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Caution

The default or operating values used in this manual and in the program of the AccuLoad III are for factory testing only and should not be construed as default or operating values for your metering system. Each metering system is unique and each program parameter must be reviewed and programmed for that specific metering system application.

Disclaimer

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Section I – Introduction

General Information

The Modbus™ protocol requires one master communication device which initiates communications and up to 31 slaves on a common communication line. Each AccuLoad III must have a unique communication address in the range of 1 to 99. Communication address zero is reserved for broadcast communications from the master communication device, and is not currently used in Modbus™ communications with the AccuLoad III.

The Modbus™ communications operates on a query-response cycle.

The Query: The function code in the query tells the addressed slave device what kind of action to perform. The data bytes contain any additional information that the slave will need to perform the function. For example, function code 03 will query the slave to

read holding registers and respond with their contents. The data field must contain information telling the slave which register to start at and how many registers to read. The error check field enables the slave to validate the integrity of the message contents.

The Response: If the slave makes a normal response, the function code in the response is an echo of the function code in the query. The data bytes contain the data collected by the slave, such as register values or status. If an error occurs, the function code is modified to indicate that the response is an error response, and the data bytes contain a code that describes the error. The error check field allows the master to confirm that the message contents are valid.

Section II – Communications

Communications

This section describes the Modbus™ protocol features implemented in the AccuLoad. The RTU message format is supported from 1200 to 38,400 baud. The AccuLoad III-S Modbus™ interface is designed to conform to a subset of the "Modicon Modbus™ Protocol Reference Guide" PI-MBUS-300 Rev. D (Modicon, Inc., Industrial Automation Systems).

The format for each byte in RTU Mode is as follows:

Coding System: 8 bit binary, hexadecimal 0-9, A-F. Two hexadecimal characters are contained in each 8-bit field of the message.

Bits per Byte: 1 start bit;
8 data bits, least significant bit sent first;
1 bit for odd/even parity;
1 stop bit if parity is used or two bits for no parity

Error Check Field: Cyclical Redundancy Check (CRC)

Modbus™ Protocol can be implemented on RS-232 or RS-485 communication ports. Transmission of data is asynchronous.

When AccuLoad III is set up to communicate on a Modbus network using RTU (Remote Terminal Unit) mode, each 8-bit byte in a message contains two 4-bit hexadecimal characters. Each message must be transmitted in a continuous stream.

RTU Framing

Every Modbus™ message begins with a silent interval of at least 3.5 character times. Multiply the character times by the current network baud rate to determine the length of the silent interval (see T1-T2-T3-T4 in the figure below). Next, the AccuLoad address field is transmitted.

Characters for all fields are transmitted as binary bytes. In this manual, characters are represented by hexadecimal 0-9, A-F. The network bus is constantly monitored by all networked devices. This monitoring occurs even during silent intervals. As each AccuLoad receives the first field (the address field), it decodes it to determine if it is the AccuLoad being addressed.

A second silent interval of at least 3.5 character times follows the last transmitted character of each message, after which a new message can begin. The new message must be transmitted as a continuous stream, with no silent interval in excess of 3.5 character times. If an excessively long silent interval occurs before completion of the frame, the receiving AccuLoad will disregard the entire incomplete message and wait for the address field of the next new message.

If a silent interval is less than 3.5 character times, the receiving AccuLoad will be unable to recognize it as the start of a new message and will attempt to read it as a part of the prior message. These combined messages will result in an invalid value in the final CRC field, and an error will result. A typical message frame is shown below.

START	ADDRESS	FUNCTION	DATA	CRC CHECK	END
T1-T2-T3-T4	1 byte	1 byte	<i>n</i> bytes	2 bytes	T1-T2-T3-T4

How Characters are Transmitted Serially

When messages are transmitted on standard Modbus™ serial networks, each character or byte is sent in this order (left to right):

With Parity Checking (8 bit word, 1 stop)

Start	1	2	3	4	5	6	7	8	Par	Stop
-------	---	---	---	---	---	---	---	---	-----	------

Without Parity Checking (8 bit word, 2 stop)

Start	1	2	3	4	5	6	7	8	Stop	Stop
-------	---	---	---	---	---	---	---	---	------	------

How Numerical Values Are Expressed

Numerical values (such as addresses, codes, or data) are expressed as hexadecimal values in the text of this section, preceded by "0x". If no "0x" is present, then the value is expressed as decimal.

Data Addresses in Modbus™ Messages

All data addresses in Modbus™ messages are referenced to zero; the first occurrence of a data item is addressed as item number zero.

Section II – Communications

Function Code

The one-byte function code tells the addressed AccuLoad III what function to perform. The following Modbus™ functions have been implemented in the AccuLoad III.

Standard

Code	Function	Description
01	Read Relay Status	Reads the binary data from the (read/write) set of variables.
02	Read Input Status	Reads the binary data from the "inputs" (read only) set of variables.
03	Read Integer Registers (Read/Write Register Set)	Retrieves the current data from the requested registers.
04	Read Integer Registers (Read Only Register Set)	Retrieves the current data from the requested registers.
05	Force Single Relay	Changes the state of a binary (read/write).
06	Write (Preset) Single Register	Places a specific value into a (read/write) register.
08	Loop Back Diagnostic Text	Diagnostic test message sent to the AccuLoad to evaluate communications processing. <i>Note: Only the return Query Data diagnostic code is supported.</i>
15	Force Multiple Relays	Changes the state of multiple binary (read/write).
16	Write (Preset) Multiple Registers	Places specific values into a series of consecutive (read/write) registers.

Master/Slave Communications

The master communicates with the AccuLoad by sending messages containing function codes. Function codes indicate the actions the AccuLoad is to perform.

The AccuLoad's response to the master uses the function code field to report on the status of the task it was assigned. The two possible reports are (1) a normal, error-free response or (2) an exception response, indicating an error. A normal response repeats the original function code. An exception response returns a code that corresponds to the original function code, with its most-significant bit set to a logic 1.

For example, a master directs an AccuLoad to read a group of holding registers by sending the following function code:

0000 0011 (Hexadecimal 03)

If the AccuLoad completes the action without error, its response echoes the original command. If an error occurs, the AccuLoad returns the following message:

1000 0011 (Hexadecimal 83)

The AccuLoad augments its exception response by adding a code in the data field that indicates what type of error occurred. The exception response is handled according to the parameters of the application program controlling the master device.

01 Read Relay Status

Description

Reads the ON/OFF status of discrete variables in the AccuLoad. The maximum number of "coils" per response is 256 in the AccuLoad III-S.

Query

The query message specifies the starting register and quantity of registers to be read.

As of revision 1 (AccuLoad III-S) software, there are no variables to read from this group. If there were, this is an example of a request to read variables 20 through 56 from AccuLoad device 17:

Query	
Field Name	Example (Hex)
AccuLoad Address	0x11
Function	0x01
Starting Address Hi	0x00
Starting Address Lo	0x13
No. of Points Hi	0x00
No. of Points Lo	0x25
Error Check (CRC)	(calculated)

Response

A response message consists of a relay status packed as one relay per bit of the data field. Status is indicated by means of the following code: 0 = OFF; 1 = ON. The first data byte is contained in the LSB, and specifies the relay addressed in the query. All other relays follow from "low order to high order" in subsequent bytes.

The returned relay quantity must be a multiple of eight; otherwise, it will be padded with zeros toward the high order end of the byte. The assembled bytes of data are specified in the byte count field.

An example of a response to the preceding query appears below.

Response	
Field Name	Example (Hex)
AccuLoad Address	0x11
Function	0x01
Byte Count	0x05
Data (Relays 27-20)	0xCD
Data (Relays 35-28)	0x6B
Data (Relays 43-36)	0xB2
Data (Relays 51-44)	0x0E
Data (Relays 56-52)	0x1B
Error Check (CRC)	(calculated)

Section III – AccuLoad III Modbus™ Data and Control Functions

The status of relays 27 through 20 is shown as the byte value CD hex, or binary 1100 1101. Relay 27 is the MSB of the byte, and relay 20 is the LSB. The status of relays 27 through 20 is expressed from left to right as ON-ON-OFF-OFF-ON-ON-OFF-ON.

Bits within a byte are shown with the MSB to the left and the LSB to the right; therefore, the relays in the first byte are “27 through 20,” from left to right. Relays “35 through 28” are contained in the next byte, again from left to right. As the bits are transmitted serially, they flow from LSB to MSB (i.e., 20 through 27, 28 through 35, and so on).

In the last data byte, the status of relays 56 through 52 is shown as the byte value 1B hex, or binary 0001 1011. Relay 56 is in the fourth bit position from the left, and relay 52 is the LSB of this byte. The status of relays 56 through 52 is expressed as ON-ON-OFF-ON-ON. The three remaining bits toward the high order end are padded with zeros.

02 Read Input Status

Description

Reads the ON/OFF status of discrete "inputs" (read only binary references) in the AccuLoad. The maximum number of parameters supported by AccuLoad III is limited to 256 per query.

Query

The query message specifies the starting "input" and quantity of "inputs" to be read. "Inputs" are addressed starting at zero: inputs 1 through 16 are addressed as 0 through 15.

An example of a request to read the states of inputs 1024 to 1045 from AccuLoad 17 is shown below:

Query	
Field Name	Example (Hex)
AccuLoad Address	0x11
Function	0x02
Starting Address Hi	0x00
Starting Address Lo	0xC4
No. of Points Hi	0x00
No. of Points Lo	0x16
Error Check (CRC)	(calculated)

Response

The input status is packed in the response message as one input per bit of the data field. Status is indicated as 0 = OFF; 1 = ON. The input addressed in the query appears in the LSB of the first data byte. The other inputs follow toward the high order end of this byte, and from low order to high order in all subsequent bytes.

The returned input quantity must be a multiple of eight; otherwise, the remaining bits in the final data byte will be padded with zeros toward the high order end of the byte. The quantity of complete bytes of data is indicated in the byte count field.

An example of a response to the preceding query appears below.

Response	
Field Name	Example (Hex)
AccuLoad Address	0x11
Function	0x02
Byte Count	0x03
Data (Inputs 1031-1024)	0xAC
Data (Inputs 1039-1032)	0xDB
Data (Inputs 1045-1040)	0x35
Error Check (CRC)	(calculated)

The status of inputs 1045 through 1024 is shown as the byte value AC hex, or binary 1010 1100. Input 1031 is the MSB of this byte and input 1024 is the LSB. The status of inputs 1031 through 1024 is expressed as ON-OFF-ON-OFF-ON-ON-OFF-OFF, from left to right.

The status of inputs 1045 through 1040 is shown as the byte value 35 hex, or binary 1011 0101. Input 1045 is in the third bit position from the left and input 1040 is the LSB. The status of inputs 1045 through 1040 is ON-ON-OFF-ON-OFF-ON. The two remaining bits toward the high order end are padded with zeros, since the returned input quantity must be a multiple of eight.

03 Read Holding Registers

Description

Reads the binary contents of holding registers (read/write registers).

Query

The query message specifies the starting register and quantity of registers to be read. Registers are addressed starting at zero.

An example of a request to read registers 107 through 109 from AccuLoad 17 is shown below.

Query	
Field Name	Example (Hex)
AccuLoad Address	0x11
Function	0x03
Starting Address Hi	0x00
Starting Address Lo	0x6B
No. of Points Hi	0x00
No. of Points Lo	0x03
Error Check (CRC)	(calculated)

Response

Each register data in the response message contains two bytes. The binary contents are right justified within each byte. Within each register, the first byte contains the high order bits and the second byte contains the low order bits.

An example of a response to the preceding query is shown below.

Response	
Field Name	Example (Hex)
AccuLoad Address	11
Function	03
Byte Count	06
Data Hi (Register 40108)	02
Data Lo (Register 40108)	2B
Data Hi (Register 40109)	00
Data Lo (Register 40109)	00
Data Hi (Register 40110)	00
Data Lo (Register 40110)	64
Error Check (CRC)	--

04 Read Input Registers

Description

Reads the binary contents of input registers (3X references) in the AccuLoad.

Query

The query message specifies the starting register and quantity of registers to be read. Registers are addressed starting at zero.

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An example of a request to read register 30009 from AccuLoad 17 appears below.

Query	
Field Name	Example (Hex)
AccuLoad Address	11
Function	04
Starting Address Hi	00
Starting Address Lo	08
No. of Points Hi	00
No. of Points Lo	01
Error Check (CRC)	--

Response

Each register data in the response message contains two bytes. The binary contents are right justified within each byte. Within each register, the first byte contains the high order bits and the second byte contains the low order bits.

An example of a response to the preceding query appears below.

Response	
Field Name	Example (Hex)
AccuLoad Address	11
Function	04
Byte Count	02
Data Hi (Register 30009)	00
Data Lo (Register 30009)	0A
Error Check (CRC)	--

05 Force Single Relay

Description

Forces a single relay either ON or OFF.

Query

The query message specifies the relay reference to be forced. Relays are addressed starting at zero.

A constant in the query data field indicates the required ON/OFF state. A value of FF 00 hex directs the relay to be ON. A value of 00 00 directs the relay to be OFF. No other value is valid, nor will it affect the relay.

An example of a request to force relay 173 ON in AccuLoad 17 appears below.

Query	
Field Name	Example (Hex)
AccuLoad Address	11
Function	05
Relay Address Hi	00
Relay Address Lo	AC
Force Data Hi	FF
Force Data Lo	00
Error Check (CRC)	--

Response

An echo of the query, returned after the relay status has been forced, indicates a normal response.

An example of a response to the preceding query appears below.

Response	
Field Name	Example (Hex)
AccuLoad Address	11
Function	05
Relay Address Hi	00
Relay Address Lo	AC
Force Data Hi	FF
Force Data Lo	00
Error Check (CRC)	--

06 Preset Single Register

Description

Presets a value into a single holding register.

Query

The query message specifies the register reference to be preset. Registers are addressed starting at zero. The requested preset value is specified in the query data field.

An example of a request to preset register 1 to 00 03 hex in AccuLoad 17 appears below.

Query	
Field Name	Example (Hex)
AccuLoad Address	11
Function	06
Register Address Hi	00
Register Address Lo	01
Preset Data Hi	00
Preset Data Lo	03
Error Check (CRC)	--

Response

An echo of the query, returned after the register contents have been preset, is a normal response.

An example of a response to the preceding query appears below.

Response	
Field Name	Example (Hex)
AccuLoad Address	11
Function	06
Register Address Hi	00
Register Address Lo	01
Preset Data Hi	00
Preset Data Lo	03
Error Check (CRC)	--

Function 08 -- Diagnostics

Description

Modbus™ function 08 is a diagnostic test that checks the master/AccuLoad communication system. A two-byte sub-function code field in the query defines the test to be performed. In a normal response, the AccuLoad echoes both the function code and sub-function code.

A two-byte data field is used in most of the tests. The data field contains control information or diagnostic data that is sent to the AccuLoad. In some tests, the AccuLoad returns diagnostic data in the data field of a normal response.

An example of a diagnostics query and response appears below. The query indicates the location of the function code, sub-function code, and the data field within the messages.

A list of sub-function codes supported by the controllers is shown on the following page. Each sub-function code is listed, along with an example of the data field content that applies to that diagnostic.

Query

An example of a Return Query Data request to slave device 17 appears below. This request involves a sub-function code of zero (00 00 hex in the two-byte field). The data to be returned is sent in the two-byte data field (A5 37 hex).

Query	
Field Name	Example (Hex)
AccuLoad Address	11
Function	08
Sub-function Hi	00
Sub-function Lo	00
Data Hi	A5
Data Lo	37
Error Check (CRC)	--

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Response

A loop-back of data is the normal response to a Return Query Data request. The function and sub-function codes are also echoed.

Response	
Field Name	Example (Hex)
AccuLoad Address	11
Function	08
Sub-function Hi	00
Sub-function Lo	00
Data Hi	A5
Data Lo	37
Error Check (CRC)	--

Subfunction "00", Return Query Data

A normal response to the data passed in the query data field is an echo of the original message.

Sub-function	Data Field (Query)	Data Field (Response)
0x0000	Any	Echo Query Data

15 (0F Hex) Force Multiple Relays

Description

Forces each relay in a sequence of relays to either ON or OFF. The maximum number of parameters by AccuLoad III is limited to 256 per query.

Query

The query message specifies the relay references to be forced. Relays are addressed starting at zero; thus, relay 1 is addressed as 0.

The contents of the query data field specify whether a state is ON or OFF. A logical "1" in a bit position of the field requests the corresponding relay to be ON. A logical "0" requests that the relay be OFF.

An example of a request to force a series of ten relays starting at address 19, or 13 hex in AccuLoad 17, appears below.

The query data content consists of two bytes: CD 01 hex (1100 1101 0000 0001 binary). The binary bits correspond to the relays as shown below.

Bit:	1	1	0	0	1	1	0	1	0	0	0	0	0	0	0	1
Re- lay:	26	25	24	23	22	21	20	19	-	-	-	-	-	-	28	27

The first byte transmitted (CD hex) addresses relays 26 through 19, with the least significant bit corresponding to the lowest relay (19) in this set.

The next byte transmitted (01 hex) addresses relays 28 to 27, with the least significant bit corresponding to the lowest relay (27) in this set. Unused bits in the last data byte are padded with zeros.

Query	
Field Name	Example (Hex)
AccuLoad Address	11
Function	0F
Relay Address Hi	00
Relay Address Lo	13
Quantity of Relays Hi	00
Quantity of Relays Lo	0A
Byte Count	02
Force Data Hi (Relays 27-20)	CD
Force Data Lo (Relays 29-28)	01
Error Check (CRC)	--

Response

The normal response consists of the slave address, function code, starting address, and number of relays forced.

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An example of a response to the preceding query appears below.

Response	
Field Name	Example (Hex)
AccuLoad Address	11
Function	0F
Relay Address Hi	00
Relay Address Lo	13
Quantity of Relays Hi	00
Quantity of Relays Lo	0A
Error Check (CRC)	--

16 (10 Hex) Preset Multiple Registers

Description

Presets values into a sequence of holding registers.

Query

The query message specifies the register references to be preset. Registers are addressed beginning with zero.

An example of a request to preset two registers starting at 1 to 00 0A and 01 02 hex, in AccuLoad 17, appears below.

Query	
Field Name	Example (Hex)
AccuLoad Address	11
Function	10
Starting Address Hi	00
Starting Address Lo	01
No. of Registers Hi	00
No. of Registers Lo	02
Byte Count	02
Data Hi	00
Data Lo	0A
Data Hi	01
Data Lo	02
Error Check (CRC)	--

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Response

A normal response consists of the slave address, function code, starting address, and quantity of registers preset.

An example of a response to the preceding query appears below.

Response	
Field Name	Example (Hex)
AccuLoad Address	11
Function	10
Starting Address Hi	00
Starting Address Lo	01
No. of Registers Hi	00
No. of Registers Lo	02
Error Check (CRC)	--

Exception Responses

When a master device sends a query to an AccuLoad device, there are three possible outcomes:

1. The AccuLoad receives the query with no communication errors, handles the query normally, and returns a normal response.
2. A communication error bars the AccuLoad from receiving the query, so no response is returned. The master program eventually processes a timeout condition for the query.
3. The AccuLoad receives the query without error, but returns no response. The master program eventually processes a timeout condition for the query.

Two fields in the exception response message differentiate it from a normal response:

Function Code Field: An AccuLoad normally echoes the function code of the original query in the function code field of the response. Because the values of all function codes are below 80 hexadecimal, all function codes have a most-significant bit (MSB) of 0. In an exception response, however, the slave sets the MSB of the function code to 1. The value of the function code in an exception response is therefore 80 hexadecimal higher than the value for a normal response.

Accordingly, the application program controlling the master can quickly recognize the exception response and derive the exception code from the data field.

Data Field: A normal response consists of any data or statistics in the data field requested by the query. An exception response consists of an exception code in the data field. The code indicates the AccuLoad condition that caused the exception.

An example of a master query and AccuLoad exception response is shown in the table below. The field examples are given in hexadecimal.

Query		
Byte	Contents	Example
1	AccuLoad Address	0A
2	Function	01
3	Starting Address Hi	04
4	Starting Address Lo	A1
5	No. of Relays Hi	00
6	No. of Relays Lo	01
7	CRC	--
Exception Response		
Byte	Contents	Example
1	AccuLoad Address	0A
2	Function	81
3	Exception Code	02
4	CRC	--

Here, the master addresses a query to AccuLoad 10 (10A hex). The function code (01) is for a Read Relay Status operation that requests the status of the relay at address 1245 (04A1 hex). The number of relays field (0001) specifies that only one relay is to be read.

If the relay address is absent in the AccuLoad device, the AccuLoad will return the exception response with the exception code shown (02). This response indicates an invalid data address for the AccuLoad.

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A listing of the exception codes appears below.

Code	Name	Meaning
01	Illegal Function	The function code received in the query is not an allowable action for the slave. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
02	Illegal Data Address	The data address received in the query is not an allowable address for the AccuLoad.
03	Illegal Data Value	A value contained in the query data field is not an allowable value for the AccuLoad.
04	AccuLoad Failure	An unrecoverable error occurred while the AccuLoad was attempting to perform the requested action.

Contents of the Data Field

The data field consists of sets of two hexadecimal digits, in the range of 00 to FF hexadecimal.

The AccuLoad reads the data field sent by the master to perform the actions indicated by the function code. The data field contains information such as discrete and register addresses, the number of items to be handled, and the count of actual data bytes in the field.

If, for example, the master directs an AccuLoad to read a group of holding registers (function code 03), the data field sent by the master must also indicate the starting register and the number of registers to be read. If the master writes to a group of registers in the slave (function code 10 hexadecimal), the data field sent by the master must also indicate the starting register, the number of registers to be written, the count of data bytes to follow in the data field, and the data to be written into the registers.

Assuming that no error in communication interferes, the data field of a response from a slave to a master contains the requested data. If an error does occur, the field contains an exception code that the application controlling the master can use to determine the next action to be taken.

Beginning Register

This register identifies the beginning register from which the master is requesting information. This two-byte field lists the most significant digit first and the least significant digit last.

Number of Requested Registers

This field identifies the number of consecutive registers from which the master is requesting information. This two-byte field lists the most significant digit first and the least significant digit last. The response is limited to 250 bytes of information.

Error Check (CRC16)

This field allows the AccuLoad III and the supervisory system to check for errors in the transmission of commands and responses. Electrical noise or other interference may cause changes in transmitted data. The capacity to check for errors prevents the receiving device from responding to a message that has changed.

Error-checking in RTU mode is built on the Cyclical Redundancy Check (CRC) method. The entire message is subject to scrutiny by the CRC field, and the CRC is applied regardless of any other parity check method that might be in effect.

The CRC consists of a two-byte field containing a 16-bit binary value. The transmitting device calculates the CRC value and adds the CRC to the message. The receiving device then recalculates the CRC when the message is received, and compares the first value with the second. An error results when the two message values are unequal.

The CRC is initiated by pre-loading a 16-bit register to all 1's. Successive 8-bit bytes of the message are then applied to the current contents of the register. The CRC is generated only by the eight bits of data in each character. Start and stop bits, and the parity bit if one is used, are not taken into account.

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When the CRC is generated, each 8-bit character is exclusive ORed with the register contents. The result is then shifted toward the least significant bit (LSB), and a zero added to the most significant bit (MSB) position. The LSB is extracted and examined. Assuming the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, there will be no exclusive OR.

The process consists of eight shifts. After the eighth and final shift, the next 8-bit byte is exclusive ORed with the register's current value. The process is then repeated for an additional eight shifts. The final content of the register, after all the bytes of the message have been applied, is the CRC value.

Placing the CRC into the Message

When the 16-bit CRC (2 8-bit bytes) is transmitted in the message, the low-order byte will be transmitted first, followed by the high-order byte. For example, if the CRC value is 1241 hex (0001 0010 0100 0001):

Addr	Func	Data Count	Data	Data	Data	Data	CRC Lo	CRC Hi
------	------	---------------	------	------	------	------	-----------	-----------

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Field Contents in Modbus™ Messages

Examples of a Modbus™ query message and normal response are shown in the tables on the following page. The field contents in both examples are displayed in hexadecimal.

In this example, the master sends a Read Holding Registers request to AccuLoad address 06. The AccuLoad is specifically directed to return data from three holding registers, starting with address 0107 (006B hex).

As is the case in any normal response, the AccuLoad first echoes the function code sent by the master. The AccuLoad then transmits the byte count field, indicating the number of 8-bit data items being returned. Finally, the AccuLoad returns the 8-bit bytes containing the requested data.

How to Use the Byte Count Field: When constructing responses in buffers, use a byte count value that equals the count of 8-bit bytes in the message data. The value is exclusive of all other field contents, including the byte count field. The AccuLoad response example illustrates a typical byte count field in a normal response.

Section III – AccuLoad III Modbus™ Data and Control Functions

Master Query		
Field Name	Example (Hex)	RTU 8-Bit Field
Header		None
AccuLoad Address	06	0000 0110
Function	03	0000 0011
Starting Address Hi	00	0000 0000
Starting Address Lo	6B	0110 1011
No. of Registers Hi	00	0000 0000
No. of Registers Lo	03	0000 0011
Error Check		CRC (16 bits)
	Total Bytes:	8

AccuLoad Response		
Field Name	Example (Hex)	RTU 8-Bit Field
Header		None
AccuLoad Address	06	0000 0110
Function	03	0000 0011
Byte Count	06	0000 0110
Data Hi	02	0000 0010
Data Lo	2B	0010 1011
Data Hi	00	0000 0000
Data Lo	00	0000 0000
Data Hi	00	0000 0000
Data Lo	63	0110 0011
Error Check		CRC (16 bits)
	Total Bytes:	11

The AccuLoad III monitors the amount of time between the receipt of characters. If three and one-half character times elapse without the AccuLoad III seeing a new character or the end of a frame, the message is flushed and the next characters received will be viewed as an address. If the address is for that AccuLoad III, it will respond. If the address is not for that AccuLoad III, the message will be flushed and it will look for the next message.

