

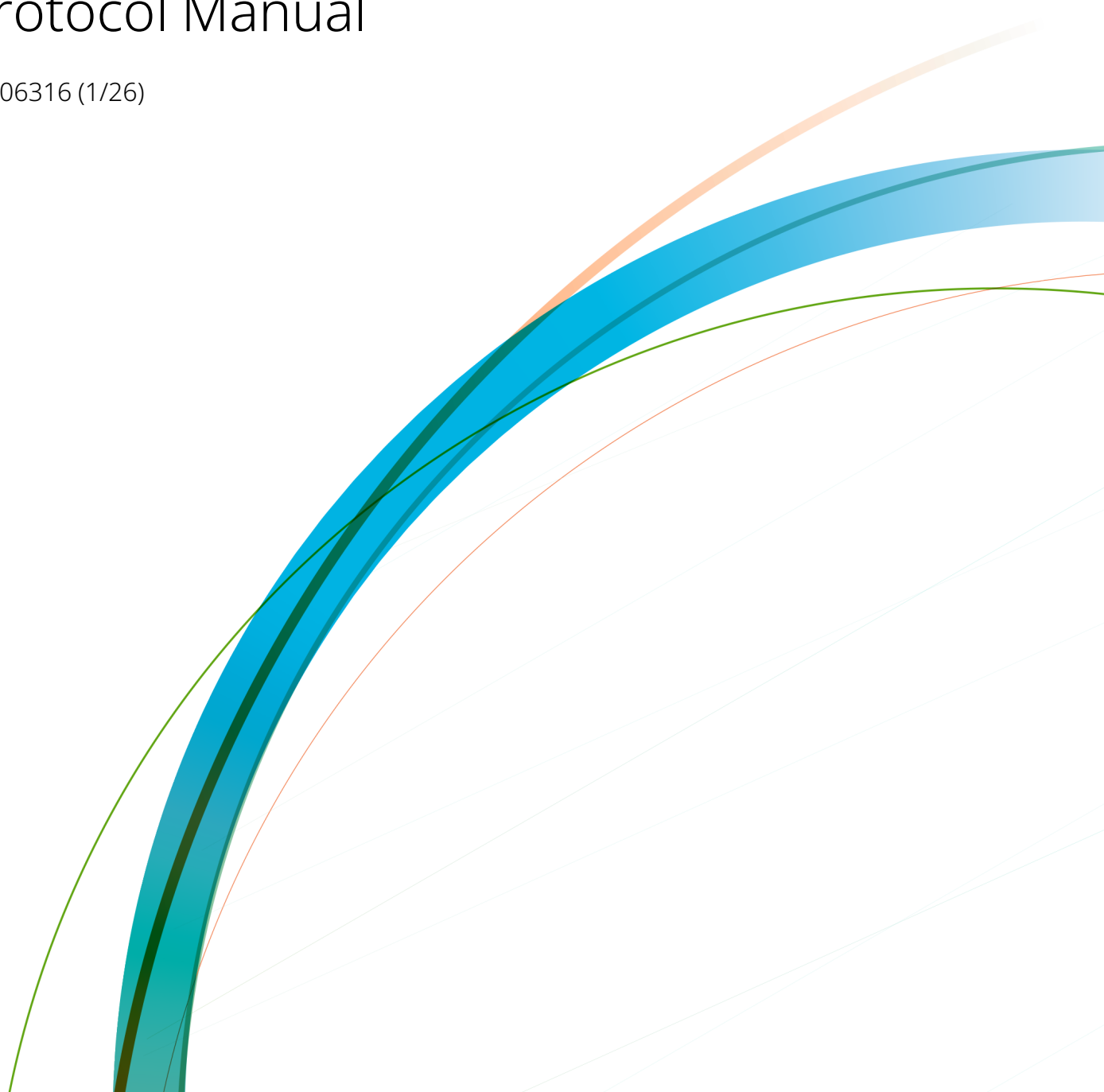


GUIDANT

1010CB Load Computer

Protocol Manual

MN06316 (1/26)



Important

All information and technical specifications in this document have been carefully checked and compiled by the author; however, we cannot completely exclude the possibility of errors. Guidant Measurement is always grateful to be informed of any errors; contact us at TechnicalCommunications@GuidantMeasurement.com.

