 6.5.3:

• P-124 = OffLine Command

6.5.1 – Reading Holding Registers (Modbus Function 03)

This function is used to read a group of up to eight parameters from the SR44. The allowable address range for this function is 0-127 for working parameters and 1000–1127 for offline EEROM parameters.

Example – Modbus Function 03: Read the fault history (P-73 – P-77) from SR44 slave #1 into a PLC

- Start Slave Address (SR44): 40074 *
- Start Master Address (PLC): internal PLC register 1
- Number of Elements: 3

	SR44								
Parameter	Address / Byte *	Data Value			Hex	Address ***			
Falametei	Address / Dyte	Decimal	Hex		Data	Address			
P-73 (Last Trip)	40073 / high	0 (no trip)	00		00 02	internal PLC			
P-74 (2nd Last Trip)	40073 / Iow	2 (too hot)	02	\rightarrow	00.02	register #1			
P-75 (3rd Last Trip)	40074 / high	13 (overload)	0D		OD OE	internal PLC			
P-76 (4th Last Trip)	40074 / Iow	14 (shearpin)	OE			register #2			
P-77 (5th Last Trip)	40075 / high	16 (external trip)	10		10 C0	internal PLC			
P-78 (Protection2) **	40075 / low **	192 (full+optimize)	CO		10 00	register #3			

* SR44 Modbus addresses are variable.

Only the 1st address of the Function 03 read instruction 'matches' the parameter number, but there is an offset of one address from the parameter#. If the PLC targets 40074, the PLC will return data starting with P-73. P-73 will be in the high byte, and P-74 will be in the low byte.

** The Function 03 multiple read instruction gets data from an even number of parameters. Unwanted data can be discarded by the PLC.

*** PLC addresses are any valid user-assigned memory addresses.

Modbus Function 03 Transaction Table						
	Query	Response				
Field Hex Byte		Field	Hex Byte			
Slave Address	01	Slave Address	01			
Function	03	Function	03			
Start Address High	00	Byte Count	04			
Start Address Low *	4A (decimal = 74) *	Data High Byte	00 (P-73)			
No. of Registers High	00	Data Low Byte	02 (P-74)			
No. of Registers Low	02	Data High Byte	0D (P-75)			
CRC Low	PLC & SR44 automatically	Data Low Byte	OE (P-76)			
CRC High	calculate CRC checksum values	Data High Byte	10 (P-77)			
		Data Low Byte	C0 (P-78)			
		CRC Low Byte	PLC & SR44 automatically			
		CRC High Byte	calculate CRC checksum values			
* The SR44 has a N	Nodbus offset of one address fo	r registers & bits; F	PLC targets one address higher.			

6.5.2 – Writing Single Coil (Modbus Function 05)

This function is used to set or clear a single bit within the Read/Write parameters between 0 through 127. (Only the bits within parameters designated as Read/Write can be preset with this function; Parameters 18, 51, 52, 53, 54, 86, 95, 96, 121, & 127)

Example – Modbus Function 05:

PLC writes "Select 2nd Parameter Group" to SR44 (send a value of 1 to Bit#6 of P-52):

- Start Slave Bit Number (SR44): 423*
- Start Master Address (PLC): internal PLC bit address #1 (value = 1)

SR44						PLC
Parameter Bit	ameter Bit Address *		Data Value		Hex	Address **
	Address	Decimal	Hex	\leftarrow	Data Add	Audress
P-52 / Bit 06 Second Parm Set	423 *	1	1		1	internal PLC bit address #1

* SR44 bit addresses have an offset of one address from the parameter bit#. The PLC needs to target slave bit #423 in order to change bit #422.

** PLC addresses are any valid user-assigned bit addresses.

Modbus Function 05 Transaction Table						
	Query		Response			
Field Hex Byte		Field	Hex Byte			
Slave Address	01	Slave Address	01			
Function	05	Function	05			
Bit Address	1A7 (decimal = 423) *	Bit Address	1A7 (bit 422*) (bit 06 of P-52)			
Force Data	01 (select 2nd parameter set)	Force Data	01 (select 2nd parameter set)			
CRC Low PLC & SR44 automatically		CRC Low Byte	PLC & SR44 automatically			
CRC High	High calculate CRC checksum values		calculate CRC checksum values			
* SR44 has a Modbus offset of one address for registers & bits; PLC targets one address higher.						

6.5.3 – Writing Single Register (Modbus Function 06)

This function is used to set the value of a single parameter. It differs from the Modbus protocol in that only the data low byte of the query is written to the parameter address. The data high byte is ignored. (The normal response for correct operation is an echo of the data.)

If the PLC uses Function 06 to write one word of data into the SR44, only the low byte of the PLC data is used. The PLC low byte is written into the SR44 parameter, and the PLC high byte is ignored.