Address

The address is the first field in the frame and consists of one byte (eight bits) of information. The address is the unique identification of the AccuLoad III (slave) that is to receive the message that is sent via the supervisory system (master). Each AccuLoad III address must be unique so that only the addressed slave will respond to a query. The address is also part of the response message sent back to the master from the AccuLoad III when data is requested. By returning the address as part of the response, the master can tell which of the AccuLoads the data is coming from.

Response to the Read Only Message

The first two fields of the response to the read only message are identical to the command. The AccuLoad III returns the address and the function code that was transmitted to the unit. The next field is the byte count.

Byte Count

The byte count is sent to the master (supervisory system) indicating how much data is being sent from the AccuLoad III. In the example shown, the command requested data from these registers and each register contains two bytes of data.

Data Register

Each of the data registers of unsigned characters contains two bytes of data. The response message returns the data with the most significant byte of data first and the least significant byte second. Data can be requested and returned from a number of registers with a single interrogation message. The limit on the amount of data returned from the AccuLoad III to the master is 256 bytes. The data lengths for the data types currently used by the AccuLoad III are as follows:

Section III – AccuLoad III Modbus™ Data and Control Functions

Data Length	
Type	Binary
Double	8 bytes
Integer	8 bytes
Long Integer	4 bytes
Text String	Variable length
Character	1 byte
CRC-16	2 bytes
Float	4 bytes
Unsigned Integer	2 bytes
Unsigned long	4 bytes
Unsigned character	1 byte

The error-checking sequence is the same as described in the paragraph under Read Only Message.

Changing Program Mode Parameters

Writing to Program Mode parameters requires a special procedure. Only one source (comm port or keypad) may be in Program Mode on the AccuLoad III-S at any one time; therefore, the following procedure must be followed to make Program Mode changes via Modbus.

1. Set the Program Mode result to "OK" (function 6 or 16, address 31746, data 0). This instructs the AccuLoad III-S to accept new Program Mode change commands.
2. Change all desired program codes.
3. Issue a "Program Mode logout and save changes" command (function 6 or 16, address 31744, data 1). Or, discard the changes made since the last "logout" by writing data 2.
4. Read the Program Mode state (function 3, address 31745). "0" = not in Program Mode via this port. "1" = preempted (the keypad seized control and all changes made via this port since the last logout were lost). 2 = currently checking criticals. Once criticals checking is done (state is not "2"), the AccuLoad III-S has exited Program Mode. Program Mode state may be examined at any time and reflects the state of Program Mode concerning this port.

5. Read the Program Mode result (function 3, address 31746) to determine if the program changes were successfully accepted. "0" = ok, "1" = preempted by the keypad (all recent changes lost). "2" = criticals exist. "3" = reset; this port has been reset, and any pending changes are lost.

Floating Point Endian Control

Floating point numbers are not defined in the Modbus™ specification; there are nearly as many variations of how it is supported as there are vendors. Most often, Modbus™ registers are combined sequentially to make up an IEEE single precision or double precision floating point number; this is the case in the AccuLoad III-S. Two registers are needed for single precision and four for double precision numbers. There are, however, many ways in which the bytes of the numbers are mapped into the Modbus™ data words. To enhance the connectivity of the AccuLoad III-S, three popular variations of the "byte order" for floating point numbers are supported (see program code 762).

The AccuLoad III-S will return the single precision representation for PI (3.14159...) using function 3 addresses 31802 and 31803. Registers 31804 through 31807 represent the double precision representation of PI. These registers are useful for setting up a compatible byte order for various Modbus™ host drivers; simply program the host to display these registers as appropriate floats, and change program code 762 until PI appears.

Modbus™ Addressing Range

The AccuLoad III-S utilizes the full addressing range allowed by the Modbus™ specification (0 through 65535). Some supervisory computer Modbus™ driver packages artificially limit the addressing range; these host drivers are not recommended for use with the AccuLoad III-S.

Section III – AccuLoad III Modbus™ Data and Control Functions

Example 1

Command Message: Clear User Alarm 3
 AccuLoad III Address: 01
 Function Code: 05
 Register Number: 1038
 Data: 65280 (0xFF00, force coil "on")

WRITE Coil							
Interrogation Message							
Address	Function Code	Register Address (MSB)	Register Address (LSB)	Force Data (MSB)	Force Data (LSB)	CRC16 (LSB)	CRC16 (MSB)
0x01	0x05	0x04	0x0E	0xFF	0x00	0xEC	0xC9

Response Message:

WRITE Coil							
Response Message							
Address	Function Code	Register Address (MSB)	Register Address (LSB)	Force Data (MSB)	Force Data (LSB)	CRC16 (LSB)	CRC16 (MSB)
0x01	0x05	0x04	0x0E	0xFF	0x00	0xEC	0xC9

Example 2

Command Message: Clear User Alarms 1, 6, and 9
 AccuLoad III Address: 01
 Function Code: 15
 Starting Register Number: 1036
 Number of Registers: 16
 Data: 0x19 (bit packed data, binary 00100001 and 00000001, corresponding to user alarm map xx6xxxx1, xxxxxxx9)

WRITE Coil (multiple)										
Interrogation Message										
Ad- dress	Func- tion Code	Register Address (MSB)	Register Address (LSB)	Quantity of Registers (MSB)	Quantity of Registers (LSB)	Byte Count	Data	Data	CRC16 (LSB)	CRC16 (MSB)
0x01	0x0F	0x04	0x0C	0x00	0x10	0x02	0x21	0x01	0x7E	0xBC

Section III – AccuLoad III Modbus™ Data and Control Functions

Response Message:

WRITE Coil (multiple)							
Response Message							
Address	Function Code	Register Address (MSB)	Register Address (LSB)	Number of Registers (MSB)	Number of Registers (LSB)	CRC16 (LSB)	CRC16 (MSB)
0x01	0x0F	0x04	0x0C	0x00	0x10	0x95	0x34

Example 3

Interrogation Message: Read the meter K factor (program code "product 301")

AccuLoad III Address: 01

Function Code: 03 (Read Holding Registers)

Beginning Register Number: 10368

Number of Registers: 2

READ HOLDING REGISTERS							
Interrogation Message							
Address	Function Code	Beginning Register (MSB)	Beginning Register (LSB)	Number of Req. Regs (MSB)	Number of Req. Regs (LSB)	CRC16 (LSB)	CRC16 (MSB)
0x01	0x03	0x28	0x80	0x00	0x02	0xCC	0x43

Response Message: K factor = 100.0 (note: AccuLoad host communications set to "Little 8" endian)

AccuLoad III Address: 01

Function Code: 03 (Read Holding Registers)

Byte Count: 04

READ HOLDING REGISTERS								
Response Message								
Address	Function Code	Byte Count	MSB of the First Data Reg.	LSB of the First Data Reg.	MSB of the Second Data Reg.	LSB of the Second Data Reg.	CRC16 (LSB)	CRC16 (MSB)
0x01	0x03	0x04	0x00	0x00	0xC8	0x42	0x2D	0xC2

Section III – AccuLoad III Modbus™ Data and Control Functions

Example 4

Interrogation Message: Write the value 1 to Boolean/Algebraic Boolean User Variable #1

AccuLoad III Address: 01

Function Code: 06 (Write a Holding Register)

Beginning Register Number: 24576

Number of Registers: 1

WRITE HOLDING REGISTER							
Interrogation Message							
Address	Function Code	Beginning Register (MSB)	Beginning Register (LSB)	Number of Req. Regs (MSB)	Number of Req. Regs (LSB)	CRC16 (LSB)	CRC16 (MSB)
0x01	0x06	0x60	0x00	0x00	0x01	0x56	0x0A

Response Message:

AccuLoad III Address: 01

Function Code: 06 (Write a Holding Register)

Beginning Register Number: 24576

Number of Registers: 1

WRITE HOLDING REGISTER							
Response Message							
Address	Function Code	Beginning Register (MSB)	Beginning Register (LSB)	Number of Req. Regs (MSB)	Number of Req. Regs (LSB)	CRC16 (LSB)	CRC16 (MSB)
0x01	0x06	0x60	0x00	0x00	0x01	0x56	0x0A

Section III – AccuLoad III Modbus™ Data and Control Functions

Example 5

Interrogation Message: Write the value 10.0 to Boolean/Algebraic User Float Variable #1

AccuLoad III Address: 01

Function Code: 16 (Write Multiple Registers)

Beginning Register Number: 23552

Number of Registers: 2

WRITE HOLDING REGISTER (MULTIPLE)												
Interrogation Message												
Ad- dress	Func- tion Code	Begin- ning Reg MSB	Begin- ning Reg LSB	No. Regs MSB	No. Regs LSB	Byte Count	Data Reg 1 MSB	Data Reg 1 LSB	Data Reg 2 MSB	Data Reg 2 LSB	CRC 16 LSB	CRC 16 MSB
0x01	0x10	0x5C	0x00	0x00	0x02	0x04	0x00	0x00	0x20	0x41	0x83	0x5C

Response Message:

AccuLoad III Address: 01

Function Code: 16

WRITE HOLDING REGISTER (MULTIPLE)							
Response Message							
Address	Function Code	Beginning Reg MSB	Beginning Reg LSB	No. Regs MSB	No. Regs LSB	CRC16 LSB	CRC16 MSB
0x01	0x10	0x5C	0x00	0x00	0x02	0x53	0x98

Section IV – Tables

Modbus™ Mapping of Function Codes 01, 05, and 15 Read/Write Control Bits (Read/Force Relay)

Note: Currently, all the points in this map are "Write Only." Reading these points will return "0" (off).

Modbus™ Address	Data Set	Data Point	0 State	1 State
0	Extended Services	Packet submission control	No action	Submit extended services buffer for processing (see the "Extended Services" section of this manual for detailed information on accessing these functions.
1024	System Alarms	communications error alarm	no action	clear this alarm
1025	System Alarms	ROM (software) bad selfcheck alarm	no action	clear this alarm
1026	System Alarms	RAM (memory) bad selfcheck alarm	no action	clear this alarm
1027	System Alarms	FLASH (nonvolatile memory) error alarm	no action	clear this alarm
1028	System Alarms	watchdog alarm	no action	clear this alarm
1029	System Alarms	system programming error alarm	no action	clear this alarm
1030	System Alarms	EAAI (I/O) board failure alarm	no action	clear this alarm
1031	System Alarms	pass codes reset	no action	clear this alarm
1032	System Alarms	system overrun alarm	no action	clear this alarm
1033	System Alarms	powerfail alarm	no action	clear this alarm
1034	System Alarms	shared printer alarm	no action	clear this alarm
1035	System Alarms	system zero flow alarm	no action	clear this alarm
1036	System Alarms	user alarm #1	no action	clear this alarm
1037	System Alarms	user alarm #2	no action	clear this alarm
1038	System Alarms	user alarm #3	no action	clear this alarm
1039	System Alarms	user alarm #4	no action	clear this alarm
1040	System Alarms	user alarm #5	no action	clear this alarm
1041	System Alarms	user alarm #6	no action	clear this alarm
1042	System Alarms	user alarm #7	no action	clear this alarm
1043	System Alarms	user alarm #8	no action	clear this alarm
1044	System Alarms	user alarm #9	no action	clear this alarm
1045	System Alarms	user alarm #10	no action	clear this alarm
1046	System Alarms	power up RAM corrupt	no action	clear this alarm

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Modbus™ Address	Data Set	Data Point	0 State	1 State
1047	System Alarms	power up flash corrupt	no action	clear this alarm
1048	System Alarms	power up error	no action	clear this alarm
1049	System Alarms	additive clean line	no action	clear this alarm
1050	System Alarms	ticket alarm	no action	clear this alarm
1051	System Alarms	Civacon alarm	no action	clear this alarm
1536	Product Alarms	back pressure alarm	no action	clear this alarm
1537	Product Alarms	product programming error alarm	no action	clear this alarm
1538	Product Alarms	density transducer failure alarm	no action	clear this alarm
1539	Product Alarms	high density alarm	no action	clear this alarm
1540	Product Alarms	high flow alarm	no action	clear this alarm
1541	Product Alarms	high pressure alarm	no action	clear this alarm
1542	Product Alarms	high temperature alarm	no action	clear this alarm
1543	Product Alarms	low density alarm	no action	clear this alarm
1544	Product Alarms	low flow alarm	no action	clear this alarm
1545	Product Alarms	low pressure alarm	no action	clear this alarm
1546	Product Alarms	low temperature alarm	no action	clear this alarm
1547	Product Alarms	transmitter integrity	no action	clear this alarm
1548	Product Alarms	pressure transducer failure alarm	no action	clear this alarm
1549	Product Alarms	pulse security alarm	no action	clear this alarm
1550	Product Alarms	temperature transducer failure alarm	no action	clear this alarm
1551	Product Alarms	valve fault alarm	no action	clear this alarm
2048	Injector Alarms	inj #1 additive feedback error	no action	clear this alarm
2049	Injector Alarms	inj #1 additive communications error	no action	clear this alarm
2050	Injector Alarms	inj #1 low additive	no action	clear this alarm
2051	Injector Alarms	inj #1 high additive	no action	clear this alarm
2052	Injector Alarms	inj #1 no additive	no action	clear this alarm
2053	Injector Alarms	inj #1 additive frequency	no action	clear this alarm
2054	Injector Alarms	inj #1 unauthorize failed	no action	clear this alarm
2055	Injector Alarms	inj #1 general additive alarm	no action	clear this alarm

Section IV – Tables

Modbus™ Address	Data Set	Data Point	0 State	1 State
2056	Injector Alarms	inj #1 over speed meter injector	no action	clear this alarm
2057	Injector Alarms	inj #1 injector command refused	no action	clear this alarm
2112	Injector Alarms	inj #2 additive feedback error	no action	clear this alarm
2113	Injector Alarms	inj #2 additive communications error	no action	clear this alarm
2114	Injector Alarms	inj #2 low additive	no action	clear this alarm
2115	Injector Alarms	inj #2 high additive	no action	clear this alarm
2116	Injector Alarms	inj #2 no additive	no action	clear this alarm
2117	Injector Alarms	inj #2 additive frequency	no action	clear this alarm
2118	Injector Alarms	inj #2 unauthorize failed	no action	clear this alarm
2119	Injector Alarms	inj #2 general additive alarm	no action	clear this alarm
2120	Injector Alarms	inj #2 over speed meter injector	no action	clear this alarm
2121	Injector Alarms	inj #2 injector command refused	no action	clear this alarm
2176	Injector Alarms	inj #3 additive feedback error	no action	clear this alarm
2177	Injector Alarms	inj #3 additive communications error	no action	clear this alarm
2178	Injector Alarms	inj #3 low additive	no action	clear this alarm
2179	Injector Alarms	inj #3 high additive	no action	clear this alarm
2180	Injector Alarms	inj #3 no additive	no action	clear this alarm
2181	Injector Alarms	inj #3 additive frequency	no action	clear this alarm
2182	Injector Alarms	inj #3 unauthorize failed	no action	clear this alarm
2183	Injector Alarms	inj #3 general additive alarm	no action	clear this alarm
2184	Injector Alarms	inj #3 over speed meter injector	no action	clear this alarm
2185	Injector Alarms	inj #3 injector command refused	no action	clear this alarm
2240	Injector Alarms	inj #4 additive feedback error	no action	clear this alarm
2241	Injector Alarms	inj #4 additive communications error	no action	clear this alarm
2242	Injector Alarms	inj #4 low additive	no action	clear this alarm

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Modbus™ Address	Data Set	Data Point	0 State	1 State
2243	Injector Alarms	inj #4 high additive	no action	clear this alarm
2244	Injector Alarms	inj #4 no additive	no action	clear this alarm
2245	Injector Alarms	inj #4 additive frequency	no action	clear this alarm
2246	Injector Alarms	inj #4 unauthorize failed	no action	clear this alarm
2247	Injector Alarms	inj #4 general additive alarm	no action	clear this alarm
2248	Injector Alarms	inj #4 over speed meter injector	no action	clear this alarm
2249	Injector Alarms	inj #4 injector command refused	no action	clear this alarm
2304	Injector Alarms	inj #5 additive feedback error	no action	clear this alarm
2305	Injector Alarms	inj #5 additive communications error	no action	clear this alarm
2306	Injector Alarms	inj #5 low additive	no action	clear this alarm
2307	Injector Alarms	inj #5 high additive	no action	clear this alarm
2308	Injector Alarms	inj #5 no additive	no action	clear this alarm
2309	Injector Alarms	inj #5 additive frequency	no action	clear this alarm
2310	Injector Alarms	inj #5 unauthorize failed	no action	clear this alarm
2311	Injector Alarms	inj #5 general additive alarm	no action	clear this alarm
2312	Injector Alarms	inj #5 over speed meter injector	no action	clear this alarm
2313	Injector Alarms	inj #5 injector command refused	no action	clear this alarm
2368	Injector Alarms	inj #6 additive feedback error	no action	clear this alarm
2369	Injector Alarms	inj #6 additive communications error	no action	clear this alarm
2370	Injector Alarms	inj #6 low additive	no action	clear this alarm
2371	Injector Alarms	inj #6 high additive	no action	clear this alarm
2372	Injector Alarms	inj #6 no additive	no action	clear this alarm
2373	Injector Alarms	inj #6 additive frequency	no action	clear this alarm
2374	Injector Alarms	inj #6 unauthorize failed	no action	clear this alarm
2375	Injector Alarms	inj #6 general additive alarm	no action	clear this alarm
2376	Injector Alarms	inj #6 over speed meter injector	no action	clear this alarm

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Modbus™ Address	Data Set	Data Point	0 State	1 State
2377	Injector Alarms	inj #6 injector command refused	no action	clear this alarm
2432	Injector Alarms	inj #7 additive feedback error	no action	clear this alarm
2433	Injector Alarms	inj #7 additive communications error	no action	clear this alarm
2434	Injector Alarms	inj #7 low additive	no action	clear this alarm
2435	Injector Alarms	inj #7 high additive	no action	clear this alarm
2436	Injector Alarms	inj #7 no additive	no action	clear this alarm
2437	Injector Alarms	inj #7 additive frequency	no action	clear this alarm
2438	Injector Alarms	inj #7 unauthorize failed	no action	clear this alarm
2439	Injector Alarms	inj #7 general additive alarm	no action	clear this alarm
2440	Injector Alarms	inj #7 over speed meter injector	no action	clear this alarm
2441	Injector Alarms	inj #7 injector command refused	no action	clear this alarm
2496	Injector Alarms	inj #8 additive feedback error	no action	clear this alarm
2497	Injector Alarms	inj #8 additive communications error	no action	clear this alarm
2498	Injector Alarms	inj #8 low additive	no action	clear this alarm
2499	Injector Alarms	inj #8 high additive	no action	clear this alarm
2500	Injector Alarms	inj #8 no additive	no action	clear this alarm
2501	Injector Alarms	inj #8 additive frequency	no action	clear this alarm
2502	Injector Alarms	inj #8 unauthorize failed	no action	clear this alarm
2503	Injector Alarms	inj #8 general additive alarm	no action	clear this alarm
2504	Injector Alarms	inj #8 over speed meter injector	no action	clear this alarm
2505	Injector Alarms	inj #8 injector command refused	no action	clear this alarm
2560	Injector Alarms	inj #9 additive feedback error	no action	clear this alarm
2561	Injector Alarms	inj #9 additive communications error	no action	clear this alarm
2562	Injector Alarms	inj #9 low additive	no action	clear this alarm
2563	Injector Alarms	inj #9 high additive	no action	clear this alarm
2564	Injector Alarms	inj #9 no additive	no action	clear this alarm

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Modbus™ Address	Data Set	Data Point	0 State	1 State
2565	Injector Alarms	inj #9 additive frequency	no action	clear this alarm
2566	Injector Alarms	inj #9 unauthorize failed	no action	clear this alarm
2567	Injector Alarms	inj #9 general additive alarm	no action	clear this alarm
2568	Injector Alarms	inj #9 over speed meter injector	no action	clear this alarm
2569	Injector Alarms	inj #9 injector command refused	no action	clear this alarm
2624	Injector Alarms	inj #10 additive feedback error	no action	clear this alarm
2625	Injector Alarms	inj #10 additive communications error	no action	clear this alarm
2626	Injector Alarms	inj #10 low additive	no action	clear this alarm
2627	Injector Alarms	inj #10 high additive	no action	clear this alarm
2628	Injector Alarms	inj #10 no additive	no action	clear this alarm
2629	Injector Alarms	inj #10 additive frequency	no action	clear this alarm
2630	Injector Alarms	inj #10 unauthorize failed	no action	clear this alarm
2631	Injector Alarms	inj #10 general additive alarm	no action	clear this alarm
2632	Injector Alarms	inj #10 over speed meter injector	no action	clear this alarm
2633	Injector Alarms	inj #10 injector command refused	no action	clear this alarm
2688	Injector Alarms	inj #11 additive feedback error	no action	clear this alarm
2689	Injector Alarms	inj #11 additive communications error	no action	clear this alarm
2690	Injector Alarms	inj #11 low additive	no action	clear this alarm
2691	Injector Alarms	inj #11 high additive	no action	clear this alarm
2692	Injector Alarms	inj #11 no additive	no action	clear this alarm
2693	Injector Alarms	inj #11 additive frequency	no action	clear this alarm
2694	Injector Alarms	inj #11 unauthorize failed	no action	clear this alarm
2695	Injector Alarms	inj #11 general additive alarm	no action	clear this alarm
2696	Injector Alarms	inj #11 over speed meter injector	no action	clear this alarm
2697	Injector Alarms	inj #11 injector command refused	no action	clear this alarm

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Modbus™ Address	Data Set	Data Point	0 State	1 State
2752	Injector Alarms	inj #12 additive feedback error	no action	clear this alarm
2753	Injector Alarms	inj #12 additive communications error	no action	clear this alarm
2754	Injector Alarms	inj #12 low additive	no action	clear this alarm
2755	Injector Alarms	inj #12 high additive	no action	clear this alarm
2756	Injector Alarms	inj #12 no additive	no action	clear this alarm
2757	Injector Alarms	inj #12 additive frequency	no action	clear this alarm
2758	Injector Alarms	inj #12 unauthorize failed	no action	clear this alarm
2759	Injector Alarms	inj #12 general additive alarm	no action	clear this alarm
2760	Injector Alarms	inj #12 over speed meter injector	no action	clear this alarm
2761	Injector Alarms	inj #12 injector command refused	no action	clear this alarm
3776	Digital Commands	General Purpose Output #1 Command	off	on
3840	Digital Commands	General Purpose Output #2 Command	off	on
3904	Digital Commands	General Purpose Output #3 Command	off	on
3968	Digital Commands	General Purpose Output #4 Command	off	on
4032	Digital Commands	General Purpose Output #5 Command	off	on
4096	Digital Commands	General Purpose Output #6 Command	off	on
4160	Digital Commands	General Purpose Output #7 Command	off	on
4224	Digital Commands	General Purpose Output #8 Command	off	on
4288	Digital Commands	General Purpose Output #9 Command	off	on
4352	Digital Commands	General Purpose Output #10 Command	off	on
4416	Digital Commands	General Purpose Output #11 Command	off	on

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Modbus™ Address	Data Set	Data Point	0 State	1 State
4480	Digital Commands	General Purpose Output #12 Command	off	on
4544	Digital Commands	General Purpose Output #13 Command	off	on
4608	Digital Commands	General Purpose Output #14 Command	off	on

Section IV – Tables

Modbus™ Mapping of Function Code 02 Read Information Bits (Read Input Status)

Note: These registers correspond to Boolean Data.