Caution

The default or operating values used in this document and in the configuration parameters of the product described in this document are for factory testing only and should not be construed as default or operating values for your system. Each system is unique and each configuration parameter must be reviewed and programmed for that specific system application.

Disclaimer

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Guidant Knowledge Base

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1 Overview

1.1 Description

This manual provides the information necessary to design communications software that is compatible with the Model 1010 loading system, using the SLIP+, Modbus RTU and Modbus TCP/IP command set.

In this document, “instrument” refers to the generic Model 1010 loading system, and “computer” refers to the attached computer, Distributed Control System (DCS), Load Rack Computers (LRC), or Terminal Automation System (TAS).

The instrument communicates with the computer using RS485 or RS232 communication standards, with a baud rate of 1200 to 38400 kbps, odd, even, or no parity, and 8 data bits.

The instrument communicates with Modbus TCP/IP with Ethernet ports.

To alter communication parameters, enter programming mode and then use the COMMUNICATIONS menu. For more information, see the [1010CB Programming Manual](#).

RS485 allows multi-drop communications. One or more instruments can be connected on a single RS485 interface. The computer can poll the individual instruments.

For terminal designations, see the [1010CB Card Description and Wiring Manual](#).

2 SLIP+ Frame Format

2.1 Description

This section describes the framing format used to transfer commands and information between the instrument and the computer. All values shown with the suffix 'H' are hexadecimal values.

Frame Format

All communications consist of 8-bit binary data with the frame format shown below:

C0H	ADDRESS	CONTROL	INFORMATION	LRC	C0H
-----	---------	---------	-------------	-----	-----

Each frame is bracketed between two C0H bytes (decimal 192) and can contain a maximum number of 200 bytes.

2.2 Address Byte

The address byte is the second byte in a frame. It is derived by adding the instrument's UNIT ADDRESS value to 80H, providing a maximum of 31 addresses in the range 81H to 9FH. For example, an instrument programmed with a unit address of 2 would have an address byte value of 82H. Enter an instrument's unit address in the UNIT ADDRESS parameter in the COMMUNICATIONS menu. For more information, see the [1010CB Programming Manual](#).

When information is sent from a computer to an instrument, the address byte is used to direct the frame to the desired instrument.

When information is sent from an instrument to a computer, the address byte indicates the instrument that is transmitting the information.

The unit address returned in the ST command is taken from the com port 1 setting, regardless of the unit address of the other com ports. If port 1 mode is not computer then the unit address is returned as 1.

2.3 Control Byte

The control byte is the third byte in the frame and must be one of the following:

Table 2-1: Control Byte Description

Control Byte	HEX Value	Description
ENQ	05H	Used by the computer to poll the instruments.
STX	02H	Used to indicate that the information field contains data.
ACK	06H	Used by the instrument to indicate that the received frame is valid.
BS		Used by the instrument to indicate that the received command cannot be answered because the instrument is in the wrong mode of operation.
NAK	15H	Used by the instrument to indicate that the received frame is invalid.
NAKxx	15Hxx	Special case that replaces the standard NAK only when the DEBUG RESPONSE is enabled in the COMMUNICATIONS menu. Same as the NAK above except “xx” indicates the reason the received frame is invalid. See Table 2-2: Invalid Frame Reason Codes for reason codes.
EOT	04H	Used by the computer to indicate the end of transmission.

