Revision History

Date	Author	Revision	Description
17-03-2017	Lex Tan, Timothy Cheong	2.0	Created the revision history table for this document. Updated document (dated 08-04-2014) with changes made to "page 2" and the new "page 3".
19-04-2017	Lex Tan	3.0	Updated for V7 application software.
08-08-2017	Lex Tan	4.0	Updated for V6 application software.
16-10-2017	Lex Tan	5.0	Updated document to indicate that this implementation is referring to the "Holding Register" of the Modbus Protocol. Also update pointers for Citect SmartGraphics for using register address > 9999.

Note:

1 This document covers the implementation of the "Holding Register" mapping of the Modbus protocol.

2 Note that this scheme separates the "status" and "command" bits.

3 Table 1 covers the "standard static Modbus" register mapping on "page 1" for Loop 1~L90 and Zone 1~1000. Check the panel EEPROM setting for page 1 – In FF+, EEPROM location 0xB2 = 0x0001 or 0xFFFF; In FFV7 and FFV6, EEPROM location 0xB9 = 0x0001 or 0xFFFF.

4 Table 2 covers the "extended static Modbus" register mapping on "page 2" for Loop 91~L180 and Zone 1001~2000. Check the panel EEPROM setting for page 2 – In FF+, EEPROM location 0xB2 = 0x0002; In FFV7 and V6, EEPROM location 0xB9 = 0x0002. **Note that the mapping for "page 2" has been modified to cover more loops as the previous version stops at loop 150, and the support for zone 1001~2000 was not present – this requires a SPB software upgrade (>=V2.5), and FF+ application software upgrade (>V2.3.3.12) or FF V7 application software (>=7.2.1.4). Also noted that FFV6 only supports a maximum of 140 loops.**

5 Table 3 covers the "extended static Modbus" register mapping on "page 3" for Loop 181~L250 and Zone 2001~2500. Check the panel EEPROM setting for page 32 – In FF+, EEPROM location 0xB2 = 0x0003; In FFV7, EEPROM location 0xB9 = 0x0003. **Note that this is a new feature and requires a SPB software upgrade (>=V2.5), and FF+ application software upgrade (>V2.3.3.12) or FF V7 application software (>=7.2.1.4). Also note that V7's maximum loop number is set at 200 at the point of this writing. "Page 3" is not supported in FFV6.**

6 When running Citect SmartGraphics (SG) system for Holding Register address > 9999, it needs to be configured at Citect in the 400000 addressing space. For example, Zone 1001 status should be set as "412352" in Citect SG.

Page 1:

Output Register Start **(Starts from 40000)**	Output Register End **(Starts from 40000)**	Access (External)	Usage	Example
1	101	N.A.	Reserved for "functions". Not driven by this implementation.	N.A.
102	126	READ	Front Panel MCP status bits for 100 nodes. Each MCP uses 4 bits: Bit 0 = alarm Bit 1 = not used Bit 2 = fault Bit 3 = isolate	Register 102 stores the MCP status bits for Node 1, 2, 3 and 4 with Node 1 MCP's data being stored at the bit 0-3 and Node 4 MCP's data being stored at bit 12-15.
127	151	READ/WRITE	Front Panel MCP command bits for 100 nodes. Each MCP uses 4 bits: Bit 0 = de-isolate Bit 1 = isolate Bit 2 = acknowledge Bit 3 = reset	Register 127 stores the MCP command bits for Node 1, 2, 3 and 4 with Node 1 MCP's data being stored at the bit 0-3 and Node 4 MCP's data being stored at bit 12-15. Priority of process: acknowledgement, reset, de-isolate and isolate
152	196	READ	Loop status bits for 90 loops (1 … 90). Each loop uses 8 bits: Bit 0 = open circuit Bit 1 = short circuit on side A Bit 2 = short circuit on side B Bit 2 & 3 = loop is down Bit 3 = over current, Bit 4 = non configured Bit 5 = loop module fault Note: all bits zero imply "normal".	Register 152 stores the loop status bits for Loop 1 and 2 with Loop 1's data being stored at the bit 0-7 and Loop 2's data being stored at bit 8-15.
197	241	READ/WRITE	Loop command bits for 90 loops (1 … 90). Not being used currently but is reserved for future implementation.	N.A.
242	3121	READ	Loop Devices status bits for 90 loops (1 … 90). Each loop uses 32 registers that holds up 128 devices' status. Each device uses 4 bits: Bit 0 = alarm Bit 1 = pre-alarm/inv-alarm Bit 2 = fault Bit 3 = isolate	Register 242 stores the device status bits for Loop 1 Device 1, 2, 3, and 4 with device 1's data being stored at the bit 0-3 and device 4's data being stored at bit 12-15. Sub-addresses share the same status bits as its main device.
3122	6001	READ/WRITE	Loop Devices command bits for 90 loops (loop 1 … 90). Each loop uses 32 registers that holds up 128 devices' command bit. Each device uses 4 bits: Bit 0 = de-isolate Bit 1 = isolate Bit 2 = acknowledge Bit 3 = reset	Register 3122 stores the device command bits for Loop 1 Device 1, 2, 3, and 4 with device 1's data being stored at the bit 0-3 and device 4's data being stored at bit 12-15. Priority of process: acknowledgement, reset, de-isolate and