Modbus™ Address	Data Set	Data Point	0 State	1 State
0	Transaction	accuload authorized	no	yes
1	Transaction	accuload released	no	yes
2	Transaction	transaction in progress	no	yes
3	Transaction	batch done	no	yes
4	Transaction	transaction done	no	yes
5	Transaction	in program mode	no	yes
6	Transaction	keypad data pending	no	yes
7	Transaction	delayed prompt in effect	no	yes
8	Transaction	display message timed out	no	yes
9	Transaction	alarm condition	no	yes
10	Transaction	checking program mode entries	no	yes
11	Transaction	start stop delay	no	yes
12	Transaction	injectors authorized	no	yes
13	Transaction	proving in progress	no	yes
14	Transaction	product flowing	no	yes
15	Transaction	program value changed	no	yes
16	Transaction	power fail occurred	no	yes
17	Transaction	product was flowing (accu 1 latched flag)	no	yes
1024	Digital I/O #1	state, input #1	off	on
1088	Digital I/O #2	state, input #2	off	on
1152	Digital I/O #3	state, input #3	off	on
1216	Digital I/O #4	state, input #4	off	on
1280	Digital I/O #5	state, input #5	off	on
1344	Digital I/O #6	state, input #6	off	on
1408	Digital I/O #7	state, input #7	off	on
1472	Digital I/O #8	state, input #8	off	on
1536	Digital I/O #9	state, input #9	off	on
1600	Digital I/O #10	state, input #10	off	on
1664	Digital I/O #11	state, input #11	off	on

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Modbus™ Address	Data Set	Data Point	0 State	1 State
1728	Digital I/O #12	state, output #1	off	on
1792	Digital I/O #13	state, output #2	off	on
1856	Digital I/O #14	state, output #3	off	on
1920	Digital I/O #15	state, output #4	off	on
1984	Digital I/O #16	state, output #5	off	on
2048	Digital I/O #17	state, output #6	off	on
2112	Digital I/O #18	state, output #7	off	on
2176	Digital I/O #19	state, output #8	off	on
2240	Digital I/O #20	state, output #9	off	on
2304	Digital I/O #21	state, output #10	off	on
2368	Digital I/O #22	state, output #11	off	on
2432	Digital I/O #23	state, output #12	off	on
2496	Digital I/O #24	state, output #13	off	on
2560	Digital I/O #25	state, output #14	off	on
3072	System Alarms	communications error alarm	inactive	active
3073	System Alarms	ROM (software) bad selfcheck alarm	inactive	active
3074	System Alarms	RAM (memory) bad selfcheck alarm	inactive	active
3075	System Alarms	FLASH (nonvolatile memory) error alarm	inactive	active
3076	System Alarms	watchdog alarm	inactive	active
3077	System Alarms	system programming error alarm	inactive	active
3078	System Alarms	EAAI (I/O) board failure alarm	inactive	active
3079	System Alarms	pass codes reset	inactive	active
3080	System Alarms	system overrun alarm	inactive	active
3081	System Alarms	powerfail alarm	inactive	active
3082	System Alarms	shared printer alarm	inactive	active
3083	System Alarms	system zero flow alarm	inactive	active
3084	System Alarms	user alarm #1	inactive	active
3085	System Alarms	user alarm #2	inactive	active
3086	System Alarms	user alarm #3	inactive	active
3087	System Alarms	user alarm #4	inactive	active

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Modbus™ Address	Data Set	Data Point	0 State	1 State
3088	System Alarms	user alarm #5	inactive	active
3089	System Alarms	user alarm #6	inactive	active
3090	System Alarms	user alarm #7	inactive	active
3091	System Alarms	user alarm #8	inactive	active
3092	System Alarms	user alarm #9	inactive	active
3093	System Alarms	user alarm #10	inactive	active
3094	System Alarms	power up RAM corrupt	inactive	active
3095	System Alarms	power up flash corrupt	inactive	active
3096	System Alarms	power up error	inactive	active
3097	System Alarms	additive clean line	inactive	active
3098	System Alarms	ticket alarm	inactive	active
3099	System Alarms	Civacon alarm	inactive	active
3584	Product Alarms	back pressure alarm	inactive	active
3585	Product Alarms	product programming error alarm	inactive	active
3586	Product Alarms	density transducer failure alarm	inactive	active
3587	Product Alarms	high density alarm	inactive	active
3588	Product Alarms	high flow alarm	inactive	active
3589	Product Alarms	high pressure alarm	inactive	active
3590	Product Alarms	high temperature alarm	inactive	active
3591	Product Alarms	low density alarm	inactive	active
3592	Product Alarms	low flow alarm	inactive	active
3593	Product Alarms	low pressure alarm	inactive	active
3594	Product Alarms	low temperature alarm	inactive	active
3595	Product Alarms	transmitter integrity	inactive	active
3596	Product Alarms	pressure transducer failure alarm	inactive	active
3597	Product Alarms	pulse security alarm	inactive	active
3598	Product Alarms	temperature transducer failure alarm	inactive	active
3599	Product Alarms	valve fault alarm	inactive	active
4096	Injector Alarms	inj #1 additive feedback error	inactive	active
4097	Injector Alarms	inj #1 additive communications error	inactive	active

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Modbus™ Address	Data Set	Data Point	0 State	1 State
4098	Injector Alarms	inj #1 low additive	inactive	active
4099	Injector Alarms	inj #1 high additive	inactive	active
4100	Injector Alarms	inj #1 no additive	inactive	active
4101	Injector Alarms	inj #1 additive frequency	inactive	active
4102	Injector Alarms	inj #1 unauthorize failed	inactive	active
4103	Injector Alarms	inj #1 general additive alarm	inactive	active
4104	Injector Alarms	inj #1 over speed meter injector	inactive	active
4105	Injector Alarms	inj #1 injector command refused	inactive	active
4160	Injector Alarms	inj #2 additive feedback error	inactive	active
4161	Injector Alarms	inj #2 additive communications error	inactive	active
4162	Injector Alarms	inj #2 low additive	inactive	active
4163	Injector Alarms	inj #2 high additive	inactive	active
4164	Injector Alarms	inj #2 no additive	inactive	active
4165	Injector Alarms	inj #2 additive frequency	inactive	active
4166	Injector Alarms	inj #2 unauthorize failed	inactive	active
4167	Injector Alarms	inj #2 general additive alarm	inactive	active
4168	Injector Alarms	inj #2 over speed meter injector	inactive	active
4169	Injector Alarms	inj #2 injector command refused	inactive	active
4224	Injector Alarms	inj #3 additive feedback error	inactive	active
4225	Injector Alarms	inj #3 additive communications error	inactive	active
4226	Injector Alarms	inj #3 low additive	inactive	active
4227	Injector Alarms	inj #3 high additive	inactive	active
4228	Injector Alarms	inj #3 no additive	inactive	active
4229	Injector Alarms	inj #3 additive frequency	inactive	active
4230	Injector Alarms	inj #3 unauthorize failed	inactive	active
4231	Injector Alarms	inj #3 general additive alarm	inactive	active
4232	Injector Alarms	inj #3 over speed meter injector	inactive	active
4233	Injector Alarms	inj #3 injector command refused	inactive	active

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Modbus™ Address	Data Set	Data Point	0 State	1 State
4288	Injector Alarms	inj #4 additive feedback error	inactive	active
4289	Injector Alarms	inj #4 additive communications error	inactive	active
4290	Injector Alarms	inj #4 low additive	inactive	active
4291	Injector Alarms	inj #4 high additive	inactive	active
4292	Injector Alarms	inj #4 no additive	inactive	active
4293	Injector Alarms	inj #4 additive frequency	inactive	active
4294	Injector Alarms	inj #4 unauthorize failed	inactive	active
4295	Injector Alarms	inj #4 general additive alarm	inactive	active
4296	Injector Alarms	inj #4 over speed meter injector	inactive	active
4297	Injector Alarms	inj #4 injector command refused	inactive	active
4352	Injector Alarms	inj #5 additive feedback error	inactive	active
4353	Injector Alarms	inj #5 additive communications error	inactive	active
4354	Injector Alarms	inj #5 low additive	inactive	active
4355	Injector Alarms	inj #5 high additive	inactive	active
4356	Injector Alarms	inj #5 no additive	inactive	active
4357	Injector Alarms	inj #5 additive frequency	inactive	active
4358	Injector Alarms	inj #5 unauthorize failed	inactive	active
4359	Injector Alarms	inj #5 general additive alarm	inactive	active
4360	Injector Alarms	inj #5 over speed meter injector	inactive	active
4361	Injector Alarms	inj #5 injector command refused	inactive	active
4416	Injector Alarms	inj #6 additive feedback error	inactive	active
4417	Injector Alarms	inj #6 additive communications error	inactive	active
4418	Injector Alarms	inj #6 low additive	inactive	active
4419	Injector Alarms	inj #6 high additive	inactive	active
4420	Injector Alarms	inj #6 no additive	inactive	active
4421	Injector Alarms	inj #6 additive frequency	inactive	active
4422	Injector Alarms	inj #6 unauthorize failed	inactive	active
4423	Injector Alarms	inj #6 general additive alarm	inactive	active
4424	Injector Alarms	inj #6 over speed meter injector	inactive	active
4425	Injector Alarms	inj #6 injector command refused	inactive	active
4480	Injector Alarms	inj #7 additive feedback error	inactive	active

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Modbus™ Address	Data Set	Data Point	0 State	1 State
4481	Injector Alarms	inj #7 additive communications error	inactive	active
4482	Injector Alarms	inj #7 low additive	inactive	active
4483	Injector Alarms	inj #7 high additive	inactive	active
4484	Injector Alarms	inj #7 no additive	inactive	active
4485	Injector Alarms	inj #7 additive frequency	inactive	active
4486	Injector Alarms	inj #7 unauthorize failed	inactive	active
4487	Injector Alarms	inj #7 general additive alarm	inactive	active
4488	Injector Alarms	inj #7 over speed meter injector	inactive	active
4489	Injector Alarms	inj #7 injector command refused	inactive	active
4544	Injector Alarms	inj #8 additive feedback error	inactive	active
4545	Injector Alarms	inj #8 additive communications error	inactive	active
4546	Injector Alarms	inj #8 low additive	inactive	active
4547	Injector Alarms	inj #8 high additive	inactive	active
4548	Injector Alarms	inj #8 no additive	inactive	active
4549	Injector Alarms	inj #8 additive frequency	inactive	active
4550	Injector Alarms	inj #8 unauthorize failed	inactive	active
4551	Injector Alarms	inj #8 general additive alarm	inactive	active
4552	Injector Alarms	inj #8 over speed meter injector	inactive	active
4553	Injector Alarms	inj #8 injector command refused	inactive	active
4608	Injector Alarms	inj #9 additive feedback error	inactive	active
4609	Injector Alarms	inj #9 additive communications error	inactive	active
4610	Injector Alarms	inj #9 low additive	inactive	active
4611	Injector Alarms	inj #9 high additive	inactive	active
4612	Injector Alarms	inj #9 no additive	inactive	active
4613	Injector Alarms	inj #9 additive frequency	inactive	active
4614	Injector Alarms	inj #9 unauthorize failed	inactive	active
4615	Injector Alarms	inj #9 general additive alarm	inactive	active
4616	Injector Alarms	inj #9 over speed meter injector	inactive	active
4617	Injector Alarms	inj #9 injector command refused	inactive	active
4672	Injector Alarms	inj #10 additive feedback error	inactive	active

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Modbus™ Address	Data Set	Data Point	0 State	1 State
4673	Injector Alarms	inj #10 additive communications error	inactive	active
4674	Injector Alarms	inj #10 low additive	inactive	active
4675	Injector Alarms	inj #10 high additive	inactive	active
4676	Injector Alarms	inj #10 no additive	inactive	active
4677	Injector Alarms	inj #10 additive frequency	inactive	active
4678	Injector Alarms	inj #10 unauthorize failed	inactive	active
4679	Injector Alarms	inj #10 general additive alarm	inactive	active
4680	Injector Alarms	inj #10 over speed meter injector	inactive	active
4681	Injector Alarms	inj #10 injector command refused	inactive	active
4736	Injector Alarms	inj #11 additive feedback error	inactive	active
4737	Injector Alarms	inj #11 additive communications error	inactive	active
4738	Injector Alarms	inj #11 low additive	inactive	active
4739	Injector Alarms	inj #11 high additive	inactive	active
4740	Injector Alarms	inj #11 no additive	inactive	active
4741	Injector Alarms	inj #11 additive frequency	inactive	active
4742	Injector Alarms	inj #11 unauthorize failed	inactive	active
4743	Injector Alarms	inj #11 general additive alarm	inactive	active
4744	Injector Alarms	inj #11 over speed meter injector	inactive	active
4745	Injector Alarms	inj #11 injector command refused	inactive	active
4800	Injector Alarms	inj #12 additive feedback error	inactive	active
4801	Injector Alarms	inj #12 additive communications error	inactive	active
4802	Injector Alarms	inj #12 low additive	inactive	active
4803	Injector Alarms	inj #12 high additive	inactive	active
4804	Injector Alarms	inj #12 no additive	inactive	active
4805	Injector Alarms	inj #12 additive frequency	inactive	active
4806	Injector Alarms	inj #12 unauthorize failed	inactive	active
4807	Injector Alarms	inj #12 general additive alarm	inactive	active
4808	Injector Alarms	inj #12 over speed meter injector	inactive	active
4809	Injector Alarms	inj #12 injector command refused	inactive	active

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Modbus™ Mapping of Function Code 03, 06, and 16, Read/Write Control Register (Read/Preset Holding Registers)

Note: An entry in the "Program Mode Parameter" column indicates the protocol for entry and exit from Program Mode that must be used to modify that parameter.

Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
0	512	Extended Services	inbound (command) buffer area	extended services packet (currently limited to 1024 bytes)	
4096	4111	System Program Code	flow rate descriptive text	text string	System 112
4112	4127	System Program Code	date text (writing will have no effect)	text string	
4128	4143	System Program Code	time text (writing will have no effect)	text string	
4144	4159	System Program Code	transaction identification message	text string	System 144
4160	4175	System Program Code	volume descriptive text	text string	System 303
4176	4191	System Program Code	mass descriptive text	text string	System 304
4192	4207	System Program Code	user defined alarm #1 descriptive text	text string	System 661
4208	4223	System Program Code	user defined alarm #2 descriptive text	text string	System 662
4224	4239	System Program Code	user defined alarm #3 descriptive text	text string	System 663
4240	4255	System Program Code	user defined alarm #4 descriptive text	text string	System 664
4256	4271	System Program Code	user defined alarm #5 descriptive text	text string	System 665
4272	4287	System Program Code	user defined alarm #6 descriptive text	text string	System 666
4288	4303	System Program Code	user defined alarm #7 descriptive text	text string	System 667
4304	4319	System Program Code	user defined alarm #8 descriptive text	text string	System 668
4320	4335	System Program Code	user defined alarm #9 descriptive text	text string	System 669
4336	4351	System Program Code	user defined alarm #10 descriptive text	text string	System 670

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
4352	4367	System Program Code	injector units	text string	System 861
4368	4383	System Program Code	injector totals units	text string	System 862
4608		System Program Code	communications address	unsigned char	System 701
4609		System Program Code	volume units selection	unsigned char	System 301
4610		System Program Code	temperature units selection	unsigned char	System 401
4611		System Program Code	density units selection	unsigned char	System 403
4612		System Program Code	mass units selection	unsigned char	System 302
4613		System Program Code	pressure units selection	unsigned char	System 501
4614		System Program Code	flow rate time units selection	unsigned char	System 111
4615		System Program Code	decimal point or comma radix point selection	unsigned char	System 131
4616		System Program Code	start key disable	unsigned char	System 132
4617		System Program Code	use built-in English language or uploaded language	unsigned char	System 133
4618		System Program Code	AccuLoad III mode	unsigned char	System 001
4619		System Program Code	pulse output #1 function selection	unsigned char	System 008
4620		System Program Code	pulse output #2 function selection	unsigned char	System 011
4621		System Program Code	pulse output #1 units selection	unsigned char	System 010
4622		System Program Code	pulse output #2 units selection	unsigned char	System 013
4623		System Program Code	dynamic display feature timeout	unsigned char	System 121
4624		System Program Code	automatic reset timer preset	unsigned char	System 122
4625		System Program Code	communications link programming	unsigned char	System 761

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
4626		System Program Code	modbus floating point byte order (endian)	unsigned char	System 762
4627		System Program Code	alarms clearable during transaction	unsigned char	System 601
4628		System Program Code	additive injector selection method	unsigned char	System 801
4629		System Program Code	additive injector stop option	unsigned char	System 803
4630		System Program Code	additive pacing units	unsigned char	System 802
4631		System Program Code	additive maximum feedback errors	unsigned char	System 821
4672	4673	System Program Code	reference temperature	single precision floating point	System 402
4674	4675	System Program Code	pulse output #1 pulses per unit volume	single precision floating point	System 009
4676	4677	System Program Code	pulse output #2 pulses per unit volume	single precision floating point	System 012
4678	4679	System Program Code	additive stop volume	single precision floating point	System 804
4680	4681	System Program Code	additive conversion factor	single precision floating point	System 863
4682	4683	System Program Code	additive clean line volume	single precision floating point	System 864
4684	4685	System Program Code	pulse output #1 max pulse frequency	single precision floating point	System 077
4686	4687	System Program Code	pulse output #1 max pulse frequency	single precision floating point	System 078
6144	6159	Meter Program Code	permissive 1 descriptive text	text string	System 135
6160	6175	Meter Program Code	permissive 2 descriptive text	text string	System 138
6176	6191	Meter Program Code	permissive 3 descriptive text	text string	System 141
6192	6207	Meter Program Code	meter position descriptive text	text string	System 113
6208	6223	Meter Program Code	report print time	text string	System 732
6400	6401	Meter Program Code	maximum allowable batch volume	single precision floating point	System 311

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
6402	6403	Meter Program Code	minimum allowable batch volume	single precision floating point	System 312
6404	6405	Meter Program Code	auto preset feature volume	single precision floating point	System 313
6406	6407	Meter Program Code	auto preset feature volume increment	single precision floating point	System 314
6408	6409	Meter Program Code	low flow start feature volume	single precision floating point	System 202
6410	6411	Meter Program Code	low flow start feature flow rate	single precision floating point	System 201
6412	6413	Meter Program Code	low flow start feature percentage	single precision floating point	System 203
6414	6415	Meter Program Code	overrun alarm limit	single precision floating point	System 221
6416	6417	Meter Program Code	S-mass densitometer parameter: a	single precision floating point	System 407
6418	6419	Meter Program Code	S-mass densitometer parameter: b	single precision floating point	System 408
6420	6421	Meter Program Code	Solartron densitometer parameter: dcf	single precision floating point	System 412
6422	6423	Meter Program Code	Solartron densitometer parameter: k0	single precision floating point	System 413
6424	6425	Meter Program Code	Solartron densitometer parameter: k1	single precision floating point	System 414
6426	6427	Meter Program Code	Solartron densitometer parameter: k2	single precision floating point	System 415
6428	6429	Meter Program Code	Solartron densitometer parameter: k18	single precision floating point	System 416
6430	6431	Meter Program Code	Solartron densitometer parameter: k19	single precision floating point	System 417
6432	6433	Meter Program Code	Solartron densitometer parameter: k20a	single precision floating point	System 418
6434	6435	Meter Program Code	Solartron densitometer parameter: k20b	single precision floating point	System 419
6436	6437	Meter Program Code	Solartron densitometer parameter: k21a	single precision floating point	System 420
6438	6439	Meter Program Code	Solartron densitometer parameter: k21b	single precision floating point	System 421
6440	6441	Meter Program Code	Solartron densitometer parameter: tcal	single precision floating point	System 422

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
6442	6443	Meter Program Code	Solartron densitometer parameter: pcal	single precision floating point	System 423
6444	6445	Meter Program Code	Sarasota densitometer parameter: dcf	single precision floating point	System 442
6446	6447	Meter Program Code	Sarasota densitometer parameter: k	single precision floating point	System 443
6448	6449	Meter Program Code	Sarasota densitometer parameter: d0	single precision floating point	System 444
6450	6451	Meter Program Code	Sarasota densitometer parameter: t0	single precision floating point	System 445
6452	6453	Meter Program Code	Sarasota densitometer parameter: tcoef	single precision floating point	System 446
6454	6455	Meter Program Code	Sarasota densitometer parameter: tcal	single precision floating point	System 447
6456	6457	Meter Program Code	Sarasota densitometer parameter: pcoef	single precision floating point	System 448
6458	6459	Meter Program Code	Sarasota densitometer parameter: pcal	single precision floating point	System 449
6460	6461	Meter Program Code	UGC densitometer parameter: dcf	single precision floating point	System 462
6462	6463	Meter Program Code	UGC densitometer parameter: k0	single precision floating point	System 463
6464	6465	Meter Program Code	UGC densitometer parameter: k1	single precision floating point	System 464
6466	6467	Meter Program Code	UGC densitometer parameter: k2	single precision floating point	System 465
6468	6469	Meter Program Code	UGC densitometer parameter: tc	single precision floating point	System 466
6470	6471	Meter Program Code	UGC densitometer parameter: kt1	single precision floating point	System 467
6472	6473	Meter Program Code	UGC densitometer parameter: kt2	single precision floating point	System 468
6474	6475	Meter Program Code	UGC densitometer parameter: kt3	single precision floating point	System 469
6476	6477	Meter Program Code	UGC densitometer parameter: pc	single precision floating point	System 470
6478	6479	Meter Program Code	UGC densitometer parameter: kp1	single precision floating point	System 471
6480	6481	Meter Program Code	UGC densitometer parameter: kp2	single precision floating point	System 472

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
6482	6483	Meter Program Code	UGC densitometer parameter: kp3	single precision floating point	System 473
6484	6485	Meter Program Code	"other" densitometer parameter: dcf	single precision floating point	System 492
6486	6487	Meter Program Code	"other" densitometer parameter: a	single precision floating point	System 493
6488	6489	Meter Program Code	"other" densitometer parameter: b	single precision floating point	System 494
6490	6491	Meter Program Code	"other" densitometer parameter: c	single precision floating point	System 495
6592		Meter Program Code	preset volume type select	unsigned char	System 332
6593		Meter Program Code	delivery volume type select	unsigned char	System 333
6594		Meter Program Code	pulse mode type select	unsigned char	System 002
6595		Meter Program Code	sec levels selection	unsigned char	System 003
6596		Meter Program Code	display resolution selection	unsigned char	System 334
6597		Meter Program Code	blank downcounter selection	unsigned char	System 331
6598		Meter Program Code	permissive 1 type selection	unsigned char	System 134
6599		Meter Program Code	permissive 1 start option select	unsigned char	System 136
6600		Meter Program Code	permissive 2 type selection	unsigned char	System 137
6601		Meter Program Code	permissive 2 start option selection	unsigned char	System 139
6602		Meter Program Code	permissive 3 type selection	unsigned char	System 140
6603		Meter Program Code	permissive 3 start option selection	unsigned char	System 142
6604		Meter Program Code	pump off delay time	unsigned char	System 214
6605		Meter Program Code	valve open delay time	unsigned char	System 213
6606		Meter Program Code	zero flow timer preset	unsigned char	System 212

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
6607		Meter Program Code	number of batches per transaction selection	unsigned char	System 145
6608		Meter Program Code	low flow start conditions selection	unsigned char	System 204
6609		Meter Program Code	trans_term,	unsigned char	System 315
6610		Meter Program Code	auto prove select	unsigned char	System 321
6611		Meter Program Code	prove mode	unsigned char	System 322
6612		Meter Program Code	report select	unsigned char	System 731
6613		Meter Program Code	prompt timeout timer preset	unsigned char	System 742
6614		Meter Program Code	number of prompts in use	unsigned char	System 741
6615		Meter Program Code	Solartron densitometer density units selection	unsigned char	System 411
6616		Meter Program Code	Sarasota densitometer density units selection	unsigned char	System 441
6617		Meter Program Code	UGC densitometer density units selection	unsigned char	System 461
6618		Meter Program Code	"other" densitometer density units selection	unsigned char	System 491
6619		Meter Program Code	valve fault timeout	unsigned char	System 222
6656		Meter Program Code	start - stop delay time	unsigned int	System 211
6657		Meter Program Code	report print interval	unsigned int	System 733
10240	10255	Product Program Code	product descriptive text	text string	Product 102
10256	10271	Product Program Code	hazardous materials (hm) class descriptive text 1	text string	Product 103
10272	10287	Product Program Code	hazardous materials (hm) class descriptive text 2	text string	Product 104
10368	10369	Product Program Code	meter K factor	single precision floating point	Product 301
10370	10371	Product Program Code	meter factor 1	single precision floating point	Product 302

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
10372	10373	Product Program Code	meter factor 2	single precision floating point	Product 304
10374	10375	Product Program Code	meter factor 3	single precision floating point	Product 306
10376	10377	Product Program Code	meter factor 4	single precision floating point	Product 308
10378	10379	Product Program Code	meter factor 1 rate reference	single precision floating point	Product 303
10380	10381	Product Program Code	meter factor 2 rate reference	single precision floating point	Product 305
10382	10383	Product Program Code	meter factor 3 rate reference	single precision floating point	Product 307
10384	10385	Product Program Code	meter factor 4 rate reference	single precision floating point	Product 309
10386	10387	Product Program Code	min flow rate	single precision floating point	Product 211
10388	10389	Product Program Code	high flow rate	single precision floating point	Product 212
10390	10391	Product Program Code	second high flow rate	single precision floating point	Product 213
10392	10393	Product Program Code	flow tolerance percent	single precision floating point	Product 214
10394	10395	Product Program Code	flow tolerance rate	single precision floating point	Product 215
10396	10397	Product Program Code	first trip volume	single precision floating point	Product 216
10398	10399	Product Program Code	second trip volume	single precision floating point	Product 217
10400	10401	Product Program Code	excess high flow rate	single precision floating point	Product 231
10402	10403	Product Program Code	low flow rate alarm limit	single precision floating point	Product 232
10404	10405	Product Program Code	reserved for future use	single precision floating point	
10406	10407	Product Program Code	master meter factor	single precision floating point	Product 310
10408	10409	Product Program Code	linear factor dev	single precision floating point	Product 311
10410	10411	Product Program Code	differential pressure flow rate cutoff	single precision floating point	Product 323

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
10412	10413	Product Program Code	maintenance temperature	single precision floating point	Product 401
10414	10415	Product Program Code	high temperature alarm limit	single precision floating point	Product 402
10416	10417	Product Program Code	low temperature alarm limit	single precision floating point	Product 403
10418	10419	Product Program Code	product density	single precision floating point	Product 412
10420	10421	Product Program Code	high density alarm limit	single precision floating point	Product 413
10422	10423	Product Program Code	low density alarm limit	single precision floating point	Product 414
10424	10425	Product Program Code	maintenance pressure	single precision floating point	Product 501
10426	10427	Product Program Code	pressure coefficient	single precision floating point	Product 502
10428	10429	Product Program Code	high pressure alarm limit	single precision floating point	Product 503
10430	10431	Product Program Code	low pressure alarm limit	single precision floating point	Product 504
10432	10433	Product Program Code	differential pressure	single precision floating point	Product 511
10434	10435	Product Program Code	back pressure control minimum flow rate	single precision floating point	Product 512
10436	10437	Product Program Code	back pressure control percent reduction	single precision floating point	Product 514
10438	10439	Product Program Code	back pressure control recovery pressure	single precision floating point	Product 515
10440	10441	Product Program Code	vapor pressure 1	single precision floating point	Product 522
10442	10443	Product Program Code	vapor pressure 2	single precision floating point	Product 524
10444	10445	Product Program Code	vapor pressure 3	single precision floating point	Product 526
10446	10447	Product Program Code	vapor pressure reference temperature 1	single precision floating point	Product 523
10448	10449	Product Program Code	vapor pressure reference temperature 2	single precision floating point	Product 525
10450	10451	Product Program Code	vapor pressure reference temperature 3	single precision floating point	Product 527