Table 2-2: Invalid Frame Reason Codes

Code	Description	Code	Description
NAK00	Command does not exist	NAK17	Calculated parameters fault
NAK01	Instrument in programming mode	NAK18	Manager reset (MR) required
NAK02	Flow is active	NAK19	No meter enabled
NAK03	No transaction in progress or complete	NAK20	Additive batch setup not complete
NAK04	Operation not allowed	NAK21	Arm disabled in configuration
NAK05	Instrument in wrong control mode	NAK22	Arm faulty - MR required
NAK06	Transaction in progress	NAK23	Arm position fault
NAK07	Alarm condition	NAK24	Overfill/ground fault

Code	Description	Code	Description
NAK08	Storage Full	NAK25	Transaction record not found
NAK09	Operation is out of sequence	NAK26	Manager reset is not required
NAK10	Power fail during transaction	NAK27	Permissive delay active
NAK11	Instrument authorised	NAK28	Batch record not found
NAK12	Option not installed	NAK29	SDF read fault
NAK13	Parameter size incorrect	NAK30	Option not configured
NAK14	Invalid SLIP command structure	NAK31	Recipe not available
NAK15	Parameter value rejected	NAK32	Non-existent arm number
NAK16	Incorrect number of parameters	NAK33	Non-existent meter number

An example of each of the ENQ (Enquiry), ACK (Acknowledge) and NAK (Negative Acknowledge) frames follow. The address byte used in each frame is 81H.

ENQ	C0H	81H	05H	84H	C0H
ACK	C0H	81H	06H	87H	C0H
NAK	C0H	81H	15H	94H	C0H

2.4 Information Field

The optional information field is present only when the STX control byte is used.

The general format for the information field is as follows:

COMMAND	00H	Data Field 1	00H	Data Field 2	00H	ETX
---------	-----	--------------	-----	--------------	-----	-----

A terminating byte of ETX (03H) indicates the end of the information field.

Alternating byte of ETB (17H) indicates the end of the information field, with more information to follow in the next frame.

The information field must contain a two byte alphanumeric command and an arbitrary number of data fields.

The information in the command and data fields must be in the ASCII range of values 20H through to 7FH.

The NULL (00H) character separates the command and data fields.

Table 2-3: Information Field Example

Information Field	Description
[ST] 0 [123] 0 [ETX]	Send Transaction Number 123
[AT] 0 [ETX]	Send Accumulated Totals

For ease of identification, each field of the information field has been defined by enclosure in square brackets. The 0 between each field is the null character (00H).

The frames following show the complete transmission frame for the two previous examples. The address byte used in each frame is 0x81.

The following line shows the complete frame, in hexadecimal values, transmitted to an instrument to send transaction number 123. The line below that shows the ASCII values, where possible, of the same frame.

C0H	81H	02H	53H	54H	00H	31H	32H	33H	00H	03H	B7H	C0H
	Address	STX	S	T	null	1	2	3	null	ETX		

The following line shows the complete frame, in hexadecimal values, transmitted to an instrument to send accumulated totals. The line below that shows the ASCII values, where possible, of the same frame.

C0H	81H	02H	41H	54H	00H	03H	95H	C0H
	Address	STX	A	T	null	ETX		

2.5 LRC

Longitudinal Redundancy Checksum (LRC) byte must be equal to the Exclusive OR (XOR) of all bytes in the packet, excluding the C0H and LRC bytes.

The LRC register shall be set to 0 at the beginning of each frame. The LRC should be derived by the transmitting unit and then sent to the receiving unit.

The receiving unit should, in turn, check each byte for parity, derive the LRC from the information it has received and then compare the LRC it received to the one it derived.

Once the correct closing C0H bracket has been received, the frame is deemed to be either correct or incorrect and one of the following conditions would arise:

Table 2-4: LRC Scenarios

Receiving Unit	Frame Correct	Frame Incorrect
Instrument	Send data, if command calls for data to be sent, else send ACK, NAK or BS.	Do Nothing
Computer	Send next command or EOT	Repeat Command

For a frame to be acceptable it must meet the following conditions:

- All bytes (including the frame bracketing bytes) pass the parity check.
- The address byte matches the address of the unit.
- The derived LRC matches the received LRC.
- The two byte command within any information field is valid for the unit addressed.
- Is one of the commands described in [Section 6: SLIP+ Command Summary](#).
- A valid end of frame bracket is received within 200 mS after the opening bracket.

