

# FL500 Modbus Communication Operating Manual



Order No.: 10193214/00



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# Contents

- 1. Modbus Interface..... 5**
  - 1.1. Baud Rate ..... 5
  - 1.2. Data Format ..... 5
  - 1.3. Modbus Read Status Protocol (Query/Response)..... 5
    - 1.3.1 Modbus Read Query Message ..... 5
    - 1.3.2 Modbus Read Response Message ..... 6
  - 1.4. Modbus Write Command Protocol (Query/Response)..... 6
    - 1.4.1 Modbus Write Query Message..... 6
    - 1.4.2 Modbus Write Response Message ..... 6
  - 1.5. Function Codes Supported ..... 7
  - 1.6. Exception Responses and Codes ..... 7
  
- 2. Operational Mode Commands ..... 8**
  
- 3. Operational Mode Command Register Details ..... 10**
  - 3.1. Analog (00H) ..... 10
  - 3.2. Mode (01H) ..... 10
  - 3.3. Fault (02H) ..... 11
  - 3.4. Factory Use Only (03H) ..... 11
  - 3.5. Model Type (04H) ..... 11
  - 3.6. Software Revision (05H) ..... 11
  - 3.7. Input Voltage (06H) ..... 11
  - 3.8. Switch Override (07H)..... 12
  - 3.9. Options (08H)..... 13
  - 3.10. Comm Address (09H) ..... 13
  - 3.11. Comm Baud Rate (0BH) ..... 14
  - 3.12. Comm Data Format (0CH)..... 14
  - 3.13. UV Signal Count (0DH)..... 15
  - 3.14. IR Signal Count (0EH)..... 15
  - 3.15. Remote Reset (11H) ..... 15
  - 3.16. Remote Alarm Test (12H) ..... 15
  - 3.17. Unit Temperature (13H) ..... 15
  - 3.18. Clear COPM Faults (14H) ..... 15
  - 3.19. Serial Number (15H, 16H)..... 16
  - 3.20. HART Enable (1D) ..... 16



3.21.	HART Test (1E).....	16
3.22.	Comm RXD CRC Errors (26H) .....	16
3.23.	Comm UART Errors (2AH).....	16
3.24.	Comm Clear UART (2CH).....	16
3.25.	Comm Clear Stats (2DH) .....	16
3.26.	HART Current Range (2E) .....	17
3.27.	Input Voltage (33H) .....	17
3.28.	DIP Switch Settings (36H).....	17
3.29.	User Information (68H to 77H).....	17
<b>4.</b>	<b>Event Logging.....</b>	<b>18</b>
4.1.	Fault .....	18
4.2.	Alarm Low .....	18
4.3.	Alarm High.....	18
<b>5.</b>	<b>Maintenance.....</b>	<b>19</b>
<b>6.</b>	<b>Clock Settings.....</b>	<b>20</b>
<b>7.</b>	<b>Fault Troubleshooting .....</b>	<b>22</b>
<b>8.</b>	<b>Customer Support .....</b>	<b>23</b>



## 1. Modbus Interface

### 1.1. Baud Rate

The baud rate can be set through the Modbus interface. The available baud rates are 19.2K and 9600, 4800, and 2400 bits per second (bps).

### 1.2. Data Format

The data format can be set through the Modbus interface.

Data Bits	Parity	Stop Bit	Format
8	None	1	8-N-1
8	Even	1	8-E-1
8	Odd	1	8-O-1
8	None	2	8-N-2

### 1.3. Modbus Read Status Protocol (Query/Response)

In a normal exchange, the master device sends a query to the FL500. The FL500 receives the query and sends back a response with data and status in the data field.