Example – Modbus Function 06: PLC writes "Enable" to SR44 (send a value of 2 to P-124):

- Start Slave Address (SR44): 40125 *
- Start Master Address (PLC): internal PLC register #1 (value = 2)

SR44						PLC
Parameter	Address / Byte *	Data Value			Hex Data**	Address ***
Faianietei	Address / Dyte	Decimal	\leftarrow	Data**	Audress	
P-124 (OffLine Command)	40125* / high	02	02**		00 02**	internal PLC register #1

* SR44 Modbus addresses have an offset of one address from the parameter #. The PLC needs to target slave address 40125 in order to change P-124.

** For Function 06 single write instructions, the SR44 accepts <u>only the low byte of the PLC word;</u> the high byte is ignored. In this example, only P-124 is changed by the write instruction.

*** PLC addresses are any valid user-assigned memory addresses.

Modbus Function 06 Transaction Table							
	Query	Response					
Field Hex Byte		Field	Hex Byte				
Slave Address	01	Slave Address	01				
Function	06	Function	06				
Address High	00	Address High	00				
Address Low	7D (decimal = 125) *	Address Low	7D (P-124) *				
Force Data High	n/a (doesn't matter)	Force Data High	n/a (ignored)				
Force Data Low	02 (Enable Starter)	Force Data Low	02 (Enable Starter)				
CRC Low	.ow PLC & SR44 automatically		PLC & SR44 automatically				
CRC High calculate CRC checksum values		CRC High	calculate CRC checksum values				
* SR44 has a Mo	* SR44 has a Modbus offset of one address for registers & bits; PLC targets one address higher.						

6.5.4 – P-124 Offline Commands

The SR44 has a mechanism for carrying out common functions, or offline ones which take a long time and require the SR44 to be off and disabled. Commands are carried out by writing various values to a Command Register (parameter 124). For example, writing a 1 to P-124 using function 06 disables the starter.

Once a value has been written to this special register, further Modbus queries will receive a "slave busy" error until the command execution is completed. If an error occurred during the execution of the command (say the unit was not disabled before execution), then the Offline Command failed flag will be set. If function 7 has been used to poll the SR44, then once the busy period is over this flag is available in the returned status byte position 80h.

	Parameter 124 Command Codes *							
Value	Command	Active	Meaning					
1	Disable Starter	Always	Stop the SR44 responding to start commands, remote or local. If running the SR44 will stop immediately. The status of any start signal is not changed.					
2	Enable Starter	Always	The SR44 will respond to new or existing start commands.					
3	Bus Starting	Always	The SR44 responds to start requests from the keypad / bus port.					
4	Remote Starting	Always	The SR44 responds to start requests from the hardware input.					
5	Reset Starter	Always	The SR44 is forced to a cold start.					
6	Reset Trip	Always	Resets the SR44 to stopped and ready state.					
7	Bus Start	When Enabled	If Starting = bus & unit is enabled, SR44 will start.					
8	Bus Stop	When Enabled	SR44 will always stop.					
9	Factory Default	When Disabled	The working RAM is loaded with factory default values. his may take up to 5 seconds.					
10	Power On Default	When Disabled	The working RAM is loaded with the permanent store values.					
11	Save RAM	When Disabled	The working RAM is saved to the permanent store for future use. This may take up to 5 seconds.					
* Use a	only Function Code	06 for P-124 Offli	ne Commands.					

6.5.5 - Read Exception Status (Modbus Function 07) - Starter 01

This function's format is per the Modbus standard, but the bits in the value returned have different meanings shown below. This is the quickest of the Modbus functions, and should be used in the context of the SR44 to check if a station is present or check if it is busy.

	Modbus Function 07 Transaction Table						
	Query	Response					
Field	Hex Byte	Field	Hex Byte				
Slave Address	01	Slave Address	01				
Function	07	Function	07				
CRC Low	41	Exception Data	00				
CRC High	CRC High E2		PLC & SR44 automatically				
		CRC High	calculate CRC checksum values				
	Returned Ex	ception Data					
	Bit	Meaning					
	0	Enabled					
	1	Stopped					
	2	Starting					
	3	Current Limiting					
	4	TOR (Start Complete)					
	5	Cooling					
	6	Alarm					
	7	Offline Command Failed					

6.5.6 – Returned Errors

If there is a communication error in the query, the SR44 does not reply.