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
10452	10453	Product Program Code	meter factor variation - % change per degree	single precision floating point	Product 313
10454	10455	Product Program Code	meter factor variation - reference temperature	single precision floating point	Product 314
10496		Product Program Code	valve type selection	unsigned char	Product 201
10497		Product Program Code	second trip auto adjust	unsigned char	Product 218
10498		Product Program Code	reserved for future use	unsigned char	
10499		Product Program Code	dual pulse error reset	unsigned char	Product 322
10500		Product Program Code	API table selection	unsigned char	Product 411
10501		Product Program Code	back pressure minimum flow rate timer preset	unsigned char	Product 513
10502		Product Program Code	back pressure flow recovery timer preset	unsigned char	Product 516
10503		Product Program Code	vapor pressure calculation method selection	unsigned char	Product 521
10504		Product Program Code	meter factor variation - enable/disable	unsigned char	Product 312
10560		Product Program Code	dual pulse error count	unsigned int	Product 321
14400		Digital I/O Program Code	Input #1 function selection	unsigned char	System 014
14401		Digital I/O Program Code	Input #2 function selection	unsigned char	System 015
14402		Digital I/O Program Code	Input #3 function selection	unsigned char	System 016
14403		Digital I/O Program Code	Input #4 function selection	unsigned char	System 017
14404		Digital I/O Program Code	Input #5 function selection	unsigned char	System 018
14405		Digital I/O Program Code	Input #6 function selection	unsigned char	System 019
14406		Digital I/O Program Code	Input #7 function selection	unsigned char	System 020
14407		Digital I/O Program Code	Input #8 function selection	unsigned char	System 021

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
14408		Digital I/O Program Code	Input #9 function selection	unsigned char	System 022
14409		Digital I/O Program Code	Input #10 function selection	unsigned char	System 023
14410		Digital I/O Program Code	Output #1 function selection	unsigned char	System 024
14411		Digital I/O Program Code	Output #2 function selection	unsigned char	System 025
14412		Digital I/O Program Code	Output #3 function selection	unsigned char	System 026
14413		Digital I/O Program Code	Output #4 function selection	unsigned char	System 027
14414		Digital I/O Program Code	Output #5 function selection	unsigned char	System 028
14415		Digital I/O Program Code	Output #6 function selection	unsigned char	System 029
14416		Digital I/O Program Code	Output #7 function selection	unsigned char	System 030
14417		Digital I/O Program Code	Output #8 function selection	unsigned char	System 031
14418		Digital I/O Program Code	Output #9 function selection	unsigned char	System 032
14419		Digital I/O Program Code	Output #10 function selection	unsigned char	System 033
14420		Digital I/O Program Code	Output #11 function selection	unsigned char	System 034
14421		Digital I/O Program Code	Output #12 function selection	unsigned char	System 035
14422		Digital I/O Program Code	Output #13 function selection	unsigned char	System 036
14423		Digital I/O Program Code	Output #14 function selection	unsigned char	System 037
15360	15361	Analog I/O Program Code	I/o point #1 calibration point 1, counts	single precision floating point	System 041
15362	15363	Analog I/O Program Code	I/o point #2 calibration point 1, counts	single precision floating point	System 048
15364	15365	Analog I/O Program Code	I/o point #3 calibration point 1, counts	single precision floating point	System 055

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
15366	15367	Analog I/O Program Code	I/o point #4 calibration point 1, counts	single precision floating point	System 061
15368	15369	Analog I/O Program Code	I/o point #5 calibration point 1, counts	single precision floating point	System 067
15370	15371	Analog I/O Program Code	I/o point #6 calibration point 1, counts	single precision floating point	System 073
15372	15373	Analog I/O Program Code	I/o point #1 calibration point 2, counts	single precision floating point	System 042
15374	15375	Analog I/O Program Code	I/o point #2 calibration point 2, counts	single precision floating point	System 049
15376	15377	Analog I/O Program Code	I/o point #3 calibration point 2, counts	single precision floating point	System 056
15378	15379	Analog I/O Program Code	I/o point #4 calibration point 2, counts	single precision floating point	System 062
15380	15381	Analog I/O Program Code	I/o point #5 calibration point 2, counts	single precision floating point	System 068
15382	15383	Analog I/O Program Code	I/o point #6 calibration point 2, counts	single precision floating point	System 074
15384	15385	Analog I/O Program Code	I/o point #1 minimum engineering value	single precision floating point	System 043
15386	15387	Analog I/O Program Code	I/o point #2 minimum engineering value	single precision floating point	System 050
15388	15389	Analog I/O Program Code	I/o point #3 minimum engineering value	single precision floating point	System 057
15390	15391	Analog I/O Program Code	I/o point #4 minimum engineering value	single precision floating point	System 063
15392	15393	Analog I/O Program Code	I/o point #5 minimum engineering value	single precision floating point	System 069
15394	15395	Analog I/O Program Code	I/o point #6 minimum engineering value	single precision floating point	System 075
15396	15397	Analog I/O Program Code	I/o point #1 maximum engineering value	single precision floating point	System 044
15398	15399	Analog I/O Program Code	I/o point #2 maximum engineering value	single precision floating point	System 051
15400	15401	Analog I/O Program Code	I/o point #3 maximum engineering value	single precision floating point	System 058
15402	15403	Analog I/O Program Code	I/o point #4 maximum engineering value	single precision floating point	System 064
15404	15405	Analog I/O Program Code	I/o point #5 maximum engineering value	single precision floating point	System 070

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
15406	15407	Analog I/O Program Code	I/o point #6 maximum engineering value	single precision floating point	System 076
15408	15409	Analog I/O Program Code	I/o point #1 RTD offset value	single precision floating point	System 045
15410	15411	Analog I/O Program Code	I/o point #2 RTD offset value	single precision floating point	System 052
15424		Analog I/O Program Code	I/O point #1 transducer type select	unsigned char	System 039
15425		Analog I/O Program Code	I/O point #2 transducer type select	unsigned char	System 046
15426		Analog I/O Program Code	I/O point #3 transducer type select	unsigned char	System 053
15427		Analog I/O Program Code	I/O point #4 transducer type select	unsigned char	System 059
15428		Analog I/O Program Code	I/O point #5 transducer type select	unsigned char	System 065
15429		Analog I/O Program Code	I/O point #6 transducer type select	unsigned char	System 071
15430		Analog I/O Program Code	I/O point #1 function select	unsigned char	System 040
15431		Analog I/O Program Code	I/O point #2 function select	unsigned char	System 047
15432		Analog I/O Program Code	I/O point #3 function select	unsigned char	System 054
15433		Analog I/O Program Code	I/O point #4 function select	unsigned char	System 060
15434		Analog I/O Program Code	I/O point #5 function select	unsigned char	System 066
15435		Analog I/O Program Code	I/O point #6 function select	unsigned char	System 072
16384		Comm Program Code	port #1 protocol selection	unsigned char	System 702
16385		Comm Program Code	port #2 protocol selection	unsigned char	System 707
16386		Comm Program Code	port #3 protocol selection	unsigned char	System 712
16387		Comm Program Code	port #4 protocol selection	unsigned char	System 717
16388		Comm Program Code	port #1 baud rate selection	unsigned char	System 703

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
16389		Comm Program Code	port #2 baud rate selection	unsigned char	System 708
16390		Comm Program Code	port #3 baud rate selection	unsigned char	System 713
16391		Comm Program Code	port #4 baud rate selection	unsigned char	System 718
16392		Comm Program Code	port #1 word length/parity selection	unsigned char	System 704
16393		Comm Program Code	port #2 word length/parity selection	unsigned char	System 709
16394		Comm Program Code	port #3 word length/parity selection	unsigned char	System 714
16395		Comm Program Code	port #4 word length/parity selection	unsigned char	System 719
16396		Comm Program Code	port #1 access control selection	unsigned char	System 705
16397		Comm Program Code	port #2 access control selection	unsigned char	System 710
16398		Comm Program Code	port #3 access control selection	unsigned char	System 715
16399		Comm Program Code	port #4 access control selection	unsigned char	System 720
16400		Comm Program Code	reserved	unsigned char	
16401		Comm Program Code	reserved	unsigned char	
16448		Comm Program Code	port #1 timeout timer preset	unsigned integer	System 706
16449		Comm Program Code	port #2 timeout timer preset	unsigned integer	System 711
16450		Comm Program Code	port #3 timeout timer preset	unsigned integer	System 716
16451		Comm Program Code	port #4 timeout timer preset	unsigned integer	System 721
18496		Prompt Program Code	prompt #1 input type	unsigned char	System 744
18497		Prompt Program Code	prompt #2 input type	unsigned char	System 747
18498		Prompt Program Code	prompt #3 input type	unsigned char	System 750

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
18499		Prompt Program Code	prompt #4 input type	unsigned char	System 753
18500		Prompt Program Code	prompt #5 input type	unsigned char	System 756
18501		Prompt Program Code	prompt #1 length	unsigned char	System 745
18502		Prompt Program Code	prompt #2 length	unsigned char	System 748
18503		Prompt Program Code	prompt #3 length	unsigned char	System 751
18504		Prompt Program Code	prompt #4 length	unsigned char	System 754
18505		Prompt Program Code	prompt #5 length	unsigned char	System 757
18560	18575	Prompt Program Code	prompt #1 message	text string	System 743
18576	18591	Prompt Program Code	prompt #2 message	text string	System 746
18592	18607	Prompt Program Code	prompt #3 message	text string	System 749
18608	18623	Prompt Program Code	prompt #4 message	text string	System 752
18624	18639	Prompt Program Code	prompt #5 message	text string	System 755
20480	20481	Additive Injector Program Code	metered injector #1 K factor	single precision floating point	System 851
20482	20483	Additive Injector Program Code	metered injector #2 K factor	single precision floating point	System 852
20484	20485	Additive Injector Program Code	metered injector #1 meter factor	single precision floating point	System 853
20486	20487	Additive Injector Program Code	metered injector #2 meter factor	single precision floating point	System 854
20488	20489	Additive Injector Program Code	metered injector #1 high tolerance	single precision floating point	System 855
20490	20491	Additive Injector Program Code	metered injector #2 high tolerance	single precision floating point	System 856
20492	20493	Additive Injector Program Code	metered injector #1 low tolerance	single precision floating point	System 857
20494	20495	Additive Injector Program Code	metered injector #2 low tolerance	single precision floating point	System 858

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
20544		Additive Injectors Program Code	injector #1 type	unsigned char	System 805
20545		Additive Injectors Program Code	injector #2 type	unsigned char	System 806
20546		Additive Injectors Program Code	injector #3 type	unsigned char	System 807
20547		Additive Injectors Program Code	injector #4 type	unsigned char	System 808
20548		Additive Injectors Program Code	injector #5 type	unsigned char	System 809
20549		Additive Injectors Program Code	injector #6 type	unsigned char	System 810
20550		Additive Injectors Program Code	injector #7 type	unsigned char	System 811
20551		Additive Injectors Program Code	injector #8 type	unsigned char	System 812
20552		Additive Injectors Program Code	injector #9 type	unsigned char	System 813
20553		Additive Injectors Program Code	injector #10 type	unsigned char	System 814
20554		Additive Injectors Program Code	injector #11 type	unsigned char	System 815
20555		Additive Injectors Program Code	injector #12 type	unsigned char	System 816
20556		Additive Injectors Program Code	metered injector #1 tolerance errors	unsigned char	System 859
20557		Additive Injectors Program Code	metered injector #2 tolerance errors	unsigned char	System 860
20608		Additive Injectors Program Code	"smart" injector #1 communications address	unsigned int	System 831
20609		Additive Injectors Program Code	"smart" injector #2 communications address	unsigned int	System 832
20610		Additive Injectors Program Code	"smart" injector #3 communications address	unsigned int	System 833
20611		Additive Injectors Program Code	"smart" injector #4 communications address	unsigned int	System 834
20612		Additive Injectors Program Code	"smart" injector #5 communications address	unsigned int	System 835
20613		Additive Injectors Program Code	"smart" injector #6 communications address	unsigned int	System 836

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
20614		Additive Injectors Program Code	"smart" injector #7 communications address	unsigned int	System 837
20615		Additive Injectors Program Code	"smart" injector #8 communications address	unsigned int	System 838
20616		Additive Injectors Program Code	"smart" injector #9 communications address	unsigned int	System 839
20617		Additive Injectors Program Code	"smart" injector #10 communications address	unsigned int	System 840
20618		Additive Injectors Program Code	"smart" injector #11 communications address	unsigned int	System 841
20619		Additive Injectors Program Code	"smart" injector #12 communications address	unsigned int	System 842
21504		Alarm Config Program Code	additive communications alarm	unsigned char	System 602
21505		Alarm Config Program Code	back pressure alarm	unsigned char	System 603
21506		Alarm Config Program Code	communications error alarm	unsigned char	System 604
21507		Alarm Config Program Code	density transducer failure alarm	unsigned char	System 605
21508		Alarm Config Program Code	additive feedback alarm	unsigned char	System 606
21509		Alarm Config Program Code	high density alarm	unsigned char	System 607
21510		Alarm Config Program Code	high flow alarm	unsigned char	System 608
21511		Alarm Config Program Code	high pressure alarm	unsigned char	System 609
21512		Alarm Config Program Code	high temperature alarm	unsigned char	System 610
21513		Alarm Config Program Code	low additive alarm	unsigned char	System 611
21514		Alarm Config Program Code	low density alarm	unsigned char	System 612
21515		Alarm Config Program Code	low flow alarm	unsigned char	System 613
21516		Alarm Config Program Code	low pressure alarm	unsigned char	System 614
21517		Alarm Config Program Code	low temperature alarm	unsigned char	System 615

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
21518		Alarm Config Program Code	excess additive pulses alarm	unsigned char	System 616
21519		Alarm Config Program Code	no additive pulses alarm	unsigned char	System 617
21520		Alarm Config Program Code	system overrun alarm	unsigned char	System 618
21521		Alarm Config Program Code	transmitter integrity alarm	unsigned char	System 619
21522		Alarm Config Program Code	pressure transducer failure alarm	unsigned char	System 620
21523		Alarm Config Program Code	pulse security alarm	unsigned char	System 621
21524		Alarm Config Program Code	additive injection frequency alarm	unsigned char	System 622
21525		Alarm Config Program Code	shared printer alarm	unsigned char	System 623
21526		Alarm Config Program Code	temperature transducer failure alarm	unsigned char	System 624
21527		Alarm Config Program Code	valve fault alarm	unsigned char	System 625
21528		Alarm Config Program Code	additive injector unauthorize failure alarm	unsigned char	System 626
21529		Alarm Config Program Code	system zero flow alarm	unsigned char	System 627
21530		Alarm Config Program Code	general additive alarm	unsigned char	System 628
21531		Alarm Config Program Code	over speed metered injector alarm	unsigned char	System 629
21532		Alarm Config Program Code	additive clean line alarm	unsigned char	System 630
21533		Alarm Config Program Code	injector command rejected	unsigned char	System 631
21534		Alarm Config Program Code	user alarm #1	unsigned char	System 651
21535		Alarm Config Program Code	user alarm #2	unsigned char	System 652
21536		Alarm Config Program Code	user alarm #3	unsigned char	System 653
21537		Alarm Config Program Code	user alarm #4	unsigned char	System 654

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
21538		Alarm Config Program Code	user alarm #5	unsigned char	System 655
21539		Alarm Config Program Code	user alarm #6	unsigned char	System 656
21540		Alarm Config Program Code	user alarm #7	unsigned char	System 657
21541		Alarm Config Program Code	user alarm #8	unsigned char	System 658
21542		Alarm Config Program Code	user alarm #9	unsigned char	System 659
21543		Alarm Config Program Code	user alarm #10	unsigned char	System 660
21544		Alarm Config Program Code	ticket alarm	unsigned char	System 632
21545		Alarm Config Program Code	Civacon alarm	unsigned char	System 633
22528		Pulse Input Program Code	reserved	unsigned char	
22529		Pulse Input Program Code	reserved	unsigned char	
22530		Pulse Input Program Code	pulse input #3 function	unsigned char	System 004
22531		Pulse Input Program Code	pulse input #4 function	unsigned char	System 005
22532		Pulse Input Program Code	pulse input #5 function	unsigned char	System 006
22533		Pulse Input Program Code	pulse input #6 function	unsigned char	System 007
23552	23553	Boolean/Algebraic	user floating point variable #1	single precision floating point	
23554	23555	Boolean/Algebraic	user floating point variable #2	single precision floating point	
23556	23557	Boolean/Algebraic	user floating point variable #3	single precision floating point	
23558	23559	Boolean/Algebraic	user floating point variable #4	single precision floating point	
23560	23561	Boolean/Algebraic	user floating point variable #5	single precision floating point	
23562	23563	Boolean/Algebraic	user floating point variable #6	single precision floating point	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
23564	23565	Boolean/ Algebraic	user floating point variable #7	single precision floating point	
23566	23567	Boolean/ Algebraic	user floating point variable #8	single precision floating point	
23568	23569	Boolean/ Algebraic	user floating point variable #9	single precision floating point	
23570	23571	Boolean/ Algebraic	user floating point variable #10	single precision floating point	
23572	23573	Boolean/ Algebraic	user floating point variable #11	single precision floating point	
23574	23575	Boolean/ Algebraic	user floating point variable #12	single precision floating point	
23576	23577	Boolean/ Algebraic	user floating point variable #13	single precision floating point	
23578	23579	Boolean/ Algebraic	user floating point variable #14	single precision floating point	
23580	23581	Boolean/ Algebraic	user floating point variable #15	single precision floating point	
23582	23583	Boolean/ Algebraic	user floating point variable #16	single precision floating point	
23584	23585	Boolean/ Algebraic	user floating point variable #17	single precision floating point	
23586	23587	Boolean/ Algebraic	user floating point variable #18	single precision floating point	
23588	23589	Boolean/ Algebraic	user floating point variable #19	single precision floating point	
23590	23591	Boolean/ Algebraic	user floating point variable #20	single precision floating point	
23592	23593	Boolean/ Algebraic	user floating point variable #21	single precision floating point	
23594	23595	Boolean/ Algebraic	user floating point variable #22	single precision floating point	
23596	23597	Boolean/ Algebraic	user floating point variable #23	single precision floating point	
23598	23599	Boolean/ Algebraic	user floating point variable #24	single precision floating point	
23600	23601	Boolean/ Algebraic	user floating point variable #25	single precision floating point	
23602	23603	Boolean/ Algebraic	user floating point variable #26	single precision floating point	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
23604	23605	Boolean/ Algebraic	user floating point variable #27	single precision floating point	
23606	23607	Boolean/ Algebraic	user floating point variable #28	single precision floating point	
23608	23609	Boolean/ Algebraic	user floating point variable #29	single precision floating point	
23610	23611	Boolean/ Algebraic	user floating point variable #30	single precision floating point	
23612	23613	Boolean/ Algebraic	user floating point variable #31	single precision floating point	
23614	23615	Boolean/ Algebraic	user floating point variable #32	single precision floating point	
23616	23617	Boolean/ Algebraic	user floating point variable #33	single precision floating point	
23618	23619	Boolean/ Algebraic	user floating point variable #34	single precision floating point	
23620	23621	Boolean/ Algebraic	user floating point variable #35	single precision floating point	
23622	23623	Boolean/ Algebraic	user floating point variable #36	single precision floating point	
23624	23625	Boolean/ Algebraic	user floating point variable #37	single precision floating point	
23626	23627	Boolean/ Algebraic	user floating point variable #38	single precision floating point	
23628	23629	Boolean/ Algebraic	user floating point variable #39	single precision floating point	
23630	23631	Boolean/ Algebraic	user floating point variable #40	single precision floating point	
23632	23633	Boolean/ Algebraic	user floating point variable #41	single precision floating point	
23634	23635	Boolean/ Algebraic	user floating point variable #42	single precision floating point	
23636	23637	Boolean/ Algebraic	user floating point variable #43	single precision floating point	
23638	23639	Boolean/ Algebraic	user floating point variable #44	single precision floating point	
23640	23641	Boolean/ Algebraic	user floating point variable #45	single precision floating point	
23642	23643	Boolean/ Algebraic	user floating point variable #46	single precision floating point	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
23644	23645	Boolean/ Algebraic	user floating point variable #47	single precision floating point	
23646	23647	Boolean/ Algebraic	user floating point variable #48	single precision floating point	
23648	23649	Boolean/ Algebraic	user floating point variable #49	single precision floating point	
23650	23651	Boolean/ Algebraic	user floating point variable #50	single precision floating point	
23652	23653	Boolean/ Algebraic	user floating point variable #51	single precision floating point	
23654	23655	Boolean/ Algebraic	user floating point variable #52	single precision floating point	
23656	23657	Boolean/ Algebraic	user floating point variable #53	single precision floating point	
23658	23659	Boolean/ Algebraic	user floating point variable #54	single precision floating point	
23660	23661	Boolean/ Algebraic	user floating point variable #55	single precision floating point	
23662	23663	Boolean/ Algebraic	user floating point variable #56	single precision floating point	
23664	23665	Boolean/ Algebraic	user floating point variable #57	single precision floating point	
23666	23667	Boolean/ Algebraic	user floating point variable #58	single precision floating point	
23668	23669	Boolean/ Algebraic	user floating point variable #59	single precision floating point	
23670	23671	Boolean/ Algebraic	user floating point variable #60	single precision floating point	
23672	23673	Boolean/ Algebraic	user floating point variable #61	single precision floating point	
23674	23675	Boolean/ Algebraic	user floating point variable #62	single precision floating point	
23676	23677	Boolean/ Algebraic	user floating point variable #63	single precision floating point	
23678	23679	Boolean/ Algebraic	user floating point variable #64	single precision floating point	
23680	23681	Boolean/ Algebraic	user floating point variable #65	single precision floating point	
23682	23683	Boolean/ Algebraic	user floating point variable #66	single precision floating point	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
23684	23685	Boolean/ Algebraic	user floating point variable #67	single precision floating point	
23686	23687	Boolean/ Algebraic	user floating point variable #68	single precision floating point	
23688	23689	Boolean/ Algebraic	user floating point variable #69	single precision floating point	
23690	23691	Boolean/ Algebraic	user floating point variable #70	single precision floating point	
23692	23693	Boolean/ Algebraic	user floating point variable #71	single precision floating point	
23694	23695	Boolean/ Algebraic	user floating point variable #72	single precision floating point	
23696	23697	Boolean/ Algebraic	user floating point variable #73	single precision floating point	
23698	23699	Boolean/ Algebraic	user floating point variable #74	single precision floating point	
23700	23701	Boolean/ Algebraic	user floating point variable #75	single precision floating point	
23702	23703	Boolean/ Algebraic	user floating point variable #76	single precision floating point	
23704	23705	Boolean/ Algebraic	user floating point variable #77	single precision floating point	
23706	23707	Boolean/ Algebraic	user floating point variable #78	single precision floating point	
23708	23709	Boolean/ Algebraic	user floating point variable #79	single precision floating point	
23710	23711	Boolean/ Algebraic	user floating point variable #80	single precision floating point	
23712	23713	Boolean/ Algebraic	user floating point variable #81	single precision floating point	
23714	23715	Boolean/ Algebraic	user floating point variable #82	single precision floating point	
23716	23717	Boolean/ Algebraic	user floating point variable #83	single precision floating point	
23718	23719	Boolean/ Algebraic	user floating point variable #84	single precision floating point	
23720	23721	Boolean/ Algebraic	user floating point variable #85	single precision floating point	
23722	23723	Boolean/ Algebraic	user floating point variable #86	single precision floating point	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
23724	23725	Boolean/ Algebraic	user floating point variable #87	single precision floating point	
23726	23727	Boolean/ Algebraic	user floating point variable #88	single precision floating point	
23728	23729	Boolean/ Algebraic	user floating point variable #89	single precision floating point	
23730	23731	Boolean/ Algebraic	user floating point variable #90	single precision floating point	
23732	23733	Boolean/ Algebraic	user floating point variable #91	single precision floating point	
23734	23735	Boolean/ Algebraic	user floating point variable #92	single precision floating point	
23736	23737	Boolean/ Algebraic	user floating point variable #93	single precision floating point	
23738	23739	Boolean/ Algebraic	user floating point variable #94	single precision floating point	
23740	23741	Boolean/ Algebraic	user floating point variable #95	single precision floating point	
23742	23743	Boolean/ Algebraic	user floating point variable #96	single precision floating point	
23744	23745	Boolean/ Algebraic	user floating point variable #97	single precision floating point	
23746	23747	Boolean/ Algebraic	user floating point variable #98	single precision floating point	
23748	23749	Boolean/ Algebraic	user floating point variable #99	single precision floating point	
23750	23751	Boolean/ Algebraic	user floating point variable #100	single precision floating point	
24576		Boolean/ Algebraic	user boolean variable #1	unsigned char	
24577		Boolean/ Algebraic	user boolean variable #2	unsigned char	
24578		Boolean/ Algebraic	user boolean variable #3	unsigned char	
24579		Boolean/ Algebraic	user boolean variable #4	unsigned char	
24580		Boolean/ Algebraic	user boolean variable #5	unsigned char	
24581		Boolean/ Algebraic	user boolean variable #6	unsigned char	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
24582		Boolean/ Algebraic	user boolean variable #7	unsigned char	
24583		Boolean/ Algebraic	user boolean variable #8	unsigned char	
24584		Boolean/ Algebraic	user boolean variable #9	unsigned char	
24585		Boolean/ Algebraic	user boolean variable #10	unsigned char	
24586		Boolean/ Algebraic	user boolean variable #11	unsigned char	
24587		Boolean/ Algebraic	user boolean variable #12	unsigned char	
24588		Boolean/ Algebraic	user boolean variable #13	unsigned char	
24589		Boolean/ Algebraic	user boolean variable #14	unsigned char	
24590		Boolean/ Algebraic	user boolean variable #15	unsigned char	
24591		Boolean/ Algebraic	user boolean variable #16	unsigned char	
24592		Boolean/ Algebraic	user boolean variable #17	unsigned char	
24593		Boolean/ Algebraic	user boolean variable #18	unsigned char	
24594		Boolean/ Algebraic	user boolean variable #19	unsigned char	
24595		Boolean/ Algebraic	user boolean variable #20	unsigned char	
24596		Boolean/ Algebraic	user boolean variable #21	unsigned char	
24597		Boolean/ Algebraic	user boolean variable #22	unsigned char	
24598		Boolean/ Algebraic	user boolean variable #23	unsigned char	
24599		Boolean/ Algebraic	user boolean variable #24	unsigned char	
24600		Boolean/ Algebraic	user boolean variable #25	unsigned char	
24601		Boolean/ Algebraic	user boolean variable #26	unsigned char	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
24602		Boolean/ Algebraic	user boolean variable #27	unsigned char	
24603		Boolean/ Algebraic	user boolean variable #28	unsigned char	
24604		Boolean/ Algebraic	user boolean variable #29	unsigned char	
24605		Boolean/ Algebraic	user boolean variable #30	unsigned char	
24606		Boolean/ Algebraic	user boolean variable #31	unsigned char	
24607		Boolean/ Algebraic	user boolean variable #32	unsigned char	
24608		Boolean/ Algebraic	user boolean variable #33	unsigned char	
24609		Boolean/ Algebraic	user boolean variable #34	unsigned char	
24610		Boolean/ Algebraic	user boolean variable #35	unsigned char	
24611		Boolean/ Algebraic	user boolean variable #36	unsigned char	
24612		Boolean/ Algebraic	user boolean variable #37	unsigned char	
24613		Boolean/ Algebraic	user boolean variable #38	unsigned char	
24614		Boolean/ Algebraic	user boolean variable #39	unsigned char	
24615		Boolean/ Algebraic	user boolean variable #40	unsigned char	
24616		Boolean/ Algebraic	user boolean variable #41	unsigned char	
24617		Boolean/ Algebraic	user boolean variable #42	unsigned char	
24618		Boolean/ Algebraic	user boolean variable #43	unsigned char	
24619		Boolean/ Algebraic	user boolean variable #44	unsigned char	
24620		Boolean/ Algebraic	user boolean variable #45	unsigned char	
24621		Boolean/ Algebraic	user boolean variable #46	unsigned char	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
24622		Boolean/ Algebraic	user boolean variable #47	unsigned char	
24623		Boolean/ Algebraic	user boolean variable #48	unsigned char	
24624		Boolean/ Algebraic	user boolean variable #49	unsigned char	
24625		Boolean/ Algebraic	user boolean variable #50	unsigned char	
24626		Boolean/ Algebraic	user boolean variable #51	unsigned char	
24627		Boolean/ Algebraic	user boolean variable #52	unsigned char	
24628		Boolean/ Algebraic	user boolean variable #53	unsigned char	
24629		Boolean/ Algebraic	user boolean variable #54	unsigned char	
24630		Boolean/ Algebraic	user boolean variable #55	unsigned char	
24631		Boolean/ Algebraic	user boolean variable #56	unsigned char	
24632		Boolean/ Algebraic	user boolean variable #57	unsigned char	
24633		Boolean/ Algebraic	user boolean variable #58	unsigned char	
24634		Boolean/ Algebraic	user boolean variable #59	unsigned char	
24635		Boolean/ Algebraic	user boolean variable #60	unsigned char	
24636		Boolean/ Algebraic	user boolean variable #61	unsigned char	
24637		Boolean/ Algebraic	user boolean variable #62	unsigned char	
24638		Boolean/ Algebraic	user boolean variable #63	unsigned char	
24639		Boolean/ Algebraic	user boolean variable #64	unsigned char	
24640		Boolean/ Algebraic	user boolean variable #65	unsigned char	
24641		Boolean/ Algebraic	user boolean variable #66	unsigned char	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
24642		Boolean/ Algebraic	user boolean variable #67	unsigned char	
24643		Boolean/ Algebraic	user boolean variable #68	unsigned char	
24644		Boolean/ Algebraic	user boolean variable #69	unsigned char	
24645		Boolean/ Algebraic	user boolean variable #70	unsigned char	
24646		Boolean/ Algebraic	user boolean variable #71	unsigned char	
24647		Boolean/ Algebraic	user boolean variable #72	unsigned char	
24648		Boolean/ Algebraic	user boolean variable #73	unsigned char	
24649		Boolean/ Algebraic	user boolean variable #74	unsigned char	
24650		Boolean/ Algebraic	user boolean variable #75	unsigned char	
24651		Boolean/ Algebraic	user boolean variable #76	unsigned char	
24652		Boolean/ Algebraic	user boolean variable #77	unsigned char	
24653		Boolean/ Algebraic	user boolean variable #78	unsigned char	
24654		Boolean/ Algebraic	user boolean variable #79	unsigned char	
24655		Boolean/ Algebraic	user boolean variable #80	unsigned char	
24656		Boolean/ Algebraic	user boolean variable #81	unsigned char	
24657		Boolean/ Algebraic	user boolean variable #82	unsigned char	
24658		Boolean/ Algebraic	user boolean variable #83	unsigned char	
24659		Boolean/ Algebraic	user boolean variable #84	unsigned char	
24660		Boolean/ Algebraic	user boolean variable #85	unsigned char	
24661		Boolean/ Algebraic	user boolean variable #86	unsigned char	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
24662		Boolean/ Algebraic	user boolean variable #87	unsigned char	
24663		Boolean/ Algebraic	user boolean variable #88	unsigned char	
24664		Boolean/ Algebraic	user boolean variable #89	unsigned char	
24665		Boolean/ Algebraic	user boolean variable #90	unsigned char	
24666		Boolean/ Algebraic	user boolean variable #91	unsigned char	
24667		Boolean/ Algebraic	user boolean variable #92	unsigned char	
24668		Boolean/ Algebraic	user boolean variable #93	unsigned char	
24669		Boolean/ Algebraic	user boolean variable #94	unsigned char	
24670		Boolean/ Algebraic	user boolean variable #95	unsigned char	
24671		Boolean/ Algebraic	user boolean variable #96	unsigned char	
24672		Boolean/ Algebraic	user boolean variable #97	unsigned char	
24673		Boolean/ Algebraic	user boolean variable #98	unsigned char	
24674		Boolean/ Algebraic	user boolean variable #99	unsigned char	
24675		Boolean/ Algebraic	user boolean variable #100	unsigned char	
26624		System Command	set user alarm (data = user alarm # to set)	unsigned char	
26688		Boolean/ Algebraic	timer #1	unsigned char	
26689		Boolean/ Algebraic	timer #2	unsigned char	
26690		Boolean/ Algebraic	timer #3	unsigned char	
26691		Boolean/ Algebraic	timer #4	unsigned char	
26692		Boolean/ Algebraic	timer #5	unsigned char	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
26693		Boolean/ Algebraic	timer #6	unsigned char	
26694		Boolean/ Algebraic	timer #7	unsigned char	
26695		Boolean/ Algebraic	timer #8	unsigned char	
26696		Boolean/ Algebraic	timer #9	unsigned char	
26697		Boolean/ Algebraic	timer #10	unsigned char	
26698		Boolean/ Algebraic	timer #11	unsigned char	
26699		Boolean/ Algebraic	timer #12	unsigned char	
26700		Boolean/ Algebraic	timer #13	unsigned char	
26701		Boolean/ Algebraic	timer #14	unsigned char	
26702		Boolean/ Algebraic	timer #15	unsigned char	
26703		Boolean/ Algebraic	timer #16	unsigned char	
26816	26817	System Data	transaction ID	unsigned long int	System 143
<i>Note: The following registers are NOT database variables. Instead, they are control/test registers for Modbus™ setup and Program Mode access.</i>					
31744		Program Mode control	program mode exit (0=no op, 1=accept, 2=discard)	unsigned int (write only)	
31745			program mode state (0=no, 1=yes, 2=checking crits)	unsigned int (read only)	
31746			Program mode result (0=ok, 1=preempted, 2=crits, 3=reset)	unsigned int	
31747			number of criticals	unsigned int (read only)	
31800			endian control (0=big, 1=little 16, 2=little 8) <i>Note: This overrides the Program Mode Parameter "System 762" (modbus address 4626, function code 03.</i>	unsigned int	
31802	31803		PI (3.14159.....)	single precision floating point	