#### 1.3.1 Modbus Read Query Message

Byte	Modbus Query	Range	FL500 Response
1	Slave Address	1 - 247* (Decimal)	FL500 ID (address)
2	Function Code	03	Read Holding registers
3	Starting Address Hi**	00	Not used
4	Starting Address Lo**	00-FF (Hex)	FL500 commands
5	No. of Registers Hi	00	Not used
6	No. of registers Lo	01	Number of 16-bit registers
7	CRC Lo	00-FF (Hex)	CRC Lo byte
8	CRC Hi	00-FF (Hex)	CRC Hi byte

\*Address 0 is used for broadcast mode and is not supported at this time.

\*\*Starting Address can be a maximum of 247 address locations (0000 to 0x00F7).

## 1.3.2 Modbus Read Response Message

Byte	Modbus Query	Range	FL500 Response
1	Slave Address	1 - 247* (Decimal)	FL500 ID (address)
2	Function Code	03 or 04	Read Holding registers
3	Byte Count	02 - FF (Hex)	Number of data bytes
4	Data Hi	00-FF (Hex)	FL500 Hi byte status data
5	Data Lo	00-FF (Hex)	FL500 Lo byte status data
6	CRC Lo	00-FF (Hex)	CRC Lo byte
7	CRC Hi	00-FF (Hex)	CRC Hi byte

\*Address 0 is used for broadcast mode and is not supported at this time.

## 1.4. Modbus Write Command Protocol (Query/Response)

### 1.4.1 Modbus Write Query Message

Byte	Modbus Query	Range	FL500 Response
1	Slave Address	1 - 247* (Decimal)	FL500 ID (address)
2	Function Code	06	Preset single register
3	Register Address Hi**	00	Not used
4	Register Address Lo**	00-FF (Hex)	FL500 commands
5	Preset Data Hi	00-FF (Hex)	FL500 Hi byte command data
6	Preset Data Lo	00-FF (Hex)	FL500 Lo byte command data
7	CRC Lo	00-FF (Hex)	CRC Lo byte
8	CRC Hi	00-FF (Hex)	CRC Hi byte

\*Address 0 is used for broadcast mode and is not supported at this time.

\*\*Starting Address can be a maximum of 247 address locations (0000 to 0x00F7).

### 1.4.2 Modbus Write Response Message

Byte	Modbus Query	Range	FL500 Response
1	Slave Address	1 - 247* (Decimal)	FL500 ID (address)
2	Function Code	06	Preset single register
3	Register Address Hi**	00	Not used
4	Register Address Lo**	00-FF (Hex)	FL500 commands
5	Preset Data Hi	00-FF (Hex)	FL500 Hi byte command data
6	Preset Data Lo	00-FF (Hex)	FL500 Lo byte command data
7	CRC Lo	00-FF (Hex)	CRC Lo byte
8	CRC Hi	00-FF (Hex)	CRC Hi byte

\*Address 0 is reserved for broadcast mode and is not supported at this time.

\*\*Starting Address can be a maximum of 247 address locations (0000 to 0x00F7).

## 1.5. Function Codes Supported

Function codes 03 and 04 (Read Holding Registers) are used to identify the status of the slave unit. Function code 06 (Preset Single Register) is used to write a command to the slave unit.

## 1.6. Exception Responses and Codes

If a communication error occurs, the FL500 does the following:

- If the FL500 cannot identify the query because of a communication error, or if the FL500 receives the query, but identifies a communication error, the FL500 does not send back a response. After some time, the master device goes to a time-out condition for the query.
- If the FL500 receives a query without a communications error, but cannot process the query because of a Read or Write command to a nonexistent or Illegal Function Code, Data Address (Starting or Register), or Data Value, the FL500 sends back an exception response.

Byte	Modbus Query	Range	FL500 Response
1	Slave Address	1 - 247* (Decimal)	FL500 ID (address)
2	Function Code	83 or 86 (Hex)	MSB is set with function code
3	Exception Code	01 - 06 (Hex)	Applicable exception code
4	CRC Lo	00-FF (Hex)	CRC Lo byte
5	CRC Hi	00-FF (Hex)	CRC Hi byte

An exception response includes an exception code in the data field. The exception code describes the condition that caused the exception.