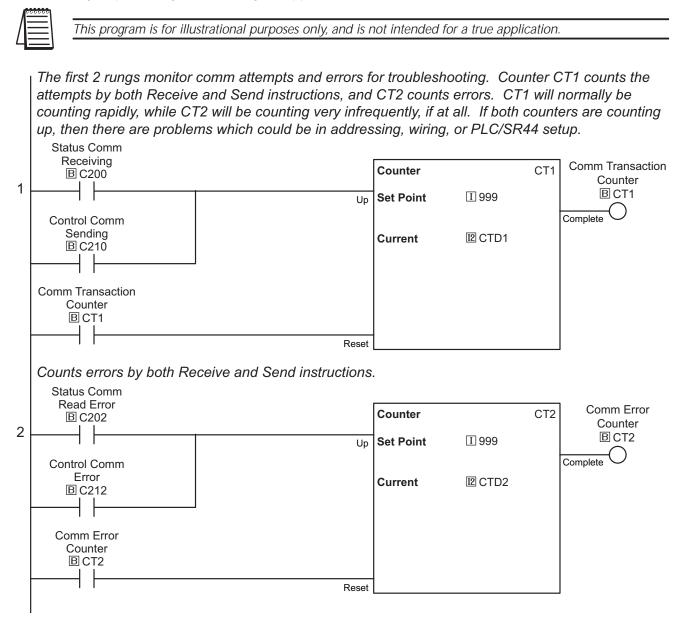
If the network communication is OK, but for some reason the SR44 cannot correctly execute the query, then it will return an error reply. In an error reply, the function byte is returned OR'ed with 80h, and the following byte contains the error number, e.g. if Function 07 cannot be executed, 87h will be returned.

Modbus Function 07 Transaction Table Showing Error Response						
	Query		Response			
Field	Hex Byte	Field	Hex Byte			
Slave Address	01	Slave Address	01			
Function	07	Function	87			
CRC Low	41	Exception Data	01			
CRC High	E2	CRC Low	PLC & SR44 automatically			
		CRC High	calculate CRC checksum values			
	Returne	ed Error Response				
Number	Modbus	Meaning				
0	Illegal Function	Writing				
1	Illegal Data Address	Out of allowed par	Out of allowed parameter range			
2	Illegal Data	Too many data byt	es in query			
3	Slave Busy	Slave is performing	a long command			

6.7 – Example PLC Communications Programs

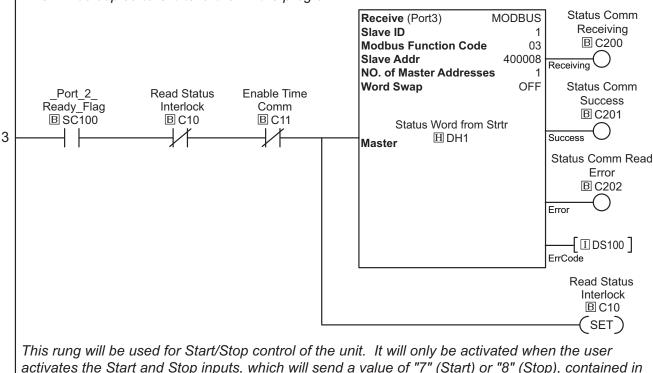
6.7.1 – CLICK PLC Example Program

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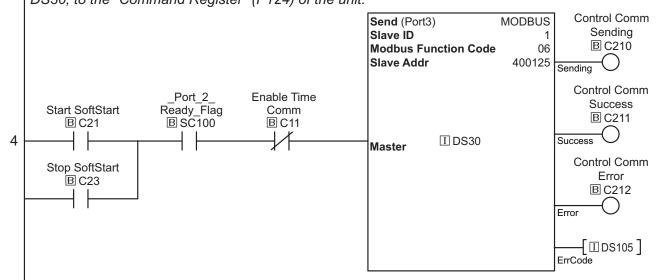


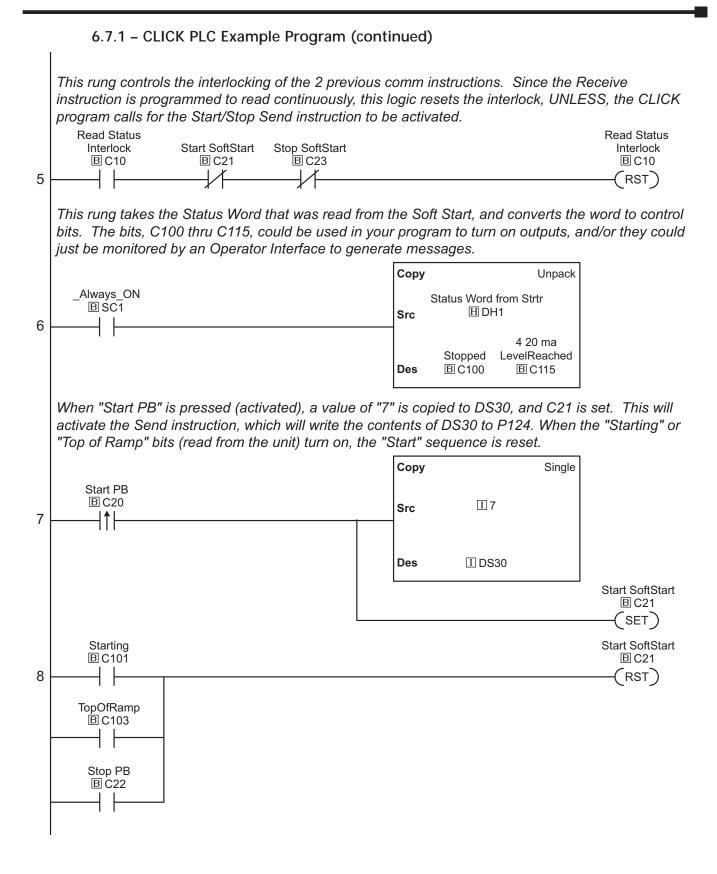
6.7.1 - CLICK PLC Example Program (continued)