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
31804	31807		PI (3.14159.....)	double precision floating point	
32768	32783	Recipe Program Code	recipe #1 descriptive text (name)	text string	Recipe 002
32832	32833	Recipe Program Code	recipe #1 injector #1 volume	single precision floating point	Recipe 014
32834	32835	Recipe Program Code	recipe #1 injector #2 volume	single precision floating point	Recipe 015
32836	32837	Recipe Program Code	recipe #1 injector #3 volume	single precision floating point	Recipe 016
32838	32839	Recipe Program Code	recipe #1 injector #4 volume	single precision floating point	Recipe 017
32840	32841	Recipe Program Code	recipe #1 injector #5 volume	single precision floating point	Recipe 018
32842	32843	Recipe Program Code	recipe #1 injector #6 volume	single precision floating point	Recipe 019
32844	32845	Recipe Program Code	recipe #1 injector #7 volume	single precision floating point	Recipe 020
32846	32847	Recipe Program Code	recipe #1 injector #8 volume	single precision floating point	Recipe 021
32848	32849	Recipe Program Code	recipe #1 injector #9 volume	single precision floating point	Recipe 022
32850	32851	Recipe Program Code	recipe #1 injector #10 volume	single precision floating point	Recipe 023
32852	32853	Recipe Program Code	recipe #1 injector #11 volume	single precision floating point	Recipe 024
32854	32855	Recipe Program Code	recipe #1 injector #12 volume	single precision floating point	Recipe 025
32856	32857	Recipe Program Code	recipe #1 injector #1 rate	single precision floating point	Recipe 026
32858	32859	Recipe Program Code	recipe #1 injector #2 rate	single precision floating point	Recipe 027
32860	32861	Recipe Program Code	recipe #1 injector #3 rate	single precision floating point	Recipe 028
32862	32863	Recipe Program Code	recipe #1 injector #4 rate	single precision floating point	Recipe 029
32864	32865	Recipe Program Code	recipe #1 injector #5 rate	single precision floating point	Recipe 030
32866	32867	Recipe Program Code	recipe #1 injector #6 rate	single precision floating point	Recipe 031

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
32868	32869	Recipe Program Code	recipe #1 injector #7 rate	single precision floating point	Recipe 032
32870	32871	Recipe Program Code	recipe #1 injector #8 rate	single precision floating point	Recipe 033
32872	32873	Recipe Program Code	recipe #1 injector #9 rate	single precision floating point	Recipe 034
32874	32875	Recipe Program Code	recipe #1 injector #10 rate	single precision floating point	Recipe 035
32876	32877	Recipe Program Code	recipe #1 injector #11 rate	single precision floating point	Recipe 036
32878	32879	Recipe Program Code	recipe #1 injector #12 rate	single precision floating point	Recipe 037
32896		Recipe Program Code	recipe #1 in use	unsigned char	Recipe 001
33280	33295	Recipe Program Code	recipe #2 descriptive text (name)	text string	Recipe 002
33344	33345	Recipe Program Code	recipe #2 injector #1 volume	single precision floating point	Recipe 014
33346	33347	Recipe Program Code	recipe #2 injector #2 volume	single precision floating point	Recipe 015
33348	33349	Recipe Program Code	recipe #2 injector #3 volume	single precision floating point	Recipe 016
33350	33351	Recipe Program Code	recipe #2 injector #4 volume	single precision floating point	Recipe 017
33352	33353	Recipe Program Code	recipe #2 injector #5 volume	single precision floating point	Recipe 018
33354	33355	Recipe Program Code	recipe #2 injector #6 volume	single precision floating point	Recipe 019
33356	33357	Recipe Program Code	recipe #2 injector #7 volume	single precision floating point	Recipe 020
33358	33359	Recipe Program Code	recipe #2 injector #8 volume	single precision floating point	Recipe 021
33360	33361	Recipe Program Code	recipe #2 injector #9 volume	single precision floating point	Recipe 022
33362	33363	Recipe Program Code	recipe #2 injector #10 volume	single precision floating point	Recipe 023
33364	33365	Recipe Program Code	recipe #2 injector #11 volume	single precision floating point	Recipe 024
33366	33367	Recipe Program Code	recipe #2 injector #12 volume	single precision floating point	Recipe 025

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
33368	33369	Recipe Program Code	recipe #2 injector #1 rate	single precision floating point	Recipe 026
33370	33371	Recipe Program Code	recipe #2 injector #2 rate	single precision floating point	Recipe 027
33372	33373	Recipe Program Code	recipe #2 injector #3 rate	single precision floating point	Recipe 028
33374	33375	Recipe Program Code	recipe #2 injector #4 rate	single precision floating point	Recipe 029
33376	33377	Recipe Program Code	recipe #2 injector #5 rate	single precision floating point	Recipe 030
33378	33379	Recipe Program Code	recipe #2 injector #6 rate	single precision floating point	Recipe 031
33380	33381	Recipe Program Code	recipe #2 injector #7 rate	single precision floating point	Recipe 032
33382	33383	Recipe Program Code	recipe #2 injector #8 rate	single precision floating point	Recipe 033
33384	33385	Recipe Program Code	recipe #2 injector #9 rate	single precision floating point	Recipe 034
33386	33387	Recipe Program Code	recipe #2 injector #10 rate	single precision floating point	Recipe 035
33388	33389	Recipe Program Code	recipe #2 injector #11 rate	single precision floating point	Recipe 036
33390	33391	Recipe Program Code	recipe #2 injector #12 rate	single precision floating point	Recipe 037
33408		Recipe Program Code	recipe #2 in use	unsigned char	Recipe 001
33792	33807	Recipe Program Code	recipe #3 descriptive text (name)	text string	Recipe 002
33856	33857	Recipe Program Code	recipe #3 injector #1 volume	single precision floating point	Recipe 014
33858	33859	Recipe Program Code	recipe #3 injector #2 volume	single precision floating point	Recipe 015
33860	33861	Recipe Program Code	recipe #3 injector #3 volume	single precision floating point	Recipe 016
33862	33863	Recipe Program Code	recipe #3 injector #4 volume	single precision floating point	Recipe 017
33864	33865	Recipe Program Code	recipe #3 injector #5 volume	single precision floating point	Recipe 018
33866	33867	Recipe Program Code	recipe #3 injector #6 volume	single precision floating point	Recipe 019

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
33868	33869	Recipe Program Code	recipe #3 injector #7 volume	single precision floating point	Recipe 020
33870	33871	Recipe Program Code	recipe #3 injector #8 volume	single precision floating point	Recipe 021
33872	33873	Recipe Program Code	recipe #3 injector #9 volume	single precision floating point	Recipe 022
33874	33875	Recipe Program Code	recipe #3 injector #10 volume	single precision floating point	Recipe 023
33876	33877	Recipe Program Code	recipe #3 injector #11 volume	single precision floating point	Recipe 024
33878	33879	Recipe Program Code	recipe #3 injector #12 volume	single precision floating point	Recipe 025
33880	33881	Recipe Program Code	recipe #3 injector #1 rate	single precision floating point	Recipe 026
33882	33883	Recipe Program Code	recipe #3 injector #2 rate	single precision floating point	Recipe 027
33884	33885	Recipe Program Code	recipe #3 injector #3 rate	single precision floating point	Recipe 028
33886	33887	Recipe Program Code	recipe #3 injector #4 rate	single precision floating point	Recipe 029
33888	33889	Recipe Program Code	recipe #3 injector #5 rate	single precision floating point	Recipe 030
33890	33891	Recipe Program Code	recipe #3 injector #6 rate	single precision floating point	Recipe 031
33892	33893	Recipe Program Code	recipe #3 injector #7 rate	single precision floating point	Recipe 032
33894	33895	Recipe Program Code	recipe #3 injector #8 rate	single precision floating point	Recipe 033
33896	33897	Recipe Program Code	recipe #3 injector #9 rate	single precision floating point	Recipe 034
33898	33899	Recipe Program Code	recipe #3 injector #10 rate	single precision floating point	Recipe 035
33900	33901	Recipe Program Code	recipe #3 injector #11 rate	single precision floating point	Recipe 036
33902	33903	Recipe Program Code	recipe #3 injector #12 rate	single precision floating point	Recipe 037
33920		Recipe Program Code	recipe #3 in use	unsigned char	Recipe 001
34304	34319	Recipe Program Code	recipe #4 descriptive text (name)	text string	Recipe 002

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
34368	34369	Recipe Program Code	recipe #4 injector #1 volume	single precision floating point	Recipe 014
34370	34371	Recipe Program Code	recipe #4 injector #2 volume	single precision floating point	Recipe 015
34372	34373	Recipe Program Code	recipe #4 injector #3 volume	single precision floating point	Recipe 016
34374	34375	Recipe Program Code	recipe #4 injector #4 volume	single precision floating point	Recipe 017
34376	34377	Recipe Program Code	recipe #4 injector #5 volume	single precision floating point	Recipe 018
34378	34379	Recipe Program Code	recipe #4 injector #6 volume	single precision floating point	Recipe 019
34380	34381	Recipe Program Code	recipe #4 injector #7 volume	single precision floating point	Recipe 020
34382	34383	Recipe Program Code	recipe #4 injector #8 volume	single precision floating point	Recipe 021
34384	34385	Recipe Program Code	recipe #4 injector #9 volume	single precision floating point	Recipe 022
34386	34387	Recipe Program Code	recipe #4 injector #10 volume	single precision floating point	Recipe 023
34388	34389	Recipe Program Code	recipe #4 injector #11 volume	single precision floating point	Recipe 024
34390	34391	Recipe Program Code	recipe #4 injector #12 volume	single precision floating point	Recipe 025
34392	34393	Recipe Program Code	recipe #4 injector #1 rate	single precision floating point	Recipe 026
34394	34395	Recipe Program Code	recipe #4 injector #2 rate	single precision floating point	Recipe 027
34396	34397	Recipe Program Code	recipe #4 injector #3 rate	single precision floating point	Recipe 028
34398	34399	Recipe Program Code	recipe #4 injector #4 rate	single precision floating point	Recipe 029
34400	34401	Recipe Program Code	recipe #4 injector #5 rate	single precision floating point	Recipe 030
34402	34403	Recipe Program Code	recipe #4 injector #6 rate	single precision floating point	Recipe 031
34404	34405	Recipe Program Code	recipe #4 injector #7 rate	single precision floating point	Recipe 032
34406	34407	Recipe Program Code	recipe #4 injector #8 rate	single precision floating point	Recipe 033

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
34408	34409	Recipe Program Code	recipe #4 injector #9 rate	single precision floating point	Recipe 034
34410	34411	Recipe Program Code	recipe #4 injector #10 rate	single precision floating point	Recipe 035
34412	34413	Recipe Program Code	recipe #4 injector #11 rate	single precision floating point	Recipe 036
34414	34415	Recipe Program Code	recipe #4 injector #12 rate	single precision floating point	Recipe 037
34432		Recipe Program Code	recipe #4 in use	unsigned char	Recipe 001
34816	34831	Recipe Program Code	recipe #5 descriptive text (name)	text string	Recipe 002
34880	34881	Recipe Program Code	recipe #5 injector #1 volume	single precision floating point	Recipe 014
34882	34883	Recipe Program Code	recipe #5 injector #2 volume	single precision floating point	Recipe 015
34884	34885	Recipe Program Code	recipe #5 injector #3 volume	single precision floating point	Recipe 016
34886	34887	Recipe Program Code	recipe #5 injector #4 volume	single precision floating point	Recipe 017
34888	34889	Recipe Program Code	recipe #5 injector #5 volume	single precision floating point	Recipe 018
34890	34891	Recipe Program Code	recipe #5 injector #6 volume	single precision floating point	Recipe 019
34892	34893	Recipe Program Code	recipe #5 injector #7 volume	single precision floating point	Recipe 020
34894	34895	Recipe Program Code	recipe #5 injector #8 volume	single precision floating point	Recipe 021
34896	34897	Recipe Program Code	recipe #5 injector #9 volume	single precision floating point	Recipe 022
34898	34899	Recipe Program Code	recipe #5 injector #10 volume	single precision floating point	Recipe 023
34900	34901	Recipe Program Code	recipe #5 injector #11 volume	single precision floating point	Recipe 024
34902	34903	Recipe Program Code	recipe #5 injector #12 volume	single precision floating point	Recipe 025
34904	34905	Recipe Program Code	recipe #5 injector #1 rate	single precision floating point	Recipe 026
34906	34907	Recipe Program Code	recipe #5 injector #2 rate	single precision floating point	Recipe 027

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
34908	34909	Recipe Program Code	recipe #5 injector #3 rate	single precision floating point	Recipe 028
34910	34911	Recipe Program Code	recipe #5 injector #4 rate	single precision floating point	Recipe 029
34912	34913	Recipe Program Code	recipe #5 injector #5 rate	single precision floating point	Recipe 030
34914	34915	Recipe Program Code	recipe #5 injector #6 rate	single precision floating point	Recipe 031
34916	34917	Recipe Program Code	recipe #5 injector #7 rate	single precision floating point	Recipe 032
34918	34919	Recipe Program Code	recipe #5 injector #8 rate	single precision floating point	Recipe 033
34920	34921	Recipe Program Code	recipe #5 injector #9 rate	single precision floating point	Recipe 034
34922	34923	Recipe Program Code	recipe #5 injector #10 rate	single precision floating point	Recipe 035
34924	34925	Recipe Program Code	recipe #5 injector #11 rate	single precision floating point	Recipe 036
34926	34927	Recipe Program Code	recipe #5 injector #12 rate	single precision floating point	Recipe 037
34944		Recipe Program Code	recipe #5 in use	unsigned char	Recipe 001
35328	35343	Recipe Program Code	recipe #6 descriptive text (name)	text string	Recipe 002
35392	35393	Recipe Program Code	recipe #6 injector #1 volume	single precision floating point	Recipe 014
35394	35395	Recipe Program Code	recipe #6 injector #2 volume	single precision floating point	Recipe 015
35396	35397	Recipe Program Code	recipe #6 injector #3 volume	single precision floating point	Recipe 016
35398	35399	Recipe Program Code	recipe #6 injector #4 volume	single precision floating point	Recipe 017
35400	35401	Recipe Program Code	recipe #6 injector #5 volume	single precision floating point	Recipe 018
35402	35403	Recipe Program Code	recipe #6 injector #6 volume	single precision floating point	Recipe 019
35404	35405	Recipe Program Code	recipe #6 injector #7 volume	single precision floating point	Recipe 020
35406	35407	Recipe Program Code	recipe #6 injector #8 volume	single precision floating point	Recipe 021

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
35408	35409	Recipe Program Code	recipe #6 injector #9 volume	single precision floating point	Recipe 022
35410	35411	Recipe Program Code	recipe #6 injector #10 volume	single precision floating point	Recipe 023
35412	35413	Recipe Program Code	recipe #6 injector #11 volume	single precision floating point	Recipe 024
35414	35415	Recipe Program Code	recipe #6 injector #12 volume	single precision floating point	Recipe 025
35416	35417	Recipe Program Code	recipe #6 injector #1 rate	single precision floating point	Recipe 026
35418	35419	Recipe Program Code	recipe #6 injector #2 rate	single precision floating point	Recipe 027
35420	35421	Recipe Program Code	recipe #6 injector #3 rate	single precision floating point	Recipe 028
35422	35423	Recipe Program Code	recipe #6 injector #4 rate	single precision floating point	Recipe 029
35424	35425	Recipe Program Code	recipe #6 injector #5 rate	single precision floating point	Recipe 030
35426	35427	Recipe Program Code	recipe #6 injector #6 rate	single precision floating point	Recipe 031
35428	35429	Recipe Program Code	recipe #6 injector #7 rate	single precision floating point	Recipe 032
35430	35431	Recipe Program Code	recipe #6 injector #8 rate	single precision floating point	Recipe 033
35432	35433	Recipe Program Code	recipe #6 injector #9 rate	single precision floating point	Recipe 034
35434	35435	Recipe Program Code	recipe #6 injector #10 rate	single precision floating point	Recipe 035
35436	35437	Recipe Program Code	recipe #6 injector #11 rate	single precision floating point	Recipe 036
35438	35439	Recipe Program Code	recipe #6 injector #12 rate	single precision floating point	Recipe 037
35456		Recipe Program Code	recipe #6 in use	unsigned char	Recipe 001
35840	35855	Recipe Program Code	recipe #7 descriptive text (name)	text string	Recipe 002
35904	35905	Recipe Program Code	recipe #7 injector #1 volume	single precision floating point	Recipe 014
35906	35907	Recipe Program Code	recipe #7 injector #2 volume	single precision floating point	Recipe 015

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
35908	35909	Recipe Program Code	recipe #7 injector #3 volume	single precision floating point	Recipe 016
35910	35911	Recipe Program Code	recipe #7 injector #4 volume	single precision floating point	Recipe 017
35912	35913	Recipe Program Code	recipe #7 injector #5 volume	single precision floating point	Recipe 018
35914	35915	Recipe Program Code	recipe #7 injector #6 volume	single precision floating point	Recipe 019
35916	35917	Recipe Program Code	recipe #7 injector #7 volume	single precision floating point	Recipe 020
35918	35919	Recipe Program Code	recipe #7 injector #8 volume	single precision floating point	Recipe 021
35920	35921	Recipe Program Code	recipe #7 injector #9 volume	single precision floating point	Recipe 022
35922	35923	Recipe Program Code	recipe #7 injector #10 volume	single precision floating point	Recipe 023
35924	35925	Recipe Program Code	recipe #7 injector #11 volume	single precision floating point	Recipe 024
35926	35927	Recipe Program Code	recipe #7 injector #12 volume	single precision floating point	Recipe 025
35928	35929	Recipe Program Code	recipe #7 injector #1 rate	single precision floating point	Recipe 026
35930	35931	Recipe Program Code	recipe #7 injector #2 rate	single precision floating point	Recipe 027
35932	35933	Recipe Program Code	recipe #7 injector #3 rate	single precision floating point	Recipe 028
35934	35935	Recipe Program Code	recipe #7 injector #4 rate	single precision floating point	Recipe 029
35936	35937	Recipe Program Code	recipe #7 injector #5 rate	single precision floating point	Recipe 030
35938	35939	Recipe Program Code	recipe #7 injector #6 rate	single precision floating point	Recipe 031
35940	35941	Recipe Program Code	recipe #7 injector #7 rate	single precision floating point	Recipe 032
35942	35943	Recipe Program Code	recipe #7 injector #8 rate	single precision floating point	Recipe 033
35944	35945	Recipe Program Code	recipe #7 injector #9 rate	single precision floating point	Recipe 034
35946	35947	Recipe Program Code	recipe #7 injector #10 rate	single precision floating point	Recipe 035