Code	Name	Description
01	Illegal Function	The function code received in the query is not applicable.
02	Illegal Data Address	The data address received in the query is not applicable.
03	Illegal Data Value	A value contained in the query data field is not applicable.
04	Slave Device Failure	An unrecoverable error occurred when the device tried to do a requested action.
05	Acknowledge	The request is accepted, but a long period of time is necessary to process it. This response is given to prevent a time-out error in the master.
06	Device Busy	The FL500 is processing a long-duration program command. The master sends the message again when the slave is free.

## 2. Operational Mode Commands

Refer to Section 3 "Operational Mode Command Register Details" for details about each of the following registers.

**NOTE:** The FL500 has Modbus error reporting. The optional dual Modbus has error reporting for each channel and can provide simultaneous block mode.

**R = Read-only access      R/W = Read/Write access**

Parameter	Function	Type	Scale	Access	REG Addr	Master I/O Addr
Analog	Identifies 0 - 20 mA current output	Value	16-Bit	R	0000	40001
Mode	Identifies FL500 operating mode	Value	(0-11)	R	0001	40002
Fault	Identifies a fault	Bit	16-Bit	R	0002	40003
Factory Use Only	For factory use only	Bit	16-Bit	R	0003	40004
Model Type	Identifies FL500 model number	Decimal	310X	R	0004	40005
Software Revision	Identifies software revision	ASCII	2-Char	R	0005	40006
Input Voltage	Identifies 24-volt supply	Value	16-Bit	R	0006	40007
Switch Override	Overrides control of the DIP switch	Bit	1-Bit	R/W	0007	40008
Options	Identifies FL500 options settings	Bit	8-Bit	R/W	0008	40009
Comm Address	Identifies FL500 Modbus address	Decimal Hex	(1-247) (01- F7)	R/W	0009	40010
Comm Baud Rate	Identifies Modbus baud rate	Value	(0-3)	R/W	000B	40012
Comm Data Format	Identifies Modbus data format	Value	(0 - 3)	R/W	000C	40013
UV Signal Count	Identifies number of UV signal pulses within 500 ms	Value	16-Bit	R	000D	40014
IR Signal Count	Identifies number of IR signal pulses within 500 ms	Value	16-Bit	R	000E	40015
Remote Reset	Remotely resets Alarm Low and Alarm High relays	Bit	1-Bit	R/W	0011	40018
Remote Alarm Test	Remotely activates Alarm Test	Bit	1-Bit	R/W	0012	40019
Unit Temperature	Identifies the temperature of the FL500	ASCII	16-Bit	R	0013	40020
Clear COPM Faults	Clears UV/IR COPM Fault counters	Bit	1-Bit	R/W	0014	40021
Serial Number	Serial number upper	Value	16 bit	R	0015	40022
Serial Number	Serial number lower	Value	16 bit	R	0016	40023
HART Enable	0 = Disabled, 1 = Enabled	Bit	1 bit	R/W	001D	40030
HART Test	0 = Normal, 1 = Constant ones, 2 = Constant zeros	Bit	2 Bit	R/W	001E	40031



Parameter	Function	Type	Scale	Access	REG Addr	Master I/O Addr
Comm RXD CRC Errors	Total number of RXD CRC errors	Value	16-Bit	R	0026	40039
Comm UART Errors	Total number of UART errors	Value	16 Bit		002A	40043
Comm Clear UART	Clear UART errors	Bit	1-Bit	R/W	002C	40045
Comm Clear Stats	Clear Comm statistics	Bit	1-Bit	R/W	002D	40046
HART Current Range	3.5 to 20 mA 1.25 to 20 mA	Bit	1-Bit	R/W	002E	40047
Input Voltage	Identifies 24-volt supply	Value	16-Bit	R	0033	40052
DIP Switch Settings	First 8 option settings on DIP switch	Value	16-Bit	R	0036	40055

### 3. Operational Mode Command Register Details

#### 3.1. Analog (00H)

A Read command sends back the current output in milliamperes (mA). A value of 16,000 in decimal is equal to 16.00 mA

#### 3.2. Mode (01H)

A Read command sends back a value that identifies the operating mode of the FL500.