This rung will be performing nearly all the comms with the starter. It will continuously read parameters P8 and P9 (the soft starter is 8-bit based) and the CLICK performs communications by 16-bit words. So the single value that is retrieved from the soft starter contains 2 values. Since both values are actually bit patterns, they are placed directly into a Hex data register DH1. This will be copied to C bits further in the program.



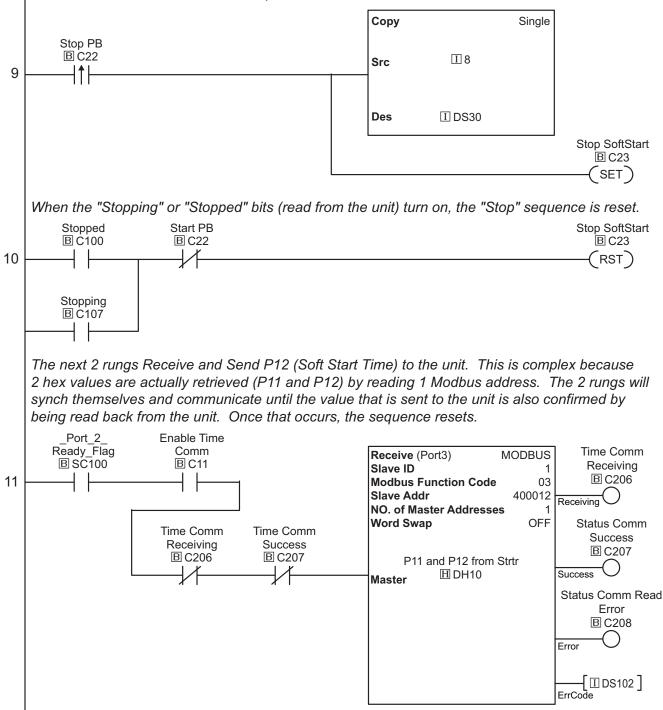
DS30, to the "Command Register" (P124) of the unit.

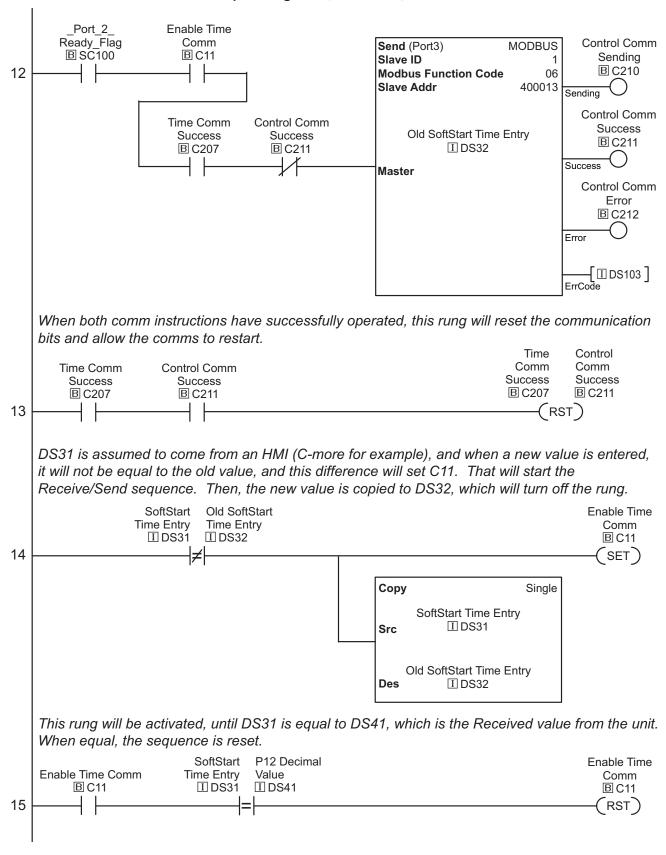




6.7.1 – CLICK PLC Example Program (continued)

When "Stop PB" C22 is pressed (activated), a value of "8" (Stop) is copied to DS30, and C23 is set. This will activate the Send instruction, which will write the contents of DS30 to P124.