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
35948	35949	Recipe Program Code	recipe #7 injector #11 rate	single precision floating point	Recipe 036
35950	35951	Recipe Program Code	recipe #7 injector #12 rate	single precision floating point	Recipe 037
35968		Recipe Program Code	recipe #7 in use	unsigned char	Recipe 001
36352	36367	Recipe Program Code	recipe #8 descriptive text (name)	text string	Recipe 002
36416	36417	Recipe Program Code	recipe #8 injector #1 volume	single precision floating point	Recipe 014
36418	36419	Recipe Program Code	recipe #8 injector #2 volume	single precision floating point	Recipe 015
36420	36421	Recipe Program Code	recipe #8 injector #3 volume	single precision floating point	Recipe 016
36422	36423	Recipe Program Code	recipe #8 injector #4 volume	single precision floating point	Recipe 017
36424	36425	Recipe Program Code	recipe #8 injector #5 volume	single precision floating point	Recipe 018
36426	36427	Recipe Program Code	recipe #8 injector #6 volume	single precision floating point	Recipe 019
36428	36429	Recipe Program Code	recipe #8 injector #7 volume	single precision floating point	Recipe 020
36430	36431	Recipe Program Code	recipe #8 injector #8 volume	single precision floating point	Recipe 021
36432	36433	Recipe Program Code	recipe #8 injector #9 volume	single precision floating point	Recipe 022
36434	36435	Recipe Program Code	recipe #8 injector #10 volume	single precision floating point	Recipe 023
36436	36437	Recipe Program Code	recipe #8 injector #11 volume	single precision floating point	Recipe 024
36438	36439	Recipe Program Code	recipe #8 injector #12 volume	single precision floating point	Recipe 025
36440	36441	Recipe Program Code	recipe #8 injector #1 rate	single precision floating point	Recipe 026
36442	36443	Recipe Program Code	recipe #8 injector #2 rate	single precision floating point	Recipe 027
36444	36445	Recipe Program Code	recipe #8 injector #3 rate	single precision floating point	Recipe 028
36446	36447	Recipe Program Code	recipe #8 injector #4 rate	single precision floating point	Recipe 029

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
36448	36449	Recipe Program Code	recipe #8 injector #5 rate	single precision floating point	Recipe 030
36450	36451	Recipe Program Code	recipe #8 injector #6 rate	single precision floating point	Recipe 031
36452	36453	Recipe Program Code	recipe #8 injector #7 rate	single precision floating point	Recipe 032
36454	36455	Recipe Program Code	recipe #8 injector #8 rate	single precision floating point	Recipe 033
36456	36457	Recipe Program Code	recipe #8 injector #9 rate	single precision floating point	Recipe 034
36458	36459	Recipe Program Code	recipe #8 injector #10 rate	single precision floating point	Recipe 035
36460	36461	Recipe Program Code	recipe #8 injector #11 rate	single precision floating point	Recipe 036
36462	36463	Recipe Program Code	recipe #8 injector #12 rate	single precision floating point	Recipe 037
36480		Recipe Program Code	recipe #8 in use	unsigned char	Recipe 001
36864	36879	Recipe Program Code	recipe #9 descriptive text (name)	text string	Recipe 002
36928	36929	Recipe Program Code	recipe #9 injector #1 volume	single precision floating point	Recipe 014
36930	36931	Recipe Program Code	recipe #9 injector #2 volume	single precision floating point	Recipe 015
36932	36933	Recipe Program Code	recipe #9 injector #3 volume	single precision floating point	Recipe 016
36934	36935	Recipe Program Code	recipe #9 injector #4 volume	single precision floating point	Recipe 017
36936	36937	Recipe Program Code	recipe #9 injector #5 volume	single precision floating point	Recipe 018
36938	36939	Recipe Program Code	recipe #9 injector #6 volume	single precision floating point	Recipe 019
36940	36941	Recipe Program Code	recipe #9 injector #7 volume	single precision floating point	Recipe 020
36942	36943	Recipe Program Code	recipe #9 injector #8 volume	single precision floating point	Recipe 021
36944	36945	Recipe Program Code	recipe #9 injector #9 volume	single precision floating point	Recipe 022
36946	36947	Recipe Program Code	recipe #9 injector #10 volume	single precision floating point	Recipe 023

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
36948	36949	Recipe Program Code	recipe #9 injector #11 volume	single precision floating point	Recipe 024
36950	36951	Recipe Program Code	recipe #9 injector #12 volume	single precision floating point	Recipe 025
36952	36953	Recipe Program Code	recipe #9 injector #1 rate	single precision floating point	Recipe 026
36954	36955	Recipe Program Code	recipe #9 injector #2 rate	single precision floating point	Recipe 027
36956	36957	Recipe Program Code	recipe #9 injector #3 rate	single precision floating point	Recipe 028
36958	36959	Recipe Program Code	recipe #9 injector #4 rate	single precision floating point	Recipe 029
36960	36961	Recipe Program Code	recipe #9 injector #5 rate	single precision floating point	Recipe 030
36962	36963	Recipe Program Code	recipe #9 injector #6 rate	single precision floating point	Recipe 031
36964	36965	Recipe Program Code	recipe #9 injector #7 rate	single precision floating point	Recipe 032
36966	36967	Recipe Program Code	recipe #9 injector #8 rate	single precision floating point	Recipe 033
36968	36969	Recipe Program Code	recipe #9 injector #9 rate	single precision floating point	Recipe 034
36970	36971	Recipe Program Code	recipe #9 injector #10 rate	single precision floating point	Recipe 035
36972	36973	Recipe Program Code	recipe #9 injector #11 rate	single precision floating point	Recipe 036
36974	36975	Recipe Program Code	recipe #9 injector #12 rate	single precision floating point	Recipe 037
36992		Recipe Program Code	recipe #9 in use	unsigned char	Recipe 001
37376	37391	Recipe Program Code	recipe #10 descriptive text (name)	text string	Recipe 002
37440	37441	Recipe Program Code	recipe #10 injector #1 volume	single precision floating point	Recipe 014
37442	37443	Recipe Program Code	recipe #10 injector #2 volume	single precision floating point	Recipe 015
37444	37445	Recipe Program Code	recipe #10 injector #3 volume	single precision floating point	Recipe 016
37446	37447	Recipe Program Code	recipe #10 injector #4 volume	single precision floating point	Recipe 017

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
37448	37449	Recipe Program Code	recipe #10 injector #5 volume	single precision floating point	Recipe 018
37450	37451	Recipe Program Code	recipe #10 injector #6 volume	single precision floating point	Recipe 019
37452	37453	Recipe Program Code	recipe #10 injector #7 volume	single precision floating point	Recipe 020
37454	37455	Recipe Program Code	recipe #10 injector #8 volume	single precision floating point	Recipe 021
37456	37457	Recipe Program Code	recipe #10 injector #9 volume	single precision floating point	Recipe 022
37458	37459	Recipe Program Code	recipe #10 injector #10 volume	single precision floating point	Recipe 023
37460	37461	Recipe Program Code	recipe #10 injector #11 volume	single precision floating point	Recipe 024
37462	37463	Recipe Program Code	recipe #10 injector #12 volume	single precision floating point	Recipe 025
37464	37465	Recipe Program Code	recipe #10 injector #1 rate	single precision floating point	Recipe 026
37466	37467	Recipe Program Code	recipe #10 injector #2 rate	single precision floating point	Recipe 027
37468	37469	Recipe Program Code	recipe #10 injector #3 rate	single precision floating point	Recipe 028
37470	37471	Recipe Program Code	recipe #10 injector #4 rate	single precision floating point	Recipe 029
37472	37473	Recipe Program Code	recipe #10 injector #5 rate	single precision floating point	Recipe 030
37474	37475	Recipe Program Code	recipe #10 injector #6 rate	single precision floating point	Recipe 031
37476	37477	Recipe Program Code	recipe #10 injector #7 rate	single precision floating point	Recipe 032
37478	37479	Recipe Program Code	recipe #10 injector #8 rate	single precision floating point	Recipe 033
37480	37481	Recipe Program Code	recipe #10 injector #9 rate	single precision floating point	Recipe 034
37482	37483	Recipe Program Code	recipe #10 injector #10 rate	single precision floating point	Recipe 035
37484	37485	Recipe Program Code	recipe #10 injector #11 rate	single precision floating point	Recipe 036
37486	37487	Recipe Program Code	recipe #10 injector #12 rate	single precision floating point	Recipe 037

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
37504		Recipe Program Code	recipe #10 in use	unsigned char	Recipe 001
37888	37903	Recipe Program Code	recipe #11 descriptive text (name)	text string	Recipe 002
37952	37953	Recipe Program Code	recipe #11 injector #1 volume	single precision floating point	Recipe 014
37954	37955	Recipe Program Code	recipe #11 injector #2 volume	single precision floating point	Recipe 015
37956	37957	Recipe Program Code	recipe #11 injector #3 volume	single precision floating point	Recipe 016
37958	37959	Recipe Program Code	recipe #11 injector #4 volume	single precision floating point	Recipe 017
37960	37961	Recipe Program Code	recipe #11 injector #5 volume	single precision floating point	Recipe 018
37962	37963	Recipe Program Code	recipe #11 injector #6 volume	single precision floating point	Recipe 019
37964	37965	Recipe Program Code	recipe #11 injector #7 volume	single precision floating point	Recipe 020
37966	37967	Recipe Program Code	recipe #11 injector #8 volume	single precision floating point	Recipe 021
37968	37969	Recipe Program Code	recipe #11 injector #9 volume	single precision floating point	Recipe 022
37970	37971	Recipe Program Code	recipe #11 injector #10 volume	single precision floating point	Recipe 023
37972	37973	Recipe Program Code	recipe #11 injector #11 volume	single precision floating point	Recipe 024
37974	37975	Recipe Program Code	recipe #11 injector #12 volume	single precision floating point	Recipe 025
37976	37977	Recipe Program Code	recipe #11 injector #1 rate	single precision floating point	Recipe 026
37978	37979	Recipe Program Code	recipe #11 injector #2 rate	single precision floating point	Recipe 027
37980	37981	Recipe Program Code	recipe #11 injector #3 rate	single precision floating point	Recipe 028
37982	37983	Recipe Program Code	recipe #11 injector #4 rate	single precision floating point	Recipe 029
37984	37985	Recipe Program Code	recipe #11 injector #5 rate	single precision floating point	Recipe 030
37986	37987	Recipe Program Code	recipe #11 injector #6 rate	single precision floating point	Recipe 031

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
37988	37989	Recipe Program Code	recipe #11 injector #7 rate	single precision floating point	Recipe 032
37990	37991	Recipe Program Code	recipe #11 injector #8 rate	single precision floating point	Recipe 033
37992	37993	Recipe Program Code	recipe #11 injector #9 rate	single precision floating point	Recipe 034
37994	37995	Recipe Program Code	recipe #11 injector #10 rate	single precision floating point	Recipe 035
37996	37997	Recipe Program Code	recipe #11 injector #11 rate	single precision floating point	Recipe 036
37998	37999	Recipe Program Code	recipe #11 injector #12 rate	single precision floating point	Recipe 037
38016		Recipe Program Code	recipe #11 in use	unsigned char	Recipe 001
38400	38415	Recipe Program Code	recipe #12 descriptive text (name)	text string	Recipe 002
38464	38465	Recipe Program Code	recipe #12 injector #1 volume	single precision floating point	Recipe 014
38466	38467	Recipe Program Code	recipe #12 injector #2 volume	single precision floating point	Recipe 015
38468	38469	Recipe Program Code	recipe #12 injector #3 volume	single precision floating point	Recipe 016
38470	38471	Recipe Program Code	recipe #12 injector #4 volume	single precision floating point	Recipe 017
38472	38473	Recipe Program Code	recipe #12 injector #5 volume	single precision floating point	Recipe 018
38474	38475	Recipe Program Code	recipe #12 injector #6 volume	single precision floating point	Recipe 019
38476	38477	Recipe Program Code	recipe #12 injector #7 volume	single precision floating point	Recipe 020
38478	38479	Recipe Program Code	recipe #12 injector #8 volume	single precision floating point	Recipe 021
38480	38481	Recipe Program Code	recipe #12 injector #9 volume	single precision floating point	Recipe 022
38482	38483	Recipe Program Code	recipe #12 injector #10 volume	single precision floating point	Recipe 023
38484	38485	Recipe Program Code	recipe #12 injector #11 volume	single precision floating point	Recipe 024
38486	38487	Recipe Program Code	recipe #12 injector #12 volume	single precision floating point	Recipe 025

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type	Program Mode Parameter
38488	38489	Recipe Program Code	recipe #12 injector #1 rate	single precision floating point	Recipe 026
38490	38491	Recipe Program Code	recipe #12 injector #2 rate	single precision floating point	Recipe 027
38492	38493	Recipe Program Code	recipe #12 injector #3 rate	single precision floating point	Recipe 028
38494	38495	Recipe Program Code	recipe #12 injector #4 rate	single precision floating point	Recipe 029
38496	38497	Recipe Program Code	recipe #12 injector #5 rate	single precision floating point	Recipe 030
38498	38499	Recipe Program Code	recipe #12 injector #6 rate	single precision floating point	Recipe 031
38500	38501	Recipe Program Code	recipe #12 injector #7 rate	single precision floating point	Recipe 032
38502	38503	Recipe Program Code	recipe #12 injector #8 rate	single precision floating point	Recipe 033
38504	38505	Recipe Program Code	recipe #12 injector #9 rate	single precision floating point	Recipe 034
38506	38507	Recipe Program Code	recipe #12 injector #10 rate	single precision floating point	Recipe 035
38508	38509	Recipe Program Code	recipe #12 injector #11 rate	single precision floating point	Recipe 036
38510	38511	Recipe Program Code	recipe #12 injector #12 rate	single precision floating point	Recipe 037
38528		Recipe Program Code	recipe #12 in use	unsigned char	Recipe 001

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Modbus™ Mapping of Function Code 04, Read Information Register (Read Input Regs)

Note: These registers correspond to run-time read only data.

Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
0	512	Extended Services	outbound (response) buffer area	extended services packet (see the "Extended Services" section of this manual for detailed information on accessing these functions.
5120	5127	Transaction Data	date	text string
5128	5135	Transaction Data	alarm log #1	text string
5136	5143	Transaction Data	alarm log #2	text string
5144	5151	Transaction Data	alarm log #3	text string
5152	5159	Transaction Data	alarm log #4	text string
5160	5167	Transaction Data	alarm log #5	text string
5168	5175	Transaction Data	alarm log #6	text string
5176	5183	Transaction Data	alarm log #7	text string
5184	5191	Transaction Data	alarm log #8	text string
5192	5199	Transaction Data	alarm log #9	text string
5200	5207	Transaction Data	alarm log #10	text string
5208	5215	Transaction Data	alarm log #11	text string
5216	5223	Transaction Data	alarm log #12	text string
5224	5231	Transaction Data	alarm log #13	text string
5232	5239	Transaction Data	alarm log #14	text string
5240	5247	Transaction Data	alarm log #15	text string
5248	5255	Transaction Data	alarm log #16	text string
5256	5263	Transaction Data	alarm log #17	text string
5264	5271	Transaction Data	alarm log #18	text string
5272	5279	Transaction Data	alarm log #19	text string
5280	5287	Transaction Data	alarm log #20	text string
5288	5295	Transaction Data	transaction end time	text string
5376	5377	Transaction Data	average meter factor	single precision floating point
5378	5379	Transaction Data	average temperature	single precision floating point
5380	5381	Transaction Data	average density	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
5382	5383	Transaction Data	average pressure	single precision floating point
5384	5385	Transaction Data	average CTL (temperature compensation)	single precision floating point
5386	5387	Transaction Data	average CPL (pressure compensation)	single precision floating point
5388	5389	Transaction Data	preset volume	single precision floating point
5390	5391	Transaction Data	current flow rate	single precision floating point
5392	5393	Transaction Data	current meter factor	single precision floating point
5394	5395	Transaction Data	current temperature	single precision floating point
5396	5397	Transaction Data	current density	single precision floating point
5398	5399	Transaction Data	current pressure	single precision floating point
5400	5401	Transaction Data	current vapor pressure	single precision floating point
5440	5443	Transaction Data	current raw volume	double precision floating point
5444	5447	Transaction Data	current gross volume	double precision floating point
5448	5451	Transaction Data	current GST volume	double precision floating point
5452	5455	Transaction Data	current GSV volume	double precision floating point
5456	5459	Transaction Data	current mass	double precision floating point
5460	5463	Transaction Data	current remaining volume	double precision floating point
5464	5467	Transaction Data	additive #1 total volume	double precision floating point
5468	5471	Transaction Data	additive #2 total volume	double precision floating point
5472	5475	Transaction Data	additive #3 total volume	double precision floating point
5476	5479	Transaction Data	additive #4 total volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
5480	5483	Transaction Data	additive #5 total volume	double precision floating point
5484	5487	Transaction Data	additive #6 total volume	double precision floating point
5488	5491	Transaction Data	additive #7 total volume	double precision floating point
5492	5495	Transaction Data	additive #8 total volume	double precision floating point
5496	5499	Transaction Data	additive #9 total volume	double precision floating point
5500	5503	Transaction Data	additive #10 total volume	double precision floating point
5504	5507	Transaction Data	additive #11 total volume	double precision floating point
5508	5511	Transaction Data	additive #12 total volume	double precision floating point
5512	5515	Transaction Data	nonresettable raw volume	double precision floating point
5516	5519	Transaction Data	nonresettable gross volume	double precision floating point
5520	5523	Transaction Data	nonresettable GST volume	double precision floating point
5524	5527	Transaction Data	nonresettable GSV volume	double precision floating point
5528	5531	Transaction Data	nonresettable mass	double precision floating point
5532	5535	Transaction Data	nonresettable additive #1 volume	double precision floating point
5536	5539	Transaction Data	nonresettable additive #2 volume	double precision floating point
5540	5543	Transaction Data	nonresettable additive #3 volume	double precision floating point
5544	5547	Transaction Data	nonresettable additive #4 volume	double precision floating point
5548	5551	Transaction Data	nonresettable additive #5 volume	double precision floating point
5552	5555	Transaction Data	nonresettable additive #6 volume	double precision floating point
5556	5559	Transaction Data	nonresettable additive #7 volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
5560	5563	Transaction Data	nonresettable additive #8 volume	double precision floating point
5564	5567	Transaction Data	nonresettable additive #9 volume	double precision floating point
5568	5571	Transaction Data	nonresettable additive #10 volume	double precision floating point
5572	5575	Transaction Data	nonresettable additive #11 volume	double precision floating point
5576	5579	Transaction Data	nonresettable additive #12 volume	double precision floating point
5696		Transaction Data	ROM (software) version	unsigned char
5697		Transaction Data	batch status	unsigned char
5698		Transaction Data	pump status	unsigned char
5760		Transaction Data	current transaction number	unsigned int
5761		Transaction Data	current batch number	unsigned int
5824	5825	Transaction Data	ROM (software) CRC32 check code	unsigned long int
5826	5827	Transaction Data	prompt #1 response	unsigned long int
5828	5829	Transaction Data	prompt #2 response	unsigned long int
5830	5831	Transaction Data	prompt #3 response	unsigned long int
5832	5833	Transaction Data	prompt #4 response	unsigned long int
5834	5835	Transaction Data	prompt #5 response	unsigned long int
6144	6151	Batch Data	batch #1 alarm #1	text string
6152	6159	Batch Data	batch #1 alarm #2	text string
6160	6167	Batch Data	batch #1 alarm #3	text string
6168	6175	Batch Data	batch #1 alarm #4	text string
6176	6183	Batch Data	batch #1 alarm #5	text string
6184	6191	Batch Data	batch #1 alarm #6	text string
6192	6199	Batch Data	batch #1 alarm #7	text string
6200	6207	Batch Data	batch #1 alarm #8	text string
6208	6215	Batch Data	batch #1 alarm #9	text string
6216	6223	Batch Data	batch #1 alarm #10	text string
6272	6273	Batch Data	batch #1 average flow rate	single precision floating point
6274	6275	Batch Data	batch #1 average meter factor	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
6276	6277	Batch Data	batch #1 average temperature	single precision floating point
6278	6279	Batch Data	batch #1 average density	single precision floating point
6280	6281	Batch Data	batch #1 average pressure	single precision floating point
6282	6283	Batch Data	batch #1 average CTL (temperature compensation)	single precision floating point
6284	6285	Batch Data	batch #1 average CPL (pressure compensation)	single precision floating point
6286	6287	Batch Data	batch #1 average CCF	single precision floating point
6288	6289	Batch Data	batch #1 reference density	single precision floating point
6290	6291	Batch Data	batch #1 relative density	single precision floating point
6292	6293	Batch Data	batch #1 API density	single precision floating point
6294	6295	Batch Data	batch #1 average vapor pressure	single precision floating point
6336	6339	Batch Data	batch #1 meter pulses	double precision floating point
6340	6343	Batch Data	batch #1 raw volume	double precision floating point
6344	6347	Batch Data	batch #1 gross volume	double precision floating point
6348	6351	Batch Data	batch #1 GST volume	double precision floating point
6352	6355	Batch Data	batch #1 GSV volume	double precision floating point
6356	6359	Batch Data	batch #1 mass	double precision floating point
6360	6363	Batch Data	batch #1 additive #1 volume	double precision floating point
6364	6367	Batch Data	batch #1 additive #2 volume	double precision floating point
6368	6371	Batch Data	batch #1 additive #3 volume	double precision floating point
6372	6375	Batch Data	batch #1 additive #4 volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
6376	6379	Batch Data	batch #1 additive #5 volume	double precision floating point
6380	6383	Batch Data	batch #1 additive #6 volume	double precision floating point
6384	6387	Batch Data	batch #1 additive #7 volume	double precision floating point
6388	6391	Batch Data	batch #1 additive #8 volume	double precision floating point
6392	6395	Batch Data	batch #1 additive #9 volume	double precision floating point
6396	6399	Batch Data	batch #1 additive #10 volume	double precision floating point
6400	6403	Batch Data	batch #1 additive #11 volume	double precision floating point
6404	6407	Batch Data	batch #1 additive #12 volume	double precision floating point
6464		Batch Data	batch #1 product number	unsigned char
6465		Batch Data	batch #1 recipe number	unsigned char
6528		Batch Data	batch #1 additive mask	unsigned int
6656	6663	Batch Data	batch #2 alarm #1	text string
6664	6671	Batch Data	batch #2 alarm #2	text string
6672	6679	Batch Data	batch #2 alarm #3	text string
6680	6687	Batch Data	batch #2 alarm #4	text string
6688	6695	Batch Data	batch #2 alarm #5	text string
6696	6703	Batch Data	batch #2 alarm #6	text string
6704	6711	Batch Data	batch #2 alarm #7	text string
6712	6719	Batch Data	batch #2 alarm #8	text string
6720	6727	Batch Data	batch #2 alarm #9	text string
6728	6735	Batch Data	batch #2 alarm #10	text string
6784	6785	Batch Data	batch #2 average flow rate	single precision floating point
6786	6787	Batch Data	batch #2 average meter factor	single precision floating point
6788	6789	Batch Data	batch #2 average temperature	single precision floating point
6790	6791	Batch Data	batch #2 average density	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
6792	6793	Batch Data	batch #2 average pressure	single precision floating point
6794	6795	Batch Data	batch #2 average CTL (temperature compensation)	single precision floating point
6796	6797	Batch Data	batch #2 average CPL (pressure compensation)	single precision floating point
6798	6799	Batch Data	batch #2 average CCF	single precision floating point
6800	6801	Batch Data	batch #2 reference density	single precision floating point
6802	6803	Batch Data	batch #2 relative density	single precision floating point
6804	6805	Batch Data	batch #2 API density	single precision floating point
6806	6807	Batch Data	batch #2 average vapor pressure	single precision floating point
6848	6851	Batch Data	batch #2 meter pulses	double precision floating point
6852	6855	Batch Data	batch #2 raw volume	double precision floating point
6856	6859	Batch Data	batch #2 gross volume	double precision floating point
6860	6863	Batch Data	batch #2 GST volume	double precision floating point
6864	6867	Batch Data	batch #2 GSV volume	double precision floating point
6868	6871	Batch Data	batch #2 mass	double precision floating point
6872	6875	Batch Data	batch #2 additive #1 volume	double precision floating point
6876	6879	Batch Data	batch #2 additive #2 volume	double precision floating point
6880	6883	Batch Data	batch #2 additive #3 volume	double precision floating point
6884	6887	Batch Data	batch #2 additive #4 volume	double precision floating point
6888	6891	Batch Data	batch #2 additive #5 volume	double precision floating point
6892	6895	Batch Data	batch #2 additive #6 volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
6896	6899	Batch Data	batch #2 additive #7 volume	double precision floating point
6900	6903	Batch Data	batch #2 additive #8 volume	double precision floating point
6904	6907	Batch Data	batch #2 additive #9 volume	double precision floating point
6908	6911	Batch Data	batch #2 additive #10 volume	double precision floating point
6912	6915	Batch Data	batch #2 additive #11 volume	double precision floating point
6916	6919	Batch Data	batch #2 additive #12 volume	double precision floating point
6976		Batch Data	batch #2 product number	unsigned char
6977		Batch Data	batch #2 recipe number	unsigned char
7040		Batch Data	batch #2 additive mask	unsigned int
7168	7175	Batch Data	batch #3 alarm #1	text string
7176	7183	Batch Data	batch #3 alarm #2	text string
7184	7191	Batch Data	batch #3 alarm #3	text string
7192	7199	Batch Data	batch #3 alarm #4	text string
7200	7207	Batch Data	batch #3 alarm #5	text string
7208	7215	Batch Data	batch #3 alarm #6	text string
7216	7223	Batch Data	batch #3 alarm #7	text string
7224	7231	Batch Data	batch #3 alarm #8	text string
7232	7239	Batch Data	batch #3 alarm #9	text string
7240	7247	Batch Data	batch #3 alarm #10	text string
7296	7297	Batch Data	batch #3 average flow rate	single precision floating point
7298	7299	Batch Data	batch #3 average meter factor	single precision floating point
7300	7301	Batch Data	batch #3 average temperature	single precision floating point
7302	7303	Batch Data	batch #3 average density	single precision floating point
7304	7305	Batch Data	batch #3 average pressure	single precision floating point
7306	7307	Batch Data	batch #3 average CTL (temperature compensation)	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
7308	7309	Batch Data	batch #3 average CPL (pressure compensation)	single precision floating point
7310	7311	Batch Data	batch #3 average CCF	single precision floating point
7312	7313	Batch Data	batch #3 reference density	single precision floating point
7314	7315	Batch Data	batch #3 relative density	single precision floating point
7316	7317	Batch Data	batch #3 API density	single precision floating point
7318	7319	Batch Data	batch #3 average vapor pressure	single precision floating point
7360	7363	Batch Data	batch #3 meter pulses	double precision floating point
7364	7367	Batch Data	batch #3 raw volume	double precision floating point
7368	7371	Batch Data	batch #3 gross volume	double precision floating point
7372	7375	Batch Data	batch #3 GST volume	double precision floating point
7376	7379	Batch Data	batch #3 GSV volume	double precision floating point
7380	7383	Batch Data	batch #3 mass	double precision floating point
7384	7387	Batch Data	batch #3 additive #1 volume	double precision floating point
7388	7391	Batch Data	batch #3 additive #2 volume	double precision floating point
7392	7395	Batch Data	batch #3 additive #3 volume	double precision floating point
7396	7399	Batch Data	batch #3 additive #4 volume	double precision floating point
7400	7403	Batch Data	batch #3 additive #5 volume	double precision floating point
7404	7407	Batch Data	batch #3 additive #6 volume	double precision floating point
7408	7411	Batch Data	batch #3 additive #7 volume	double precision floating point
7412	7415	Batch Data	batch #3 additive #8 volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
7416	7419	Batch Data	batch #3 additive #9 volume	double precision floating point
7420	7423	Batch Data	batch #3 additive #10 volume	double precision floating point
7424	7427	Batch Data	batch #3 additive #11 volume	double precision floating point
7428	7431	Batch Data	batch #3 additive #12 volume	double precision floating point
7488		Batch Data	batch #3 product number	unsigned char
7489		Batch Data	batch #3 recipe number	unsigned char
7552		Batch Data	batch #3 additive mask	unsigned int
7680	7687	Batch Data	batch #4 alarm #1	text string
7688	7695	Batch Data	batch #4 alarm #2	text string
7696	7703	Batch Data	batch #4 alarm #3	text string
7704	7711	Batch Data	batch #4 alarm #4	text string
7712	7719	Batch Data	batch #4 alarm #5	text string
7720	7727	Batch Data	batch #4 alarm #6	text string
7728	7735	Batch Data	batch #4 alarm #7	text string
7736	7743	Batch Data	batch #4 alarm #8	text string
7744	7751	Batch Data	batch #4 alarm #9	text string
7752	7759	Batch Data	batch #4 alarm #10	text string
7808	7809	Batch Data	batch #4 average flow rate	single precision floating point
7810	7811	Batch Data	batch #4 average meter factor	single precision floating point
7812	7813	Batch Data	batch #4 average temperature	single precision floating point
7814	7815	Batch Data	batch #4 average density	single precision floating point
7816	7817	Batch Data	batch #4 average pressure	single precision floating point
7818	7819	Batch Data	batch #4 average CTL (temperature compensation)	single precision floating point
7820	7821	Batch Data	batch #4 average CPL (pressure compensation)	single precision floating point
7822	7823	Batch Data	batch #4 average CCF	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
7824	7825	Batch Data	batch #4 reference density	single precision floating point
7826	7827	Batch Data	batch #4 relative density	single precision floating point
7828	7829	Batch Data	batch #4 API density	single precision floating point
7830	7831	Batch Data	batch #4 average vapor pressure	single precision floating point
7872	7875	Batch Data	batch #4 meter pulses	double precision floating point
7876	7879	Batch Data	batch #4 raw volume	double precision floating point
7880	7883	Batch Data	batch #4 gross volume	double precision floating point
7884	7887	Batch Data	batch #4 GST volume	double precision floating point
7888	7891	Batch Data	batch #4 GSV volume	double precision floating point
7892	7895	Batch Data	batch #4 mass	double precision floating point
7896	7899	Batch Data	batch #4 additive #1 volume	double precision floating point
7900	7903	Batch Data	batch #4 additive #2 volume	double precision floating point
7904	7907	Batch Data	batch #4 additive #3 volume	double precision floating point
7908	7911	Batch Data	batch #4 additive #4 volume	double precision floating point
7912	7915	Batch Data	batch #4 additive #5 volume	double precision floating point
7916	7919	Batch Data	batch #4 additive #6 volume	double precision floating point
7920	7923	Batch Data	batch #4 additive #7 volume	double precision floating point
7924	7927	Batch Data	batch #4 additive #8 volume	double precision floating point
7928	7931	Batch Data	batch #4 additive #9 volume	double precision floating point
7932	7935	Batch Data	batch #4 additive #10 volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
7936	7939	Batch Data	batch #4 additive #11 volume	double precision floating point
7940	7943	Batch Data	batch #4 additive #12 volume	double precision floating point
8000		Batch Data	batch #4 product number	unsigned char
8001		Batch Data	batch #4 recipe number	unsigned char
8064		Batch Data	batch #4 additive mask	unsigned int
8192	8199	Batch Data	batch #5 alarm #1	text string
8200	8207	Batch Data	batch #5 alarm #2	text string
8208	8215	Batch Data	batch #5 alarm #3	text string
8216	8223	Batch Data	batch #5 alarm #4	text string
8224	8231	Batch Data	batch #5 alarm #5	text string
8232	8239	Batch Data	batch #5 alarm #6	text string
8240	8247	Batch Data	batch #5 alarm #7	text string
8248	8255	Batch Data	batch #5 alarm #8	text string
8256	8263	Batch Data	batch #5 alarm #9	text string
8264	8271	Batch Data	batch #5 alarm #10	text string
8320	8321	Batch Data	batch #5 average flow rate	single precision floating point
8322	8323	Batch Data	batch #5 average meter factor	single precision floating point
8324	8325	Batch Data	batch #5 average temperature	single precision floating point
8326	8327	Batch Data	batch #5 average density	single precision floating point
8328	8329	Batch Data	batch #5 average pressure	single precision floating point
8330	8331	Batch Data	batch #5 average CTL (temperature compensation)	single precision floating point
8332	8333	Batch Data	batch #5 average CPL (pressure compensation)	single precision floating point
8334	8335	Batch Data	batch #5 average CCF	single precision floating point
8336	8337	Batch Data	batch #5 reference density	single precision floating point
8338	8339	Batch Data	batch #5 relative density	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
8340	8341	Batch Data	batch #5 API density	single precision floating point
8342	8343	Batch Data	batch #5 average vapor pressure	single precision floating point
8384	8387	Batch Data	batch #5 meter pulses	double precision floating point
8388	8391	Batch Data	batch #5 raw volume	double precision floating point
8392	8395	Batch Data	batch #5 gross volume	double precision floating point
8396	8399	Batch Data	batch #5 GST volume	double precision floating point
8400	8403	Batch Data	batch #5 GSV volume	double precision floating point
8404	8407	Batch Data	batch #5 mass	double precision floating point
8408	8411	Batch Data	batch #5 additive #1 volume	double precision floating point
8412	8415	Batch Data	batch #5 additive #2 volume	double precision floating point
8416	8419	Batch Data	batch #5 additive #3 volume	double precision floating point
8420	8423	Batch Data	batch #5 additive #4 volume	double precision floating point
8424	8427	Batch Data	batch #5 additive #5 volume	double precision floating point
8428	8431	Batch Data	batch #5 additive #6 volume	double precision floating point
8432	8435	Batch Data	batch #5 additive #7 volume	double precision floating point
8436	8439	Batch Data	batch #5 additive #8 volume	double precision floating point
8440	8443	Batch Data	batch #5 additive #9 volume	double precision floating point
8444	8447	Batch Data	batch #5 additive #10 volume	double precision floating point
8448	8451	Batch Data	batch #5 additive #11 volume	double precision floating point
8452	8455	Batch Data	batch #5 additive #12 volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
8512		Batch Data	batch #5 product number	unsigned char
8513		Batch Data	batch #5 recipe number	unsigned char
8576		Batch Data	batch #5 additive mask	unsigned int
8704	8711	Batch Data	batch #6 alarm #1	text string
8712	8719	Batch Data	batch #6 alarm #2	text string
8720	8727	Batch Data	batch #6 alarm #3	text string
8728	8735	Batch Data	batch #6 alarm #4	text string
8736	8743	Batch Data	batch #6 alarm #5	text string
8744	8751	Batch Data	batch #6 alarm #6	text string
8752	8759	Batch Data	batch #6 alarm #7	text string
8760	8767	Batch Data	batch #6 alarm #8	text string
8768	8775	Batch Data	batch #6 alarm #9	text string
8776	8783	Batch Data	batch #6 alarm #10	text string
8832	8833	Batch Data	batch #6 average flow rate	single precision floating point
8834	8835	Batch Data	batch #6 average meter factor	single precision floating point
8836	8837	Batch Data	batch #6 average temperature	single precision floating point
8838	8839	Batch Data	batch #6 average density	single precision floating point
8840	8841	Batch Data	batch #6 average pressure	single precision floating point
8842	8843	Batch Data	batch #6 average CTL (temperature compensation)	single precision floating point
8844	8845	Batch Data	batch #6 average CPL (pressure compensation)	single precision floating point
8846	8847	Batch Data	batch #6 average CCF	single precision floating point
8848	8849	Batch Data	batch #6 reference density	single precision floating point
8850	8851	Batch Data	batch #6 relative density	single precision floating point
8852	8853	Batch Data	batch #6 API density	single precision floating point
8854	8855	Batch Data	batch #6 average vapor pressure	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
8896	8899	Batch Data	batch #6 meter pulses	double precision floating point
8900	8903	Batch Data	batch #6 raw volume	double precision floating point
8904	8907	Batch Data	batch #6 gross volume	double precision floating point
8908	8911	Batch Data	batch #6 GST volume	double precision floating point
8912	8915	Batch Data	batch #6 GSV volume	double precision floating point
8916	8919	Batch Data	batch #6 mass	double precision floating point
8920	8923	Batch Data	batch #6 additive #1 volume	double precision floating point
8924	8927	Batch Data	batch #6 additive #2 volume	double precision floating point
8928	8931	Batch Data	batch #6 additive #3 volume	double precision floating point
8932	8935	Batch Data	batch #6 additive #4 volume	double precision floating point
8936	8939	Batch Data	batch #6 additive #5 volume	double precision floating point
8940	8943	Batch Data	batch #6 additive #6 volume	double precision floating point
8944	8947	Batch Data	batch #6 additive #7 volume	double precision floating point
8948	8951	Batch Data	batch #6 additive #8 volume	double precision floating point
8952	8955	Batch Data	batch #6 additive #9 volume	double precision floating point
8956	8959	Batch Data	batch #6 additive #10 volume	double precision floating point
8960	8963	Batch Data	batch #6 additive #11 volume	double precision floating point
8964	8967	Batch Data	batch #6 additive #12 volume	double precision floating point
9024		Batch Data	batch #6 product number	unsigned char
9025		Batch Data	batch #6 recipe number	unsigned char
9088		Batch Data	batch #6 additive mask	unsigned int