Mode	Decimal Value
Initialization	0
Start-up	1
Normal (standby)	2
Fault	3
COPM check	4
IR-only fire	5
UV-only fire	6
Alarm High Test	7
Alarm Low latching only	8
Alarm High latching only	9
Alarm Low non-latching only	10
Alarm High non-latching only	11
ATE test	12
ATEX test	13
Alarm Low and Alarm High latching	14

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**3.3. Fault (02H)**

A Read command sends back the errors that are occurring. The bit position identifies the error.

Byte	Function Bit	Position	Hex
High	Alarm High relay	1	0x0100
	Alarm Low relay	2	0x0200
	Fault relay	3	0x0400
	Output current	4	0x0800
	Alarm Test input/output	5	0x1000
	Not used	6	0x2000
	UV 10 minutes	7	0x4000
	Alarm Reset switch shorted	8	0x8000
Low	Internal voltage	1	0x0001
	Not used	2	0x0002
	IR COPM	3	0x0004
	UV COPM	4	0x0008
	Low supply voltage	5	0x0010
	Noncritical EEPROM	6	0x0020
	EEPROM checksum	7	0x0040
	Flash checksum	8	0x0080

**3.4. Factory Use Only (03H)**

This parameter is for factory use only.

**3.5. Model Type (04H)**

A Read command sends back the decimal value 3550 for the FL500 model number.

Model	Configuration	HART ID	Modbus ID
FL500	Standard UV/IR	0x93	3550 0x0DE8

**3.6. Software Revision (05H)**

A Read command sends back the numeric value of the software revision (such as 0, 1, 2) in use by the FL500.

**3.7. Input Voltage (06H)**

A Read command sends back the measured input voltage. If the measured voltage is less than the necessary 20 volts, a Low Supply Voltage fault can occur. Refer to the FL500 UV/IR Flame Detector Operating Manual (PN 10193213) for information about troubleshooting faults.

### 3.8. Switch Override (07H)

A Read command sends back the status of the Switch Override bit. A Write command changes the value of the Switch Override bit.

When the Switch Override bit is enabled, the data kept in EEPROM controls the first eight option settings on the DIP switch (detector sensitivity, relay time delay, relay latching/non-latching, and relay energized/non-energized). When the Switch Override bit is disabled, the DIP switch on the bottom of the power/relay board controls the option settings.

**NOTE:** The Switch Override bit has an effect on the first eight option settings only. The Switch Override bit does not have an effect on the option settings for switches 9 and 10 (HART Enabled and Alternate LED).

Function	Bit (LSB)	Access
Enable	1	Read/Write
Disable	0	Read/Write

The Switch Override bit is in the LSB of the Low data byte. The High data byte is not used.

**NOTE:** If you ground the Alarm Test input during the start-up cycle (approximately 10 seconds), the FL500 sets the Switch Override bit to 0 to enable the DIP switch. Refer to the FL500 UV/IR Flame Detector Operating Manual (PN 10193213) for information about the Alarm Test feature.

### 3.9. Options (08H)

A Read command sends back the status of the settings for the detector sensitivity, relay time delay, relay latching/non-latching, and relay energized/non-energized options.

The Switch Override bit must be enabled for a Write command to change the option settings.

**EXCEPTION:** If the Switch Override bit is not enabled when a change to an option setting is requested, Exception Code 01 (Illegal Function) is sent back.