3 SLIP+ Byte Testing

3.1 Description

This section describes how frames are correctly received.

3.2 Byte Testing

The transmitter sends a FEND (frame end) character, C0H before and after each frame.

- Two FEND characters in a row do not delimit an empty frame.

As frames are sent in 8-bit binary, the transmitter translates a FEND into the two byte sequence FESC TFEND (a frame escape byte and a transposed frame end byte), before transmission. The transmitter replaces the FESC character in the user data with the two character sequence FESC TFESC (a frame escape byte and a transposed frame escape byte), before transmission.

The receiver appends characters as they arrive to a buffer containing the current frame. A FEND marks the end of the current frame. Receiving a FESC puts the receiver into “escaped mode”, which causes the receiver to translate a following TFESC or TFEND back to FESC or FEND, respectively, before adding it to the receive buffer and leaving escaped mode.

- Receiving any character other than TFESC or TFEND while in escaped mode is an error; no action is taken and frame assembly continues. A TFEND or TFESC received while not in escaped mode is treated as an ordinary data character.

The FEND character is only sent as an end-of-frame indication. This ensures that any intact frame (properly delimited by FEND characters) is received properly regardless of the starting state of the receiver or corruption of the preceding frame. The special characters used are:

FEND	(frame end)	C0 (hex)
FESC	(frame escape)	DB (hex)
TFEND	(transposed frame end)	DC (hex)
TFESC	(transposed frame escape)	DD (hex)

The C/C++ programming tip on the following pages demonstrates how to correctly process received characters.

```
void T_COMPORT::vd_Process_SLIP_protocol(uint ui_c)
{
    //Check for a frame start or stop character - FRAME CHARACTER = COH if(ui_c ==
    FRAMECHARACTER)
    {
        //If the frame is already started if(un_serial_port.sr_flag.uf_frame_started)
        {
            //If the number of characters recieved is >= 3 (minimum required for a valid
            packet) if(ui_rx_char_count >= 3)
            {
                un_serial_port.sr_flag.uf_ready_to_decode = TRUE; ui_rx_frame_char_count = ui_rx_
                char_count; un_serial_port.sr_flag.uf_frame_started = FALSE; if(sr_sci_settings.uc_
                bus_type == (uchar)BT_CLIENT)
                {
                    pt_sci_registers->SCR.BIT.RIE = SET_BIT_LOW; pt_sci_registers->SCR.BIT.RE = SET_
                    BIT_LOW;
                }
            }
            //Less than 3 characters recieved between FRAMECHARACTER's therefore invalid packet
            - reset else if(ui_rx_char_count < 3)
            {
                ui_rx_char_count = 0;
            }
        }
        else // ie frame not previously started
        {
            un_serial_port.sr_flag.uf_frame_started = TRUE; ui_rx_char_count = 0;
        }
        un_serial_port.sr_flag.uf_escape_mode = FALSE; pt_receive_buffer = ch_receive_
        buffer;
    }
    else if(ui_c == FESC)
        //Any FESC puts the receiver into escape mode. un_serial_port.sr_flag.uf_escape_
        mode = TRUE;
    else if(un_serial_port.sr_flag.uf_escape_mode)
        //In escape mode.
        {
            //The character is TFEND, so put FEND into the buffer. if(ui_c == TFEND)
            *(uchar*)pt_receive_buffer++ = CHARFEND;
            //The character is TFESC, so put FESC into the buffer. else if(ui_c == TFESC)
            *(uchar*)pt_receive_buffer++ = CHARFESC;
            //In escape mode and the next character received was not TFEND
            //or TFESC, so it is a transmission error. else
            {
                cl_Comport[uc_port_no].vd_Reset_RX_buffer(); return;
            }
        }
    //Clear the escape mode and increment the buffer
```

```
//ui_rx_char_count. ui_rx_char_count++; un_serial_port.sr_flag.uf_escape_mode =  
FALSE;  
}  
else if(un_serial_port.sr_flag.uf_frame_started)  
//Every other character is added to the receive buffer, and the buffer  
//ui_rx_char_count is incremented. The buffer is then checked  
//for overflow.  
{  
*pt_receive_buffer++ = (char)ui_c; ui_rx_char_count++;  
if(ui_rx_char_count >= (RX_BUFFER_SIZE - 2)) cl_Comport[uc_port_no].vd_Reset_RX_  
buffer();  
}  
}  
//End of function vd_Process_SLIP_protocol
```