				isolate

6002	6251	READ	Zone status bits for 1000 zones (1 … 1000). Each zone uses 4 bits: Bit 0 = alarm Bit 1 = pre-alarm/inv-alarm Bit 2 = fault Bit 3 = isolate	Register 6002 stores the zone status bits for Zone 1, 2, 3, and 4 with zone 1's data being stored at the bit 0-3 and zone 4's data being stored at bit 12-15.
6252	6501	READ/WRITE	Zone command bits for 1000 zones (1 … 1000). Each zone uses 4 bits: Bit 0 = de-isolate Bit 1 = isolate Bit 2 = acknowledge Bit 3 = reset	Register 6252 stores the zone command bits for Zone 1, 2, 3, and 4 with zone 1's data being stored at the bit 0-3 and zone 4's data being stored at bit 12-15. Priority of process: acknowledgement, reset, de-isolate and isolate

Table 1: Standard Static Modbus (page 1) [Loop 1…90, Zone 1…1000]

Page 2:

Output Register Start **(Starts from 40000)**	Output Register End **(Starts from 40000)**	Access (External)	Usage	Example
6502	6546	READ	Loop status bits for **90** loops (91 … **180**). Each loop uses 8 bits: Bit 0 = open circuit Bit 1 = short circuit on side A Bit 2 = short circuit on side B Bit 2 & 3 = loop is down Bit 3 = over current, Bit 4 = non configured Bit 5 = loop module fault Note: all bits zero imply “normal".	Register 6502 stores the loop status bits for Loop 91 and 92 with Loop 91’s data being stored at the bit 0-7 and Loop 92’s data being stored at bit 8-15.
6547	6591	READ/WRITE	Loop command bits for **90** loops (91 … **180**). Not being used currently but is reserved for future implementation.	N.A.
6592	9471	READ	Loop Devices status bits for **90** loops (91 … **180**). Each loop uses 32 registers that holds up 128 devices’ status. Each device uses 4 bits: Bit 0 = alarm Bit 1 = pre-alarm/inv-alarm Bit 2 = fault Bit 3 = isolate	Register 6592 stores the device status bits for Loop 91 Device 1, 2, 3, and 4 with device 1’s data being stored at the bit 0-3 and device 4’s data being stored at bit 12-15. Sub-addresses share the same status bits as its main device.
9472	12351	READ/WRITE	Loop Devices command bits for **90** loops (91 … **180**). Each loop uses 32 registers that holds up 128 devices’ command bit. Each device uses 4 bits: Bit 0 = de-isolate Bit 1 = isolate Bit 2 = acknowledge Bit 3 = reset	Register 9472 stores the device command bits for Loop 91 Device 1, 2, 3, and 4 with device 1’s data being stored at the bit 0-3 and device 4’s data being stored at bit 12-15. Priority of process: acknowledgement, reset, de-isolate and isolate
12352	12601	READ	Zone status bits for 1000 zones (1001 … **2000**). Each zone uses 4 bits: Bit 0 = alarm Bit 1 = pre-alarm/inv-alarm Bit 2 = fault Bit 3 = isolate	Register 12352 stores the zone status bits for Zone 1001, 1002, 1003, and 1004 with zone 1’s data being stored at the bit 0-3 and zone 1004’s data being stored at bit 12-15.
12602	12851	READ/WRITE	Zone command bits for 1000 zones (1001 … **2000**). Each zone uses 4 bits: Bit 0 = de-isolate Bit 1 = isolate Bit 2 = acknowledge Bit 3 = reset	Register 12602 stores the zone command bits for Zone 1001, 1002, 1003, and 1004 with zone 1001’s data being stored at the bit 0-3 and zone 4’s data being stored at bit 12-15. Priority of process: acknowledgement, reset, de-isolate and isolate