6.7.1 – CLICK PLC Example Program (continued)

6.7.1 – CLICK PLC Example Program (continued)

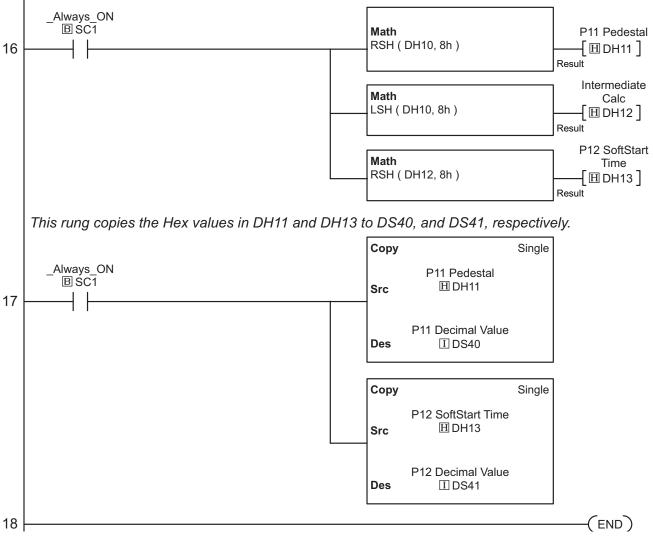
This rung manipulates the data retrieved (DH10) from the soft starter paramters P11 and P12. Since each Modbus word actually has 2 values (1 in each byte), the data has to be manipulated to put each relevant value in its' own register.

First, DH10 is loaded and the RSH instruction is performed to Shift the value to the right by 8 bits, which moves the upper byte to the lower byte, and this is output to DH11 (P11 Pedestal).

Next, the LSH (Left Shift Register) instruction is used in the 2nd MATH box to reload the original value in DH10, and move the lower byte to the upper byte (shifting left 8 bits), and we put the result in DH12 as an intermediate step.

Finally, we load DH12 in the 3rd MATH box, and perform a RSH (Right Shift Register) instruction to move the upper byte back to the lower byte, again, shifting 8 bits. Now the result is the bare lower byte value from the original word and this result is output to DH13 as our final value.

To summarize, the original data is shifted to the right 8 bits, which moved our original upper byte to the lower byte, and zeroed out the upper byte. This was the 1st MATH box. Then, the original value is reloaded, moved to the left 8 bits, then moved to the right 8 bits. This zeroed out the upper byte and resulted in the lower byte value. This took 2 MATH boxes. The values now reside in DH11 and DH13.

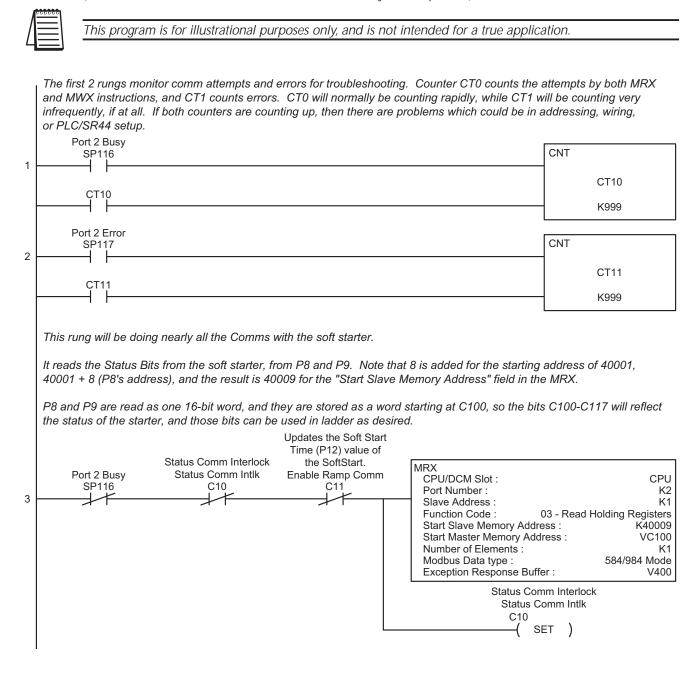


6.7.2 – DirectLOGIC PLC Example Program

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This *Direct*LOGIC ladder program example works with the MWX and MRX instructions found in the DL06 and DL260 PLC platforms.

(The DL06 and the DL260 can do RS-485 directly out of port 2.)