4 SLIP+ Communication Procedures

4.1 Description

The computer controls communications with the instrument. The instrument responds only to requests and commands from the computer. The instrument ignores any command that contains parity errors, LRC errors and/or contains an invalid address byte. The enquiry command (ENQ) provides the instrument status needed to determine computer program flow.

The computer can receive commands from any of the instrument's communication ports. For more information, see the [1010CB Programming Manual](#).

4.1.1 Wait Period

The computer waits for 300 milliseconds after sending a command to the instrument. If it does not receive a response from the instrument it sends the command again and waits another 300 milliseconds. We recommend at least four re-tries before deciding on alternative programming strategies.

4.1.2 Extended Wait Period

Some commands require a wait period of three to five seconds. Other commands sent during this extra wait period are ignored. An example is the AA command when used to download information to the instrument. The instrument updates the non-volatile memory as part of the command operation. During this time the instrument cannot respond to any other command. Therefore, use these commands only while the instrument is in the idle state. These commands respond with an ACK within the extra wait period. Similar commands are AR, DN, IA, and RD.

Depending on the status of the instrument, some commands may not be executed and will then return a busy (BS) response to the computer. An example of such

commands are the RD (Reset Date and time), ST (Send Transaction) and SY (Send Batch).

For more information on commands, see [Section 6: SLIP+ Command Summary](#).

4.2 About Load Scheduling

A load schedule is a list of quantities of products to load into the compartments of a particular vehicle, by particular personnel. To distinguish orders that have the same personnel and vehicle, each load has a unique load number. The load schedule is usually entered on the host computer, which is connected to the instrument, prior to the vehicle arriving at the loading facility.

Load scheduling involves the following:

- Retrieving information from the instrument operator. For more information, see [Section 4.7: Displaying Messages and Getting Answers](#).
- Verifying that the information constitutes a valid load
- Sending the required compartment load quantities to the instrument.

Load verification occurs in two phases:

1. Load number, personal and vehicle authorisation
2. Product and compartment verification

To perform load scheduling, enable load scheduling from the COMMUNICATIONS configuration menu. See the [1010CB Programming Manual](#) for more details.

The instrument and the computer use three commands to exchange the required information and a fourth to complete the transaction.

The first three commands are

- Enquiry (ENQ)
- Request for load (RL)
- Request for compartment (RC)

The fourth command is the transaction complete (TC) command. It tells the instrument that the loading process is complete.

The RL command performs load number, personnel and vehicle verification. The RC command performs product and compartment verification.

How the instrument responds to the ENQ command depends on the following:

- The section of program that is executing when it receives the ENQ command
- The configuration of the instrument. Valid responses to the ENQ command are

Valid responses to the ENQ command are

- SS (Send Status)
- RL (Request for Load)
- DM (Display Message)
- MT (Message Taken)
- GA (Get Answer)
- GH (Get Hidden answer)
- GK (waiting for touch key)
- PL (Post Loading status)
- AA (Answer Available)
- GN (Get NexWatch card)
- DP (Display prompt)
- NA (NexWatch available)
- KA (Touch key available)
- RA (Remote authorisation available).
- AR (Allocate Recipe)
- LA (Loading Arm Information)

All of the above include

- The current instrument status
- Status of the gantry arms
- Last transaction number
- First arm number
- The number of arms

For more information, see [Section 6.27: ENQ - Operational State Enquiry](#).