Table 2: Extended Static Modbus (page 2) [Loop 91…180, Zone 1001…2000]

Page 3:

Output Register Start **(Starts from 40000)**	Output Register End **(Starts from 40000)**	Access (External)	Usage	Example
12852	12886	READ	Loop status bits for **70** loops (181 … **250**). Each loop uses 8 bits: Bit 0 = open circuit Bit 1 = short circuit on side A Bit 2 = short circuit on side B Bit 2 & 3 = loop is down Bit 3 = over current, Bit 4 = non configured Bit 5 = loop module fault Note: all bits zero imply “normal".	Register 12852 stores the loop status bits for Loop 181 and 182 with Loop 181’s data being stored at the bit 0-7 and Loop 92’s data being stored at bit 8-15.
12897	12941	READ/WRITE	Loop command bits for **70** loops (181 … **250**). Not being used currently but is reserved for future implementation.	N.A.
12942	15181	READ	Loop Devices status bits for **70** loops (181 … **250**). Each loop uses 32 registers that holds up 128 devices’ status. Each device uses 4 bits: Bit 0 = alarm Bit 1 = pre-alarm/inv-alarm Bit 2 = fault Bit 3 = isolate	Register 12942 stores the device status bits for Loop 181 Device 1, 2, 3, and 4 with device 1’s data being stored at the bit 0-3 and device 4’s data being stored at bit 12-15. Sub-addresses share the same status bits as its main device.
15822	18061	READ/WRITE	Loop Devices command bits for **70** loops (181 … **250**). Each loop uses 32 registers that holds up 128 devices’ command bit. Each device uses 4 bits: Bit 0 = de-isolate Bit 1 = isolate Bit 2 = acknowledge Bit 3 = reset	Register 15822 stores the device command bits for Loop 181 Device 1, 2, 3, and 4 with device 1’s data being stored at the bit 0-3 and device 4’s data being stored at bit 12-15. Priority of process: acknowledgement, reset, de-isolate and isolate
18702	18826	READ	Zone status bits for **500** zones (2001 … **2500**). Each zone uses 4 bits: Bit 0 = alarm Bit 1 = pre-alarm/inv-alarm Bit 2 = fault Bit 3 = isolate	Register 18702 stores the zone status bits for Zone 2001, 2002, 2003, and 2004 with zone 1’s data being stored at the bit 0-3 and zone 2004’s data being stored at bit 12-15.
18952	19076	READ/WRITE	Zone command bits for **500** zones (2001 … **2500**). Each zone uses 4 bits: Bit 0 = de-isolate Bit 1 = isolate Bit 2 = acknowledge Bit 3 = reset	Register 18952 stores the zone command bits for Zone 2001, 2002, 2003, and 2004 with zone 2001’s data being stored at the bit 0-3 and zone 4’s data being stored at bit 12-15. Priority of process: acknowledgement, reset, de-isolate and isolate

Table 3: Extended Static Modbus (page 3) [Loop 181…250, Zone 2001…2500]