Position	Option									
	1	2	3	4	5	6	7	8	9	10
High Sensitivity	OFF	OFF	-	-	-	-	-	-	-	-
Medium Sensitivity	ON	OFF	-	-	-	-	-	-	-	-
Low Sensitivity	OFF	ON	-	-	-	-	-	-	-	-
2-second Alarm Time Delay	-	-	OFF	ON	-	-	-	-	-	-
4-second Alarm Time Delay	-	-	OFF	OFF	-	-	-	-	-	-
8-second Alarm Time Delay	-	-	ON	OFF	-	-	-	-	-	-
10-second Alarm Time Delay	-	-	ON	ON	-	-	-	-	-	-
Alarm High Non-Latching	-	-	-	-	OFF	-	-	-	-	-
Alarm High Latching	-	-	-	-	ON	-	-	-	-	-
Alarm Low Non-Latching	-	-	-	-	-	OFF	-	-	-	-
Alarm Low Latching	-	-	-	-	-	ON	-	-	-	-
Alarm High Normal Energized	-	-	-	-	-	-	ON	-	-	-
Alarm High Normal De-Energized	-	-	-	-	-	-	OFF	-	-	-
Alarm Low Normal Energized	-	-	-	-	-	-	-	ON	-	-
Alarm Low Normal De-Energized	-	-	-	-	-	-	-	OFF	-	-
Alternate LED	-	-	-	-	-	-	-	-	-	ON
HART Enabled	-	-	-	-	-	-	-	-	ON	-

These functions are indicated on the Low data byte. The High data byte is not used.

### 3.10. Comm Address (09H)

A Read command sends back the Comm address of the FL500. A Write command changes the address. The address range is 1 to 247 (01 to F7 hex).

When the slave address changes, Modbus communications stop until the master changes its query address to the new slave address.

**EXCEPTION:** The data value must be between 1 to 0x00F7. If an illegal data value is entered, Exception Code 03 (Illegal Data Value) is sent back.

**NOTE:** If you ground the Alarm Reset input during the start-up cycle (approximately 10 seconds), the FL500 address will default to 1.

### 3.11. Comm Baud Rate (0BH)

A Read command sends back the Comm baud rate in use by the FL500. A Write command changes the baud rate.

When the slave baud rate changes, Modbus communications stop until the master changes its baud rate to the new slave baud rate.

Baud Rate	Low Data Byte	Access
19.2K	192	Read/Write
9600 bps	96	Read/Write
4800 bps	48	Read/Write
2400 bps	24	Read/Write

This function is indicated on the Low data byte. The High data byte is not used.

**EXCEPTION:** If an illegal data value is entered, Exception Code 03 (Illegal Data Value) is sent back.

**NOTE:** If you ground the Alarm Reset input during the start-up cycle (approximately 10 seconds), the baud rate will default to 19.2K.

### 3.12. Comm Data Format (0CH)

A Read command sends back the Comm data format in use by the FL500. A Write command changes the data format.

When the data format changes, Modbus communications stop or communication errors occur until the master changes its data format to the new slave data format.

Data	Parity	Stop	Format	Low Data Byte	Access
8	None	1	8-N-1	00	Read/Write
8	Even	1	8-E-1	01	Read/Write
8	Odd	1	8-O-1	02	Read/Write
8	None	2	8-N-2	03	Read/Write

This function is indicated on the Low data byte. The High data byte is not used.

**EXCEPTION:** If an illegal data value is entered, Exception Code 03 (Illegal Data Value) is sent back.

**NOTE:** If you ground the Alarm Reset input during the start-up cycle (approximately 10 seconds), the data format will default to 8-N-1.

**3.13. UV Signal Count (0DH)**

A Read command sends back the number of UV signal counts that have occurred within 500 ms, which is the time necessary to detect a fire in the UV spectrum.

**3.14. IR Signal Count (0EH)**

A Read command sends back the number of IR signal counts that have occurred within 500 ms, which is the time necessary to detect a fire in the IR spectrum.

**3.15. Remote Reset (11H)**

A Write command of 1 enables the Remote Reset bit to reset the Alarm Low and Alarm High relays. The function is enabled momentarily and resets automatically after use.