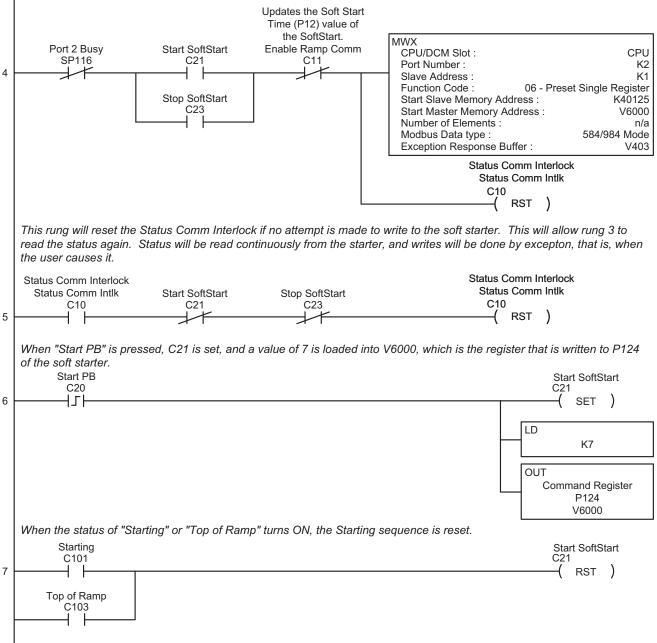


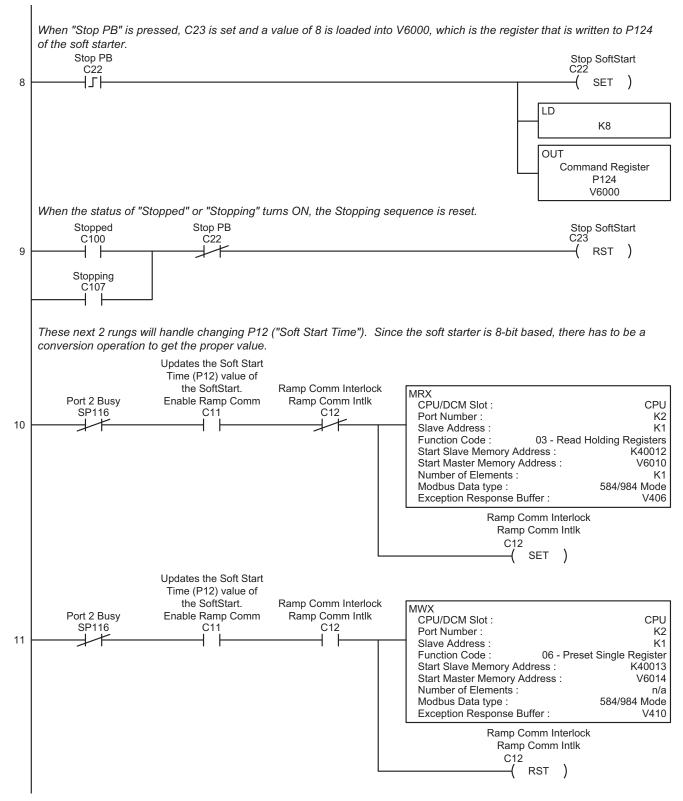
6.7.2 - DirectLOGIC PLC Example Program (continued)

This rung will be used when the user activates it. Ordinarily, it will only be active for a short period because the user is Starting or Stopping the soft starter.

This rung will write the value contained in V6000 to the Command Register (P124). The values of 7 and 8 will "Start" and "Stop" the soft starter, respectively. Note that 124 is added to the starting address of 40001, and we have 40125 for the "Start Slave Memory Address".

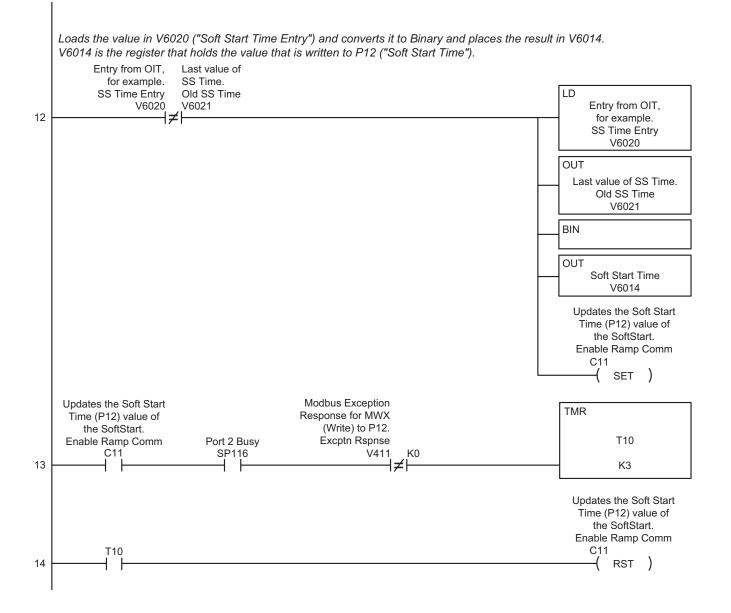
C21 (Starting) and C23 (Stopping) are located lower in the ladder, and they will enable Comms to the soft starter until the pertinent Status bits relfect the desired operation of the soft starter, then those Status bits will reset C21 and C23.