The instrument responds with an SS (Send Status) response unless it is

- Requesting load or compartment authorisation
- Displaying a message or getting an answer from the operator, and a message has not been taken or an answer is not available

To determine the current status, examine the value of the status byte of parameter 'a' in the SS response.

The status can have a value from 0 to 255 (i.e. 8 bits, with each bit representing an off/on state for up to 8 parameters). For example, bit 7 indicates the instrument state — 0 indicates that the instrument is in the idle state, 1 indicates that the instrument is not in the idle state.

To determine the current state of up to four loading arms, examine the value of the arm status bytes, parameters 'e' & 'f' in the SS response.

The arm status parameters (e — Arms 1 & 2, f — arms 3 & 4) can have a value from 0 to 255 (i.e. 8 bits, with each bit representing an off/on state for up to 8 parameters). For example, bit 7 of parameter 'e' indicates whether arm 1 of the instrument is presently loading, 0 indicating that the arm is presently not loading, 1 indicating the instrument is currently loading.

Parameter f is used for latched RIT input when RIT panel is enabled on a one or two arm system with RIT enabled, and is always 0 on a one or 2 arm instrument with RIT disabled. Parameter f is required on CB instruments with one or two arms.

For any of the above parameters, 0 is the default setting for any bit.

The computer uses the response to the ENQ command to determine the state of the instrument and then takes the appropriate action.

4.3 Load Scheduling — Sequence of Events

Load scheduling begins with the computer monitoring the instrument status using the ENQ command. The instrument always begins from the idle state.

While the instrument is in the idle state the computer may send the following commands to the instrument: DM, DP, GA, GH, GK and GN. When the instrument receives these commands it displays a prompt on the screen.

The responses that the operator makes to these prompts provide information about the operator and vehicle. The computer uses this information to determine whether the operator has an authorised load in the load schedule database.

4.4 RL State

1. The instrument moves from the idle state to the RL state after the operator responds to the initial message by either pressing the Enter key or connecting the system permissives.



2. If authorisation is enabled the instrument displays a screen like the following:



The authorisation message depends on the type of authorisation that the instrument is programmed to use. For more information, see the [1010CB Programming](#) and [Operator](#) manuals.

3. Touch key or other authorisation occurs and then the instrument displays the load number prompt.



4. The instrument now responds to the ENQ command with an RL (re-request for load authorisation). The instrument displays "please wait".



While the instrument is in this state the computer may send a message to the operator using the DM, DP, GA, GH, GK and GN commands.

An RL response from the instrument to the ENQ command from the computer has the following parameters in addition to the instrument status:

- Load number
 - Personnel index number
 - Vehicle index number
 - Personnel authorisation number
 - Vehicle authorisation number
 - Master index number
 - Master authorisation number
5. If the instrument verifies the personnel and/or vehicle authorisation numbers, the personnel/vehicle index fields of the RL response contains numbers in the range 1 to 2750. For the master authorisation numbers the RL response contains numbers in the range 1 to 85.

The numbers correspond to the memory locations in the instrument that contain the PIN touch key, or NexWatch numbers. The last two fields contain the actual personnel and/or vehicle authorisation numbers. This allows for remote authorisation of the personnel and/ or vehicle.

6. The computer should now verify if the load number, personnel and vehicle correspond to a load in the load schedule database. The personnel and/or vehicle authorisation numbers are downloaded to the instrument using the CP command when the instrument is in the idle state.