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
9216	9223	Batch Data	batch #7 alarm #1	text string
9224	9231	Batch Data	batch #7 alarm #2	text string
9232	9239	Batch Data	batch #7 alarm #3	text string
9240	9247	Batch Data	batch #7 alarm #4	text string
9248	9255	Batch Data	batch #7 alarm #5	text string
9256	9263	Batch Data	batch #7 alarm #6	text string
9264	9271	Batch Data	batch #7 alarm #7	text string
9272	9279	Batch Data	batch #7 alarm #8	text string
9280	9287	Batch Data	batch #7 alarm #9	text string
9288	9295	Batch Data	batch #7 alarm #10	text string
9344	9345	Batch Data	batch #7 average flow rate	single precision floating point
9346	9347	Batch Data	batch #7 average meter factor	single precision floating point
9348	9349	Batch Data	batch #7 average temperature	single precision floating point
9350	9351	Batch Data	batch #7 average density	single precision floating point
9352	9353	Batch Data	batch #7 average pressure	single precision floating point
9354	9355	Batch Data	batch #7 average CTL (temperature compensation)	single precision floating point
9356	9357	Batch Data	batch #7 average CPL (pressure compensation)	single precision floating point
9358	9359	Batch Data	batch #7 average CCF	single precision floating point
9360	9361	Batch Data	batch #7 reference density	single precision floating point
9362	9363	Batch Data	batch #7 relative density	single precision floating point
9364	9365	Batch Data	batch #7 API density	single precision floating point
9366	9367	Batch Data	batch #7 API average vapor pressure	single precision floating point
9408	9411	Batch Data	batch #7 meter pulses	double precision floating point
9412	9415	Batch Data	batch #7 raw volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
9416	9419	Batch Data	batch #7 gross volume	double precision floating point
9420	9423	Batch Data	batch #7 GST volume	double precision floating point
9424	9427	Batch Data	batch #7 GSV volume	double precision floating point
9428	9431	Batch Data	batch #7 mass	double precision floating point
9432	9435	Batch Data	batch #7 additive #1 volume	double precision floating point
9436	9439	Batch Data	batch #7 additive #2 volume	double precision floating point
9440	9443	Batch Data	batch #7 additive #3 volume	double precision floating point
9444	9447	Batch Data	batch #7 additive #4 volume	double precision floating point
9448	9451	Batch Data	batch #7 additive #5 volume	double precision floating point
9452	9455	Batch Data	batch #7 additive #6 volume	double precision floating point
9456	9459	Batch Data	batch #7 additive #7 volume	double precision floating point
9460	9463	Batch Data	batch #7 additive #8 volume	double precision floating point
9464	9467	Batch Data	batch #7 additive #9 volume	double precision floating point
9468	9471	Batch Data	batch #7 additive #10 volume	double precision floating point
9472	9475	Batch Data	batch #7 additive #11 volume	double precision floating point
9476	9479	Batch Data	batch #7 additive #12 volume	double precision floating point
9536		Batch Data	batch #7 product number	unsigned char
9537		Batch Data	batch #7 recipe number	unsigned char
9600		Batch Data	batch #7 additive mask	unsigned int
9728	9735	Batch Data	batch #8 alarm #1	text string
9736	9743	Batch Data	batch #8 alarm #2	text string
9744	9751	Batch Data	batch #8 alarm #3	text string

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
9752	9759	Batch Data	batch #8 alarm #4	text string
9760	9767	Batch Data	batch #8 alarm #5	text string
9768	9775	Batch Data	batch #8 alarm #6	text string
9776	9783	Batch Data	batch #8 alarm #7	text string
9784	9791	Batch Data	batch #8 alarm #8	text string
9792	9799	Batch Data	batch #8 alarm #9	text string
9800	9807	Batch Data	batch #8 alarm #10	text string
9856	9857	Batch Data	batch #8 average flow rate	single precision floating point
9858	9859	Batch Data	batch #8 average meter factor	single precision floating point
9860	9861	Batch Data	batch #8 average temperature	single precision floating point
9862	9863	Batch Data	batch #8 average density	single precision floating point
9864	9865	Batch Data	batch #8 average pressure	single precision floating point
9866	9867	Batch Data	batch #8 average CTL (temperature compensation)	single precision floating point
9868	9869	Batch Data	batch #8 average CPL (pressure compensation)	single precision floating point
9870	9871	Batch Data	batch #8 average CCF	single precision floating point
9872	9873	Batch Data	batch #8 reference density	single precision floating point
9874	9875	Batch Data	batch #8 relative density	single precision floating point
9876	9877	Batch Data	batch #8 API density	single precision floating point
9878	9879	Batch Data	batch #8 average vapor pressure	single precision floating point
9920	9923	Batch Data	batch #8 meter pulses	double precision floating point
9924	9927	Batch Data	batch #8 raw volume	double precision floating point
9928	9931	Batch Data	batch #8 gross volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
9932	9935	Batch Data	batch #8 GST volume	double precision floating point
9936	9939	Batch Data	batch #8 GSV volume	double precision floating point
9940	9943	Batch Data	batch #8 mass	double precision floating point
9944	9947	Batch Data	batch #8 additive #1 volume	double precision floating point
9948	9951	Batch Data	batch #8 additive #2 volume	double precision floating point
9952	9955	Batch Data	batch #8 additive #3 volume	double precision floating point
9956	9959	Batch Data	batch #8 additive #4 volume	double precision floating point
9960	9963	Batch Data	batch #8 additive #5 volume	double precision floating point
9964	9967	Batch Data	batch #8 additive #6 volume	double precision floating point
9968	9971	Batch Data	batch #8 additive #7 volume	double precision floating point
9972	9975	Batch Data	batch #8 additive #8 volume	double precision floating point
9976	9979	Batch Data	batch #8 additive #9 volume	double precision floating point
9980	9983	Batch Data	batch #8 additive #10 volume	double precision floating point
9984	9987	Batch Data	batch #8 additive #11 volume	double precision floating point
9988	9991	Batch Data	batch #8 additive #12 volume	double precision floating point
10048		Batch Data	batch #8 product number	unsigned char
10049		Batch Data	batch #8 recipe number	unsigned char
10112		Batch Data	batch #8 additive mask	unsigned int
10240	10247	Batch Data	batch #9 alarm #1	text string
10248	10255	Batch Data	batch #9 alarm #2	text string
10256	10263	Batch Data	batch #9 alarm #3	text string
10264	10271	Batch Data	batch #9 alarm #4	text string
10272	10279	Batch Data	batch #9 alarm #5	text string

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
10280	10287	Batch Data	batch #9 alarm #6	text string
10288	10295	Batch Data	batch #9 alarm #7	text string
10296	10303	Batch Data	batch #9 alarm #8	text string
10304	10311	Batch Data	batch #9 alarm #9	text string
10312	10319	Batch Data	batch #9 alarm #10	text string
10368	10369	Batch Data	batch #9 average flow rate	single precision floating point
10370	10371	Batch Data	batch #9 average meter factor	single precision floating point
10372	10373	Batch Data	batch #9 average temperature	single precision floating point
10374	10375	Batch Data	batch #9 average density	single precision floating point
10376	10377	Batch Data	batch #9 average pressure	single precision floating point
10378	10379	Batch Data	batch #9 average CTL (temperature compensation)	single precision floating point
10380	10381	Batch Data	batch #9 average CPL (pressure compensation)	single precision floating point
10382	10383	Batch Data	batch #9 average CCF	single precision floating point
10384	10385	Batch Data	batch #9 reference density	single precision floating point
10386	10387	Batch Data	batch #9 relative density	single precision floating point
10388	10389	Batch Data	batch #9 API density	single precision floating point
10390	10391	Batch Data	batch #9 average vapor pressure	single precision floating point
10432	10435	Batch Data	batch #9 meter pulses	double precision floating point
10436	10439	Batch Data	batch #9 raw volume	double precision floating point
10440	10443	Batch Data	batch #9 gross volume	double precision floating point
10444	10447	Batch Data	batch #9 GST volume	double precision floating point
10448	10451	Batch Data	batch #9 GSV volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
10452	10455	Batch Data	batch #9 mass	double precision floating point
10456	10459	Batch Data	batch #9 additive #1 volume	double precision floating point
10460	10463	Batch Data	batch #9 additive #2 volume	double precision floating point
10464	10467	Batch Data	batch #9 additive #3 volume	double precision floating point
10468	10471	Batch Data	batch #9 additive #4 volume	double precision floating point
10472	10475	Batch Data	batch #9 additive #5 volume	double precision floating point
10476	10479	Batch Data	batch #9 additive #6 volume	double precision floating point
10480	10483	Batch Data	batch #9 additive #7 volume	double precision floating point
10484	10487	Batch Data	batch #9 additive #8 volume	double precision floating point
10488	10491	Batch Data	batch #9 additive #9 volume	double precision floating point
10492	10495	Batch Data	batch #9 additive #10 volume	double precision floating point
10496	10499	Batch Data	batch #9 additive #11 volume	double precision floating point
10500	10503	Batch Data	batch #9 additive #12 volume	double precision floating point
10560		Batch Data	batch #9 product number	unsigned char
10561		Batch Data	batch #9 recipe number	unsigned char
10624		Batch Data	batch #9 additive mask	unsigned int
10752	10759	Batch Data	batch #10 alarm #1	text string
10760	10767	Batch Data	batch #10 alarm #2	text string
10768	10775	Batch Data	batch #10 alarm #3	text string
10776	10783	Batch Data	batch #10 alarm #4	text string
10784	10791	Batch Data	batch #10 alarm #5	text string
10792	10799	Batch Data	batch #10 alarm #6	text string
10800	10807	Batch Data	batch #10 alarm #7	text string
10808	10815	Batch Data	batch #10 alarm #8	text string

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
10816	10823	Batch Data	batch #10 alarm #9	text string
10824	10831	Batch Data	batch #10 alarm #10	text string
10880	10881	Batch Data	batch #10 average flow rate	single precision floating point
10882	10883	Batch Data	batch #10 average meter factor	single precision floating point
10884	10885	Batch Data	batch #10 average temperature	single precision floating point
10886	10887	Batch Data	batch #10 average density	single precision floating point
10888	10889	Batch Data	batch #10 average pressure	single precision floating point
10890	10891	Batch Data	batch #10 average CTL (temperature compensation)	single precision floating point
10892	10893	Batch Data	batch #10 average CPL (pressure compensation)	single precision floating point
10894	10895	Batch Data	batch #10 average CCF	single precision floating point
10896	10897	Batch Data	batch #10 reference density	single precision floating point
10898	10899	Batch Data	batch #10 relative density	single precision floating point
10900	10901	Batch Data	batch #10 API density	single precision floating point
10902	10903	Batch Data	batch #10 average vapor pressure	single precision floating point
10944	10947	Batch Data	batch #10 meter pulses	double precision floating point
10948	10951	Batch Data	batch #10 raw volume	double precision floating point
10952	10955	Batch Data	batch #10 gross volume	double precision floating point
10956	10959	Batch Data	batch #10 GST volume	double precision floating point
10960	10963	Batch Data	batch #10 GSV volume	double precision floating point
10964	10967	Batch Data	batch #10 mass	double precision floating point
10968	10971	Batch Data	batch #10 additive #1 volume	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
10972	10975	Batch Data	batch #10 additive #2 volume	double precision floating point
10976	10979	Batch Data	batch #10 additive #3 volume	double precision floating point
10980	10983	Batch Data	batch #10 additive #4 volume	double precision floating point
10984	10987	Batch Data	batch #10 additive #5 volume	double precision floating point
10988	10991	Batch Data	batch #10 additive #6 volume	double precision floating point
10992	10995	Batch Data	batch #10 additive #7 volume	double precision floating point
10996	10999	Batch Data	batch #10 additive #8 volume	double precision floating point
11000	11003	Batch Data	batch #10 additive #9 volume	double precision floating point
11004	11007	Batch Data	batch #10 additive #10 volume	double precision floating point
11008	11011	Batch Data	batch #10 additive #11 volume	double precision floating point
11012	11015	Batch Data	batch #10 additive #12 volume	double precision floating point
11072		Batch Data	batch #10 product number	unsigned char
11073		Batch Data	batch #10 recipe number	unsigned char
11136		Batch Data	batch #10 additive mask	unsigned int
11264	11265	Analog I/O Data	analog I/O #1 DAC counts	single precision floating point
11266	11267	Analog I/O Data	analog I/O #1 electrical value	single precision floating point
11268	11269	Analog I/O Data	analog I/O #1 engineering value	single precision floating point
11328	11329	Analog I/O Data	analog I/O #2 DAC counts	single precision floating point
11330	11331	Analog I/O Data	analog I/O #2 electrical value	single precision floating point
11332	11333	Analog I/O Data	analog I/O #2 engineering value	single precision floating point
11392	11393	Analog I/O Data	analog I/O #3 DAC counts	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
11394	11395	Analog I/O Data	analog I/O #3 electrical value	single precision floating point
11396	11397	Analog I/O Data	analog I/O #3 engineering value	single precision floating point
11456	11457	Analog I/O Data	analog I/O #4 DAC counts	single precision floating point
11458	11459	Analog I/O Data	analog I/O #4 electrical value	single precision floating point
11460	11461	Analog I/O Data	analog I/O #4 engineering value	single precision floating point
11520	11521	Analog I/O Data	analog I/O #5 DAC counts	single precision floating point
11522	11523	Analog I/O Data	analog I/O #5 electrical value	single precision floating point
11524	11525	Analog I/O Data	analog I/O #5 engineering value	single precision floating point
11584	11585	Analog I/O Data	analog I/O #6 DAC counts	single precision floating point
11586	11587	Analog I/O Data	analog I/O #6 electrical value	single precision floating point
11588	11589	Analog I/O Data	analog I/O #6 engineering value	single precision floating point
12288	12289	Injector Data	volume per injection, injector #1	single precision floating point
12290	12291	Injector Data	volume per injection, injector #2	single precision floating point
12292	12293	Injector Data	volume per injection, injector #3	single precision floating point
12294	12295	Injector Data	volume per injection, injector #4	single precision floating point
12296	12297	Injector Data	volume per injection, injector #5	single precision floating point
12298	12299	Injector Data	volume per injection, injector #6	single precision floating point
12300	12301	Injector Data	volume per injection, injector #7	single precision floating point
12302	12303	Injector Data	volume per injection, injector #8	single precision floating point
12304	12305	Injector Data	volume per injection, injector #9	single precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
12306	12307	Injector Data	volume per injection, injector #10	single precision floating point
12308	12309	Injector Data	volume per injection, injector #11	single precision floating point
12310	12311	Injector Data	volume per injection, injector #12	single precision floating point
12312	12313	Injector Data	volume per cycle, injector #1	single precision floating point
12314	12315	Injector Data	volume per cycle, injector #2	single precision floating point
12316	12317	Injector Data	volume per cycle, injector #3	single precision floating point
12318	12319	Injector Data	volume per cycle, injector #4	single precision floating point
12320	12321	Injector Data	volume per cycle, injector #5	single precision floating point
12322	12323	Injector Data	volume per cycle, injector #6	single precision floating point
12324	12325	Injector Data	volume per cycle, injector #7	single precision floating point
12326	12327	Injector Data	volume per cycle, injector #8	single precision floating point
12328	12329	Injector Data	volume per cycle, injector #9	single precision floating point
12330	12331	Injector Data	volume per cycle, injector #10	single precision floating point
12332	12333	Injector Data	volume per cycle, injector #11	single precision floating point
12334	12335	Injector Data	volume per cycle, injector #12	single precision floating point
13312	13315	Injector Data	additive nonresettable volume, injector #1	double precision floating point
13316	13319	Injector Data	additive nonresettable volume, injector #2	double precision floating point
13320	13323	Injector Data	additive nonresettable volume, injector #3	double precision floating point
13324	13327	Injector Data	additive nonresettable volume, injector #4	double precision floating point
13328	13331	Injector Data	additive nonresettable volume, injector #5	double precision floating point