6.7.2 – DirectLOGIC PLC Example Program (continued)

6.7.2 - DirectLOGIC PLC Example Program (continued)



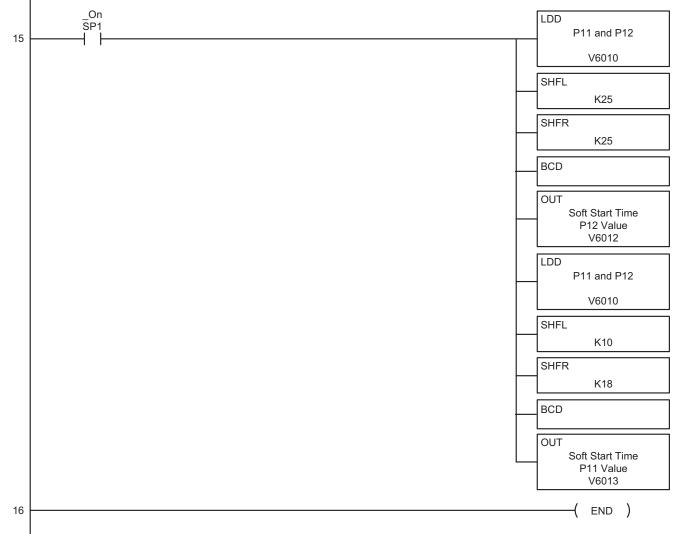
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6.7.2 - DirectLOGIC PLC Example Program (continued)

Converts the values from P11 and P12 (which are retrieved as a single 16-bit value) into 2 separate BCD values. P11 is "Soft Start Pedestal"; P12 is "Soft Start Time". Since values are stored in bytes, a single Modbus Read will obtain 2 values.

This sequence will take the retrieved value, Shift Left by 25 bits to zero out the higher bits, then Shift Right by the same amount to put it back in its original location, convert to BCD, and this leaves the value for P12 and place it in V6012. Next, perform a similar operation (different # of bits) to extract P11 and place the value into V6013.

These values are read from rung 10 by Exception, that is, when the user causes it.



6.7.3 – Productivity3000 PLC Example Program

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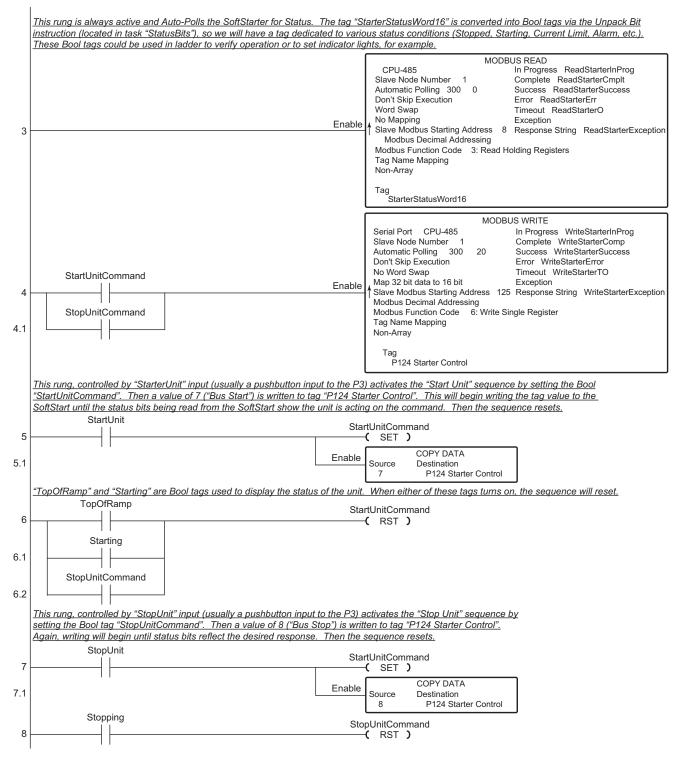


This program is for illustrational purposes only, and is not intended for a true application.