Function	Bit (LSB)	Access
Enable	1	Read/Write
Disable	0	Read/Write

**EXCEPTION:** If an illegal data value is entered, Exception Code 03 (Illegal Data Value) is sent back.

**3.16. Remote Alarm Test (12H)**

A Write command of 1 enables the Remote Alarm Test. The Remote Alarm Test activates the Alarm Low and Alarm High relays and causes the analog current to show Alarm Low then Alarm High.

When the Remote Alarm Test is complete, do the following:

1. Send a Write command of 0 to the Remote Alarm Test bit to disable the Remote Alarm Test.
2. Send a Write command of 1 to the Remote Reset bit to reset the Alarm Low and Alarm High relays.

Function	Bit (LSB)	Access
Enable	1	Read/Write
Disable	0	Read/Write

**EXCEPTION:** If an illegal data value is entered, Exception Code 03 (Illegal Data Value) is sent back.

**3.17. Unit Temperature (13H)**

A Read command sends back the temperature of the FL500 in degrees Celsius.

**3.18. Clear COPM Faults (14H)**

A Write command of 1 enables the Clear COPM Faults bit to reset both UV and IR COPM fault output. The function is enabled momentarily and resets automatically after use.

Function	Bit (LSB)	Access
Enable	1	Read/Write
Disable	0	Read/Write

**EXCEPTION:** If an illegal data value is entered, Exception Code 03 (Illegal Data Value) is sent back.

### 3.19. Serial Number (15H, 16H)

The serial number is a 32-bit word but the value is only 23 bits long. The upper bits are always zero to keep the FL500 serial number and the HART serial number the same. Address 0x16 has the lower part of the serial number. Address 0x15 has the upper part of the serial number.

### 3.20. HART Enable (1D)

If the HART protocol is installed, a Write command of 1 enables HART communication.

Function	Bit (LSB)	Access
Enable	1	Read/Write
Disable	0	Read/Write

**EXCEPTION:** If the HART protocol is not installed when a command is sent to the HART Enable bit, Exception Code 01 (Illegal Function) is sent back.

### 3.21. HART Test (1E)

If the HART protocol is installed, this command is used to do a test of HART output. A Write command of 1 sends constant zeros to HART output. A Write command of 2 sends constant ones to HART output.

Code	Results
0	Normal
1	Constant ones
2	Constant zeros

**EXCEPTION:** If HART communication is not installed when a command is sent to the HART Test bit, Exception Code 01 (Illegal Function) is sent back.

### 3.22. Comm RXD CRC Errors (26H)

Because the FL500 has a 16-bit CRC, Hi and Lo CRC errors are given in the same 16-bit word. A Read command from the previous Hi or Lo CRC address sends back the same count.

### 3.23. Comm UART Errors (2AH)

A Read command sends back the total number of Modbus Comm UART errors that have occurred in the slave device. The maximum number of the counter is 65535. When the maximum number occurs, the counter resets to zero and starts to count again. Individual communication errors such as Overrun, CRC, Parity, and Framing errors are included in the total number.

### 3.24. Comm Clear UART (2CH)

A Write command of 0 enables the Clear Comm Errors bit to reset all Modbus UART Comm Error counters to zero. The function is enabled momentarily and resets automatically after use.

### 3.25. Comm Clear Stats (2DH)

A Write command of 0 enables the Clear Comm Errors bit to reset all Modbus Comm Error counters to zero. The function is enabled momentarily and resets automatically after use.



**3.26. HART Current Range (2E)**

Usually in HART mode, the low current does not go below 3.5 mA. A special HART setting lets the current go as low as 1.25 mA so the difference between a COPM Fault and a Fault can be identified.

A Read command sends back 0 to identify 3.5 to 20 mA current, or 1 to identify 1.25 to 20 mA current.

Condition	HART (Normal)	HART (Special)
Run	4 ,8, 12,16, 20 mA	4 ,8, 12,16, 20 mA
COPM Fault	3.5 mA	2.0 mA
Fault	3.5 mA	1.25 mA

**EXCEPTION:** If HART communication is not installed when a command is sent to the HART Current bit, Exception Code 01 (Illegal Function) is sent back.