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
13332	13335	Injector Data	additive nonresettable volume, injector #6	double precision floating point
13336	13339	Injector Data	additive nonresettable volume, injector #7	double precision floating point
13340	13343	Injector Data	additive nonresettable volume, injector #8	double precision floating point
13344	13347	Injector Data	additive nonresettable volume, injector #9	double precision floating point
13348	13351	Injector Data	additive nonresettable volume, injector #10	double precision floating point
13352	13355	Injector Data	additive nonresettable volume, injector #11	double precision floating point
13356	13359	Injector Data	additive nonresettable volume, injector #12	double precision floating point
14336		Injector Data	injector #1 on/off	unsigned char
14337		Injector Data	injector #2 on/off	unsigned char
14338		Injector Data	injector #3 on/off	unsigned char
14339		Injector Data	injector #4 on/off	unsigned char
14340		Injector Data	injector #5 on/off	unsigned char
14341		Injector Data	injector #6 on/off	unsigned char
14342		Injector Data	injector #7 on/off	unsigned char
14343		Injector Data	injector #8 on/off	unsigned char
14344		Injector Data	injector #9 on/off	unsigned char
14345		Injector Data	injector #10 on/off	unsigned char
14346		Injector Data	injector #11 on/off	unsigned char
14347		Injector Data	injector #12 on/off	unsigned char
15360		Injector Data	number of injections, injector #1	unsigned int
15361		Injector Data	number of injections, injector #2	unsigned int
15362		Injector Data	number of injections, injector #3	unsigned int
15363		Injector Data	number of injections, injector #4	unsigned int
15364		Injector Data	number of injections, injector #5	unsigned int
15365		Injector Data	number of injections, injector #6	unsigned int
15366		Injector Data	number of injections, injector #7	unsigned int
15367		Injector Data	number of injections, injector #8	unsigned int
15368		Injector Data	number of injections, injector #9	unsigned int

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Modbus™ Address	Ending Address	Data Set	Data Point	Data Type (representation)
15369		Injector Data	number of injections, injector #10	unsigned int
15370		Injector Data	number of injections, injector #11	unsigned int
15371		Injector Data	number of injections, injector #12	unsigned int
15372		Injector Data	number of feedback errors, injector #1	unsigned int
15373		Injector Data	number of feedback errors, injector #2	unsigned int
15374		Injector Data	number of feedback errors, injector #3	unsigned int
15375		Injector Data	number of feedback errors, injector #4	unsigned int
15376		Injector Data	number of feedback errors, injector #5	unsigned int
15377		Injector Data	number of feedback errors, injector #6	unsigned int
15378		Injector Data	number of feedback errors, injector #7	unsigned int
15379		Injector Data	number of feedback errors, injector #8	unsigned int
15380		Injector Data	number of feedback errors, injector #9	unsigned int
15381		Injector Data	number of feedback errors, injector #10	unsigned int
15382		Injector Data	number of feedback errors, injector #11	unsigned int
15383		Injector Data	number of feedback errors, injector #12	unsigned int

Modbus™ Mapping of Function Code 08, Diagnostics (Loopback Diagnostics)

Diagnostic Subfunction	Purpose
00	loops the received query back out the port

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Notes

Function	Address Range	Note
6, 16	all long integers	all elements must be written in order (lo to hi Modbus™ address); the target value will be changed upon writing the last element.
6, 16	all floating point (single)	all elements must be written in order (lo to hi Modbus™ address); the target value will be changed upon writing the last element.
6, 16	all floating point (double)	all elements must be written in order (lo to hi Modbus™ address); the target value will be changed upon writing the last element.
6, 16	all text strings ("ASCII chars")	all elements must be written in order (lo to hi Modbus™ address); the target value will be changed upon writing the last element.
all	all	any "offset specification" (product id, etc) are "zero" based (0=1, 1=2, 2=3, etc.)

Section V – Extended Services

“Extended Services” are functions that are available via a common interface. This interface covers the network, transport, and session layers in the OSI network model. The communication stack layers are described in the following OSI table:

AccuMate III-S Protocol Layer Function	OSI Model Layer
Application services	Session Layer
As the services are fixed, this layer is not necessary	Transport Layer
Services router	Network Layer
Communications protocols such as Modicon's Modbus™ and Smith Meter's AccuLoad II two-character command protocol	Link Layer
Hardware (e.x., EIA-232, EIA-485)	Physical Layer

The Extended Service feature of the AccuLoad III allows access to functions such as transaction control, display control and stored event/transaction data retrieval. The AccuLoad III Modbus™ protocol supports the Extended Services features completely, and the requirements to interact with the services are described here. Note that the features detailed here use standard Modbus™ functions and registers, but do not make up the entire Modbus™ map for the AccuLoad III. Features such as retrieval of current input / register data, and writing to program codes (which are mapped to holding registers), are separate from the Extended Services interface.

To use an extended service from Modbus™, three steps are required.

1. Enter the command (Extended Services packet) into the buffer that starts at holding register 1 (functions 3, 6, and 16, address 1). Enter the length of the packet in bytes into holding register 0. Enter the command to invoke the service by sending a Force Coil 0 ON Command (function 5 or 15, address 0, data "on").
2. Enter the command to invoke the service by sending a Force Coil 0 ON Command (function 5 or 15, address 0, data "on").
3. Retrieve the result of the service by reading the outbound packet in input registers starting at 1 (function 4, address 1). The number of bytes in the response packet is located at address 0.

All of the Modbus™ addresses for the extended service commands are based at 0.

The following tables show the mapping of the Extended Services packets into Modbus™ address space, and controlling packet submission for processing:

Modbus™ Register Map 1 - Functions 3, 6, & 16 - Inbound Packet (command)

Modbus™ Holding Register	0	1	2	3	...	511
Data Type	Unsigned Int	Varied - Depends on packet				
Content	Number of valid bytes in packet	<packet> byte 0, byte 1	<packet> byte 2, byte 3	<packet> byte 4, byte 5	<packet>	<packet> byte 1022, byte 1023

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Modbus™ Register Map 2 - Function 4 - Outbound Packet (command)

Modbus™ Input Register	0	1	2	3	...	512
Data Type	Unsigned Int	Varied - Depends on packet				
Content	Number of valid bytes in packet	<packet> byte 0, byte 1	<packet> byte 2, byte 3	<packet> byte 4, byte 5	<packet>	<packet> byte 1022, byte 1023

Modbus™ Register Map 3 - Function 1, 5, & 15 - Packet Submission for Processing (command)

Modbus™ coil	0
Content	Writing an "on" to this coil causes the AccuLoad to submit the packet located in the holding register area for processing. The Modbus™ input register area (Function 4) then holds the response packet.

Each packet has the following structure:

Packet Data	
Router Info - 16 bit integer	Service Specific Data (any length up to 1022 bytes)

The "Services Router" (OSI network layer) examines the received packet and routes it to the specific service handler specified. "Router Info" is a 16-bit control word which primarily indicates what application (service) receives the data. The "service specific data" is passed to the applications routine, and its form may vary from service to service. The router info word is broken down as follows:

Router Info Word (16 bit)															
First Byte								Second Byte							
bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
C	U	R	R	S	S	S	S	S	S	S	S	S	S	S	S

- C Command response flag. 0=Command (host to AccuLoad), 1=Response (AccuLoad to host).
- U Unused; reserved for future use. Always set this to zero.
- R Router status. Command packets should always set this to binary 00 (normal packet). Responses may have this set to binary 00 (normal response), binary 01 (service specified doesn't exist) or binary 10 (router error). Any response other than binary 00 means that no service specific data follows. Binary 11 is reserved for future use.
- S 12 bit number referring to the specific service (application layer) routine (see table below).

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The 12-bit service numbers are typically unique among different models that support Extended Services. A section of service codes (0x000-0x0FF) are reserved for services that must be identical among all instruments supporting extended services. Service codes 0x100 and above must be unique, even among different model instruments. The following table lists the service codes for the AccuLoad III-S. (Note: all other service codes are considered reserved.)

Service Code	Model(s)	Function
0x000	All	Unit information: model number, options, serial number, etc.
0x001	All	Read the real time clock
0x002	All	Set the real time clock
0x105	AccuLoad III-S	Read from Event Log
0x106	AccuLoad III-S	Read from Transaction log
0x10D	AccuLoad III-S	Search Event Log
0x10E	AccuLoad III-S	Search Transaction Log
0x10F	AccuLoad III-S	Transaction Control (authorize, end transaction, etc)
0x110	AccuLoad III-S	Display Control (write to display, read from keypad, etc)

All of the AccuLoad III-S responses will have at least one 16-bit unsigned integer response code, possibly followed by more data (herein referred to as the "standard response code"). The response codes are broken down into four classes, as follows:

Response Code Range	Class
0x0000 – 0x3fff	Normal response; command was executed.
0x4000 – 0x7fff	Warning response; command was not executed; instrument communications status has not changed.
0x8000 – 0xbfff	Critical response; command was not executed; instrument communications status has changed.
0xc000 – 0xffff	Fatal response; command was not executed; instrument communications status has changed and recovery is necessary to continue.

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Standard Error Code Definitions

Error Code	Definition
0x0000	No error
0x0001	Download successful
0x8000	Empty config
0x8001	Block not found
0x8002	Bad message format
0x8003	Block out of sequence
0x8004	Invalid data in nonvolatile memory
0x8005	Target buffer too small
0x8006	Bad CRC
0x8007	No configuration available
0x8008	Download already in progress
0x8009	Bad database specification
0x800A	In Program Mode
0x800B	Released
0x800C	Bad value
0x800D	Flow active
0x800E	No transactions ever done
0x800F	Operation not allowed
0x8010	Wrong control mode
0x8011	Transaction in progress
0x8012	Alarm active
0x8013	Transaction storage full
0x8014	Operation out of sequence
0x8015	Power fail during transaction
0x8016	Authorized
0x8017	Program code not used
0x8018	Display under remote control
0x8019	Ticket not in printer
0x801A	No key data pending
0x801B	No transaction in progress
0x801C	Option not installed
0x801D	Start after stop delay
0x801E	Permissive delay active

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Error Code	Definition
0x801F	Print request pending
0x8020	No meter enabled
0x8021	Must be in prog mode
0x8022	Ticket alarm during trans
0x8023	Volume type not selected
0x8024	Exactly one recipe must be enabled
0x8025	Batch limit reached
0x8026	Checking entries
0x8027	Product recipe additive not assigned
0x8028	Must use "mini" protocol
0x8029	Buffer error
0x802A	Keypad locked
0x802B	Data recall error
0x802C	Internal error
0x802E	Unknown error
0x802F	Unused batch
0xC000	Internal nonvolatile memory error
0xC001	Internal nonvolatile memory has overrun
0xC002	Internal buffer error
0xC003	Buffer allocation error
0xC004	Buffer overrun
0xC005	Internal nonvolatile memory erase error
0xC006	Internal nonvolatile memory write error

Here is an example of how to execute a complete command. Let's issue a command to return the AccuLoad display to AccuLoad control (like a "DA" command using the "AccuLoad II style" protocol)

Setting up the Command Packet

You may refer ahead to the description of service 0x110, "display Control". The command is written as follows:

Modbus™ Holding Register	Value	Description
0	0x0004	Number of bytes in the packet (Modbus™ holding registers 1 and 2); each Modbus™ register consists of 2 bytes.
1	0x0110	Router control (normal packet) and display control service number
2	0x0001	Display control subcommand to return control of the display to the AccuLoad

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Note that it is possible to read back the command data using Modbus™ function 3 to determine if the command data is correct. This command data is not altered (except on port parameter changes and power up); thus, it may be used repeatedly.

Invoking the Service

The service is invoked by writing an "on" to coil 0 using Modbus™ function 5 or 15. Note that it is possible to make changes to individual fields in the service command buffer and invoke the service repeatedly (the command buffer is not cleared at any time).

Reading the Result

To read the Extended Services response, examine the input registers starting at 0 (Modbus™ function 4).

Modbus™ Input Register	Value	Description
0	0x0004	Number of bytes in the packet
1	0x8110	Router information and display control service number (normal response packet)
2	0x0000	Result Code

The following section describes all the services available via the Extended Services:

0x000 Read Unit Information

This command returns standard unit information such as manufacturer code, model number, and serial number (if available). This command is included so the host may determine what type of unit is occupying a certain address on the comm port.

Command Data: None

Response Data:

Unsigned Int	Unsigned Int	Unsigned Int	ASCII String, null term, 16 chars	Unsigned Int	Unsigned Long Int	(future space)
Standard Response Code	Unit Manufacturer Code (Smith Meter = 0x0001)	Unit Model number code (AIIS = 0x0010)	ASCII serial number (null string if not available)	software version number	ROM CRC32	...

0x001 Read Clock

This command returns the time and date indicated by the internal clock.

Command Data: None

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Response Data:

Unsigned Int	Int	Int	Int	Int	Int	Int	Int	Int
Standard Response Code	Year	Month	Day	reserved	Time Sec	Time Min	Time Hour	reserved

0x002 Set Clock

This command sets the internal clock (time/date):

Command Data:

Int	Int	Int	Int	Int	Int	Int	Int
Year	Month	Day	Reserved (enter 0x0000)	Time Sec	Time Min	Time Hour	Reserved (enter 0x0000)

Response Data:

Unsigned Int
Standard Response Code

0x106 Read Transaction Log

This service reads a record from the specified transaction log stored in nonvolatile storage. See also related command 0x010e (search transaction log).

Command Data:

Unsigned Long Int	Unsigned Int
Sequence Number	Command code, 0-10.

Response Data, command code 0 (transaction data):

Unsigned Int	Unsigned Int	Int	Int	Int	Int	Int	Int	Int	Int	Int	
Standard Response Code	Command Code	Log Date Year	Log Date Month	Log Date Day	reserved	Log Time Sec	Log Time Min	Log Time Hour	reserved	reserved	Data in the following table:

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Data:

- unsigned int transaction number
- unsigned int transaction number of batches
- unsigned int transaction number of batches (again)
- double transaction raw total volume
- double transaction gross total volume
- double transaction gst total volume
- double transaction gsv total volume
- double transaction total mass
- double injector #1 volume
- double injector #2 volume
- double injector #3 volume
- double injector #4 volume
- double injector #5 volume
- double injector #6 volume
- double injector #7 volume
- double injector #8 volume
- double injector #9 volume
- double injector #10 volume
- double injector #11 volume
- double injector #12 volume
- float transaction average meter factor
- float transaction average temperature
- float transaction average density
- float transaction average pressure
- float transaction average ctl
- float transaction average cpl
- unsigned long int transaction prompt #1 response
- unsigned long int transaction prompt #2 response
- unsigned long int transaction prompt #3 response
- unsigned long int transaction prompt #4 response
- unsigned long int transaction prompt #5 response
- char[9] transaction alarm #1 text
- char[9] transaction alarm #2 text
- char[9] transaction alarm #3 text
- char[9] transaction alarm #4 text
- char[9] transaction alarm #5 text
- char[9] transaction alarm #6 text
- char[9] transaction alarm #7 text
- char[9] transaction alarm #8 text
- char[9] transaction alarm #9 text
- char[9] transaction alarm #10 text
- char[9] transaction alarm #11 text
- char[9] transaction alarm #12 text
- char[9] transaction alarm #13 text
- char[9] transaction alarm #14 text
- char[9] transaction alarm #15 text
- char[9] transaction alarm #16 text
- char[9] transaction alarm #17 text
- char[9] transaction alarm #18 text
- char[9] transaction alarm #19 text
- char[9] transaction alarm #20 text
- unsigned char transaction number of alarms

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Response Data, command code 1 – 10 (batch data, 1 – 10 is batch number):

Unsigned Int	Unsigned Int	Int	Int	Int	Int	Int	Int	Int	Int	Int	
Standard Response Code	Command Code	Log Date Year	Log Date Month	Log Date Day	reserved	Log Time Sec	Log Time Min	Log Time Hour	reserved	reserved	Data in the following table:

Data:

- unsigned char batch product number loaded in this batch
- unsigned char batch recipe number for this batch
- unsigned int injector mask (bit 0=injector #1,...)
- double batch raw total volume
- double batch gross total volume
- double batch gst total volume
- double batch gsv total volume
- double batch total mass
- double batch total pulses
- float batch average flow rate
- float batch average meter factor
- float batch average temperature
- float batch average density
- float batch average pressure
- float batch average vapor pressure
- float batch average ctl
- float batch average cpl
- float batch average total correction factor (ccf);
- float batch reference density
- float batch relative density
- float batch api density
- double batch additive injector #1 volume
- double batch additive injector #2 volume
- double batch additive injector #3 volume
- double batch additive injector #4 volume
- double batch additive injector #5 volume
- double batch additive injector #6 volume
- double batch additive injector #7 volume
- double batch additive injector #8 volume
- double batch additive injector #9 volume
- double batch additive injector #10 volume
- double batch additive injector #11 volume
- double batch additive injector #12 volume
- char[7] batch alarm log (line 1)
- char[7] batch alarm log (line 2)
- char[7] batch alarm log (line 3)
- char[7] batch alarm log (line 4)
- char[7] batch alarm log (line 5)
- char[7] batch alarm log (line 6)
- char[7] batch alarm log (line 7)
- char[7] batch alarm log (line 8)
- char[7] batch alarm log (line 9)
- char[7] batch alarm log (line 10)
- unsigned char batch number of alarms

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0x10d Search Event Log

This service searches the event log for the latest entry, the oldest entry still available in memory, or the most recent entry that falls before a given date and time. The service returns the sequence number of the entry.

Variation #1 Command Data (returns most recent record number):

Unsigned Int
Search command = 0x0001

Variation #2 Command Data (returns oldest available record number):

Unsigned Int
Search command = 0x0002

Variation #3 Command Data (searches on specified date and time):

Response Data, command code 0 (transaction data):

Unsigned Int	Int	Int	Int	Int	Int	Int	Int	Int
Search command = 0x0003	Log Date Year	Log Date Month	Log Date Day	(reserved, set to 0x0000)	Log Time Sec	Log Time Min	Log Time Hour (0-23)	(reserved, set to 0x0000)

Response Data:

Unsigned Int	Unsigned Long Int
Standard Return Code	Sequence Number

0x10e Search Transaction Log

This service searches the transaction log for the latest entry, the oldest entry still available in memory, or the most recent entry that falls before a given date and time. The service returns the sequence number of the entry.

Variation #1 Command Data (returns most recent record number):

Unsigned Int
Search command = 0x0001

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Variation #2 Command Data (returns oldest available record number):

Unsigned Int
Search command = 0x0002

Variation #3 Command Data (searches on specified date and time):

Unsigned Int	Int	Int	Int	Int	Int	Int	Int	Int
Search command = 0x0003	Log Date Year	Log Date Month	Log Date Day	(reserved, set to 0x0000)	Log Time Sec	Log Time Min	Log Time Hour (0-23)	(reserved, set to 0x0000)

Response Data:

Unsigned Int	Unsigned Long Int
Standard Return Code	Sequence Number

0x10f Transaction Control

This service allows transactions to be controlled via Comm. There are several different subcommands (variations).

Variation #1 Command Data (authorize transaction, equivalent to AccuLoad II style commands AP and AU):

Unsigned Int	Unsigned Int	Unsigned Int
Subcommand = 0x0000	Prompt Type 0 = wait for set key 1 = preset now	Additive Code; bits 0-11 indicate injector selection (injectors 1-12); 0=off, 1=on

Variation #2 Command Data (set transaction, equivalent to AccuLoad II style command TA):

Unsigned Int	Float
Subcommand = 0x0001	Volume

Variation #3 Command Data (allocate recipes, equivalent to AccuLoad II style command AB):

Unsigned Int	Unsigned long Int	Unsigned long Int
Subcommand = 0x0002	Recipe mask A, bits 0-31 enable recipes 1-32, 0=no,1=yes	Recipe mask B, bits 32-63 enable recipes 33-64, 0=no, 1=yes

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Variation #4 Command Data (set batch, equivalent to AccuLoad II style command SB):

Unsigned Int	Float	Unsigned Int
Subcommand = 0x0003	Volume	Additive Code; bits 0-11 indicate injector selection (injectors 1-12); 0=off, 1=on

Variation #5 Command Data (end batch, equivalent to AccuLoad II style command EB):

Unsigned Int
Subcommand = 0x0004

Variation #6 Command Data (end transaction, equivalent to AccuLoad II style command ET):

Unsigned Int
Subcommand = 0x0005

Variation #7 Command Data (remote start, equivalent to AccuLoad II style command SA):

Unsigned Int
Subcommand = 0x0006

Variation #8 Command Data (remote stop, equivalent to AccuLoad II style command SP):

Unsigned Int
Subcommand = 0x0007

Response Data:

Unsigned Int	Unsigned Int
Standard Return Code	Subcommand

Variation #9 Command Data (read status flags):

Unsigned Int
Subcommand = 0x0008

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Response Data (note: flags returned are 1=true, 0=false):

Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int
Standard Return Code	Subcommand	Authorized flag	Released flag	Transac. In progress	Batch done	Transac. Done	Start/stop delay	Valve opening delay	Product flowing	Injectors authorized via Comm	Proving in progress

Response Data (cont.) (note: flags returned are 1=true, 0=false):

Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int
Alarm condition	In Program Mode	Checking entries	Program value changed	Power fail occurred	Transac. Report queued

Variation #10 Clear transaction done flag (and batch done flag):

Unsigned Int
Subcommand = 0x0009

Response Data:

Unsigned Int	Unsigned Int
Standard Return Code	Subcommand

Variation #11 Clear batch done flag:

Unsigned Int
Subcommand = 0x000A

Response Data:

Unsigned Int	Unsigned Int
Standard Return Code	Subcommand

Variation #12 Clear power fail flag:

Unsigned Int
Subcommand = 0x000B

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Response Data:

Unsigned Int	Unsigned Int
Standard Return Code	Subcommand

Variation #13 Clear program parameter changed flag:

Unsigned Int
Subcommand = 0x000C

Response Data:

Unsigned Int	Unsigned Int
Standard Return Code	Subcommand

0x110 Display Control

This service allows the display to be controlled via Comm. There are several different subcommands (variations).

Variation #1 Command Data (write to display, equivalent to AccuLoad II style commands WA, WD, WP, WQ, and WX):

Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int
Subcommand = 0x0000	Display line number, 1 or 2	Display timeout value, 0-255 seconds, 0=no timeout	Wait for set key, 0=no, 1=yes	Response length, 1-20 digits. For variable length, add 40.	Delimiter character (ASCII) in lower byte	Security, 0=echo response, 1=hide response with x's

Delimiter:

“&” = no initiator, any function key but “clear” or “stop” to terminate.

“[” = “enter” initiates, any function key but “clear” or “stop” to terminate.

“]” = “enter” initiates, “enter” terminates.

Variation #1 Response Data:

Unsigned Int	Unsigned Int
Standard Return Code	Subcommand

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Variation #2 Command Data (release the keypad and display, equivalent to AccuLoad II style command DA):

Unsigned Int
Subcommand = 0x0001

Variation #2 Response Data:

Unsigned Int	Unsigned Int
Standard Return Code	Subcommand

Variation #3 Command Data (get last key that was pressed, equivalent to AccuLoad II style command GK):

Unsigned Int
Subcommand = 0x0002

Variation #3 Response Data:

Unsigned Int	Unsigned Int	Char[] (array)
Standard Return Code	Subcommand	ASCII character(s). '0'-'9' = keys 0-9, 'E' = enter, 'P' = print, 'A' = start, 'B' = set, 'C' = clear, 'S' = stop

Variation #4 Command Data (read keypad data, equivalent to AccuLoad II style command RK):

Unsigned Int
Subcommand = 0x0003

Variation #4 Response Data:

Unsigned Int	Unsigned Int	Char[] (array)
Standard Return Code	Subcommand	ASCII character(s). '0'-'9' = keys 0-9, 'E' = enter, 'P' = print, 'A' = start, 'B' = set, 'C' = clear, 'S' = stop

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Variation #5 Command Data (read status flags):

Unsigned Int
Subcommand = 0x0004

Response Data (note: flags returned are 1=true, 0=false):

Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int	Unsigned Int
Standard Return Code	Subcommand	Authorized flag	Keypad data pending flag	Delayed prompt in effect	Display message timed out	Alarm condition	In Program Mode	Checking entries	Program parameter changed	Power fail occurred	Transac. Report queued

Section IV – Related Publications

The following literature can be obtained from FMC Measurement Solutions Literature Fulfillment at johno@gohrs.com or online at www.fmcmeasurementsolutions.com. When requesting literature from Literature Fulfillment, please reference the appropriate bulletin number and title.

AccuMate for AccuLoad III

Specification Bulletin SS06032
Installation/Operation..... Bulletin MN06114

AccuLoad III

Specification Bulletin SS06030
Installation/Operation..... Bulletin MN06108
Operator Reference..... Bulletin MN06110
Communications..... Bulletin MN06112L
Modbus™ Communications Bulletin MN06111L

AccuLoad III Upgrade

Specification Bulletin SS06033
Installation Bulletin MN06115

Revisions included in MN06111L Issue/Rev. 0.1 (9/01):
Added Caution and Disclaimer

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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