Task: StatusBits

	This rung breaks down the tag "StarterStatusWord16" retrieved from the Soft Sta which converts the 16-bit tag into 16 separate Boolean tags. These Bool tags can				
)			UNPACK BITS	
		Input	StarterStatusWord16	Bit Number	Output
				1	Stopped
				2	Starting
				3	CurrentLimit
				4	TopOfRamp
				5	Dwell
				6	FullConduction
4	Enable			7	EnergySaving
1				8	Stopping
				9	Alarm
				10	OverloadIntegrating
				11	Stall
				12	ForcedOverride
				13	Noise
				14	InhibitStart
				15	DC IP reached
				16	4-20maLevelReached
2	(EN	с)		

	Task: Comms				
	This rung monitors our Comm "InProgress" attempts to the SoftStarter. The 2	inp	outs are the Boo	ol tags th	hat are assigned in the MRX and MWX
	instructions. It has a preset of 9999, and will reset itself. These 2 counters give				
	occurence of errors. If both counters are counting up in synch, then there are	pro	<u>oblems, which c</u>	ould be	in addressing, wiring, or the slave itsel
	ReadStarterInProg	Г			COUNTER
1	Cnt U	미		9999	Current Value CommCountCurr
			Don't Reset		= Preset CommCountDone
	WriteStarterInProg				
1.1					
	Always Off Bit				
1.2	Cnt Dowr	n_I∤	L. C.		
		- Ľ			
	CommCountDone				
1.3	Rese	et			
		L			
	This rung monitors our Comm Errors. Ordinarily, this counter will only be activ	viate	ed very infreque	ently, un	<u>less a slave been lost.</u>
	It has a preset of 999, and will repeat itself.				
	ReadStarterErr	ſ			COUNTER
2	Cnt U	p /	Preset Value	999	Current Value CommErrCurr
		1	Don't Reset		= Preset CommErrorsDone
	WriteStarterError				
2.1					
	Always Off Bit				
2.2	Cnt Dow	n	k i i i i i i i i i i i i i i i i i i i		
2.2		1	I		
	CommErrorsDone				
2.3	Rese	et			
2.0		ι			



6.7.3 – Productivity3000 PLC Example Program (continued)

6.7.3 – Productivity3000 PLC Example Program (continued)

	The following rungs are optional, and are included as an example of so Reads actually return 2 values which have to be separated (show		d and Write to a parameter of the SoftStart. The SoftStart is 8-bit based, xt rung with theShift/Rotate instructions) so we can use them.
9	WriteReadTime	Enable	MODBUS READ CPU-485 In Progress ReadStarterInProg Slave Node Number 1 Complete ReadStarterCmplt Automatic Polling 300 0 Success ReadStarterSuccess Don't Skip Execution Error ReadStarterErr Word Swap Timeout ReadStarterO No Mapping Exception Slave Modbus Starting Address 12 Response String ReadStarterException Slave Modbus Decimal Addressing Modbus Function Code 3: Read Holding Registers Tag Name Mapping Non-Array Non-Array Non-Array Non-Array Non-Array
	This rung takes the value in tag "P11-12", which was retrieved from t		
	is placed in tag "Shift1". Next, tag "Shift1" is Shifted Right by 8 bits to	o return the upper byte	to the lower byte and the value is stored in tag "SoftStartPedestalResult".
			SHIFT/ROTATE BITS Input P11-12Ped/Time Output Shift1
10		Enable	Number of Bits 8 Shift Left
			Bit to Shift In 0 Don't Include Sign Bit
			SHIFT/ROTATE BITS Input Shift1 Output SoftStartTimeResult
10.1		Enable	Number of Bits 8 ↑ Shift Right
			Bit to Shift In 0 Don't Include Sign Bit
			SHIFT/ROTATE BITS Input P11-12Ped/Time Output SoftStartPedestalResult
10.2		Enable	Number of Bits 8 Shift Right
			Bit to Shift In 0
			Don't Include Sign Bit
	This rung will write to the unit, updating P12 ("SoftStartTime") with the	<u>ie latest ent</u>	
11 -	WriteReadTime	Enable	MODBUS WRITE Serial Port CPU-485 In Progress WriteStarterInProg Slave Node Number 1 Complete WriteStarterComp Automatic Polling 300 50 Sucess WriteStarterComp Automatic Polling 300 50 Sucess WriteStarterSuccess Don't Skip Execution Error WriteStarterError No Word Swap Timeout WriteStarterTO Map 32 bit data to 16 bit Exception Slave Modbus Starting Address 13 Response String WriteStarterException Modbus Decimal Addressing Modbus Function Code 6: Write Single Register
			Tag Name Mapping Non-Array Tag SoftStartTime

6.7.3 - Productivity3000 PLC Example Program (continued)

This rung compares 1 tag, "SoftStartTimeEntry", to another tag, "OldSoftStartTime". This allows the ladder to perform a sequence if the first tag (assumed for example purposes to be coming from an HMI, but can also be changed from Data View). It will Copy the new value to the old value tag. and then start the Write/Read confirmation sequence. When the value read from the soft starter is equal to the new entry, the sequence resets. COPY DATA SoftStartTimeEntry OldSoftStartTime Enable Destination Source 12 OldSoftStartTime SoftStartTimeEntr SoftStartTime WriteReadTime 12.1 -(SET) Once the value read back from the unit is equal to the new value, the sequence is reset. SoftStartTimeEntry SoftStartTimeResult WriteReadTime 13 -(RST) 14 C END)

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