**3.27. Input Voltage (33H)**

A Read command sends back the measured input voltage. If the measured voltage is less than the necessary 20 volts, a Low Supply Voltage fault can occur. Refer to the FL500 UV/IR Flame Detector Operating Manual (PN 10193213) for information about troubleshooting faults.

**3.28. DIP Switch Settings (36H)**

A Read command sends back a digital copy of the configuration of the first eight option settings on the DIP switch.

**3.29. User Information (68H to 77H)**

This section in memory lets users keep Modbus-compatible information, such as physical location or other user identification. Only one word can be written per command. A total of 16 words are available.

### 4. Event Logging

#### 4.1. Fault

When a Fault event occurs, a timestamp is recorded and a related event counter increases. A record of the time or a count increase is not made when the fault is removed.

If the same fault occurs twice within 30 seconds, the second fault is not counted.

A total of 10 timestamps for fault events are kept in memory.

#### 4.2. Alarm Low

When an Alarm Low event occurs, a timestamp is recorded and a related event counter increases. The Alarm Low event ends when the condition that caused it is removed and the Alarm Low latch is reset. A total of 10 timestamps for Alarm Low events are kept in memory.

#### 4.3. Alarm High

When an Alarm High event occurs, a timestamp is recorded and a related event counter increases. The Alarm High event ends when the condition that caused it is removed and the Alarm High latch is reset. A total of 10 timestamps for Alarm High events are kept in memory.



## 5. Maintenance

When an Alarm Test occurs, a timestamp is recorded in the Maintenance event log. Each successful Alarm Test event increases the Maintenance event counter. A total of 10 timestamps for maintenance are kept in memory.

## 6. Clock Settings

Address (hex)	Parameter	Function	Data Type	Data Range	Access
40	Reserved	Reserved	Numeric	0	
41	Reserved	Reserved	Numeric	0	
42	Real Time Clock Year, Month	Read/set real-time clock (RTC) year and month	Two numeric values	0-99 year, 1 - 12 month	Timer Struct
43	Real Time Clock Day, Hour	Read/set RTC day and hour	Two numeric values	1 - 31 day, 0 - 23 hour	
44	Real Time Clock Minute, Second	Read/set RTC minutes and seconds	Two numeric values	0 - 59 minute, 0 - 59 second	Timer Struct
45	Power Cycle Info		Bit	0 or 1	Read/Write
46	Master Event Index	Event index of logged event	Numeric value	0 - 9	Index
47	Reserved	Reserved	Numeric value	0	
48	Reserved	Reserved	Numeric value	0	
49	Structure Time Hi	Hi byte = year, low byte = month for Alarm Low event log entries	Numeric value	0 - 65535	Alarm Low
4A	Structure time Mid	Hi byte = day, low byte = hour for Alarm Low event log entries	Numeric value	0 - 65535	Alarm Low
4B	Structure Time Low	Hi byte = minutes, low byte = seconds for Alarm Low event log entries	Numeric value	0 - 65535	Alarm Low
4C	Reserved	Reserved	Numeric	0	
4D	Reserved	Reserved	Numeric	0	
4E	Alarm Low Event Count	Alarm Low event count	Numeric value	0 - 65535	Alarm Low
4F	Reserved	Reserved	Numeric value	0	
50	Reserved	Reserved	Numeric value	0	
51	Structure Time Hi	Hi byte = year, low byte = month for Alarm High event log entries	Numeric value	0 - 65535	Alarm High
52	Structure Time Mid	Hi byte = day, low byte = hour for Alarm High event log entries	Numeric value	0 - 65535	Alarm High

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Address (hex)	Parameter	Function	Data Type	Data Range	Access
53	Structure Time Low	Hi byte = minutes, low byte = seconds for Alarm High event log entries	Numeric value	0 - 65535	Alarm High
54	Reserved	Reserved	Numeric value	0	
55	Reserved	Reserved	Numeric value	0	
56	Alarm Event Count	Alarm High event count	Numeric value	0 - 65535	Alarm High
57	Reserved	Reserved	Numeric value	0	
58	Reserved	Reserved	Numeric value	0	
59	Structure Time Hi	Hi byte = year, low byte = month for Fault event log entries	Numeric value	0 - 65535	Fault
5A	Structure Time Mid	Hi byte = day, low byte = hour for Fault event log entries	Numeric value	0 - 65535	Fault
5B	Structure Time Low	Hi byte = minutes, low byte = seconds for Fault event log entries	Numeric value	0 - 65535	Fault
5C	Fault Code Low	Fault code Same code as register 2	Numeric value	0 - 65535	Fault
5D	Fault Code Low	Fault code Same code as register 2	Numeric value	0 - 65535	Fault
5E	Fault Event Count	Fault event count	Numeric value	0 - 65535	Fault
5F	Reserved	Reserved	Numeric value	0	
60	Reserved	Reserved	Numeric value	0	
61	Structure Time Hi	Hi byte = year, low byte = month for Maintenance event log entries	Numeric value	0 - 65535	Maintenance
62	Structure Time Mid	Hi byte = day, low byte = hour for Maintenance event log entries	Numeric value	0 - 65535	Maintenance
63	Structure Time Low	Hi byte = minutes, low byte = seconds for Maintenance event log entries	Numeric value	0 - 65535	Maintenance
64	Maintenance Code	Alarm Test	Numeric value	0	Maintenance
65	Reserved	Reserved	Numeric value	0	
66	Maintenance Count	Maintenance count	Numeric value	0 - 65535	Maintenance
67	Reset Event Counters	Reset Event	Numeric value	1	Reset

### 7. Fault Troubleshooting

Fault	Description
Alarm High relay Alarm Low relay Fault relay	Cycle power to the device. If the fault condition continues, return the FL500 to General Monitors for service.
Output current	There is an error in the current output circuit. Return the FL500 to General Monitors for service.
Alarm Test input/output	The FL500 identifies a continuous short-circuit. Do a check of the Alarm Test line. Refer to the FL500 UV/IR Flame Detector Operating Manual (PN 10193213) for information.
UV 10 Minute	The UV detector identifies a constant source of UV. Do a check of the area for welding, arcing, very bright lights, or other sources of UV.
Alarm Reset switch shorted	The FL500 identifies a continuous short-circuit. Do a check of the Alarm Reset switch. Refer to the FL500 UV/IR Flame Detector Operating Manual (PN 10193213) for information.
Internal voltage	The FL500 monitors various internal voltages. Return the FL500 to General Monitors for service.
IR COPM	Analog output shows 8 mA. Clean the IR window. Refer to the FL500 UV/IR Flame Detector Operating Manual (PN 10193213) for information about how to clean the optical window.
UV COPM	Analog output shows 12 mA. Clean the UV window. Refer to the FL500 UV/IR Flame Detector Operating Manual (PN 10193213) for information about how to clean the optical window.
Low supply voltage	The input voltage is low. Do a check of the input voltage with a meter or through HART or Modbus.
Noncritical EEPROM	Cycle power to the device. Make sure that all FL500 option settings on the DIP switch are correct. If the fault is not removed after the power cycle, return the FL500 to General Monitors for service.
EEPROM checksum	For a recoverable EEPROM error, cycle power to the device, then make sure that all FL500 option settings on the DIP switch are correct. For an unrecoverable EEPROM error, return the FL500 to General Monitors for service.
Flash checksum	The main program memory is not operating correctly. Return the FL500 to General Monitors for service.



## 8. Customer Support

Area	Contact
<b>UNITED STATES</b>	
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To see additional locations, go to [www.MSAsafety.com](http://www.MSAsafety.com).

To see extensive documentation, white papers, and product literature for our complete line of safety products, go to <http://www.MSAsafety.com/detection>.

For local MSA contacts, please visit us at [MSAafety.com](https://www.MSAafety.com)

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