Personnel/vehicle/master authorisation can be disabled. In this case these fields and the corresponding personnel/vehicle/master authorisation number fields will contain 0. Only the load number need be verified in this case. Alternatively the load number prompt can also be disabled. In this case the load number field will contain 0. This requires the computer to prompt the operator for information using the messaging commands DM, DP, GA, GH, GK and GN and then verify the obtained information before authorising the load.

7. The computer sends SC (Set Compartment) command to the instrument.

If any of the parameters in the SC do not constitute a valid load, the computer should send an SC command to the instrument. Refer SC command details.

8. After the operator enters a valid preset, the instrument prompts the operator to start the load.



As further arms are started within the same load, the instrument sends RC responses to ENQ commands to issue further compartment authorisation requests. See the operator presses “No” for Load another compartment.

4.5 PL State

After loading is complete, the instrument enters the PL state. Final messages for the operator can be posted using the DM, DP, GA, GH, GK and GN commands. The instrument displays “please wait”.



PLEASE WAIT

After messaging is complete the computer sends the TC (Transaction Complete) command to the instrument.

- If permissives are enabled, the instrument then moves from the PL state to the disconnect prompt.
- If no permissives are enabled or they have been disconnected, the instrument displays a message that the load has completed for 5 seconds, before reverting to the idle state. A new transaction can begin from the idle state. While in the idle state the last transaction number stored in the instrument can then be compared to that stored in the computer database. If the instrument stores higher transaction numbers than that stored in the computer database, the computer should upload the data from the instrument using the ST (Send Transaction). See the operator presses “No” for Load another compartment.

4.6 Remote Authorisation

Remote Authorisation is used to remotely authorise a personnel and/or vehicle so that they can begin the loading process. Remote Authorisation

- Can involve authorising personnel, a vehicle or both
- Can be used with any type of authorisation such as PIN/Touch Key/ NexWatch.
- Is used primarily where there are greater than 2750 personnel and/or vehicle authorisation numbers, therefore they cannot all be stored within the instrument. (The instrument can only hold 2750 personnel and 2750 vehicle and 85 master id's authorisation numbers.)

The personnel and/or vehicle authorisation numbers are entered into the computer that is connected to the instrument, prior to loading.

Generally remote authorisation involves:

1. Retrieving personnel and/or vehicle authorisation numbers from the instrument.
2. Verifying personnel and/or vehicle authorisation numbers.
3. Sending the instrument authorisation.

To perform remote authorisation, the instrument and the computer use the enquiry (ENQ) and Remote Authorisation (RA) commands.

4. After the operator responds to the instrument's prompts by entering the authorisation numbers, the instrument enters the RA state (the instrument response to the ENQ command is RA). This indicates that the instrument is waiting for a remote authorisation from the computer.

An RA response from the instrument to the ENQ command from the computer includes four extra parameters in addition to the instrument status parameters, these are:

- Personnel index number
 - Vehicle index number
 - Master index number
 - Personnel authorisation number
 - Vehicle authorisation number
 - Master authorisation number
5. The computer obtains the personnel and/or vehicle authorisation numbers from the ENQ command response. The computer then verifies the numbers and sends either an affirmative or negative RA response back to the instrument.

If any of the parameters in the RA response do not constitute a valid authorisation, the computer should send to the instrument an RA command with the first parameter 'N' to signify NO to the remote authorisation request. The second parameter being the reason the request for remote authorisation is refused (e.g. "INVALID PERSONNEL PIN"). The first 30 characters of the reason are displayed on the instrument.

After the operator acknowledges the reason, by pressing Enter, the instrument displays a prompt to re-enter the personnel and/or vehicle authorisation numbers and/or load number.

If the parameters in the RA response from the instrument are valid, the computer sends an RA command with the first parameter being 'Y' to signify YES to the remote authorisation request. The second and third parameters being the personnel and vehicle index numbers respectively that are to be stored in the transaction within the instrument.

6. After the instrument receives an affirmative remote authorisation, it prompts for load number (if enabled), and then enters RL state (if Load Scheduling is enabled).
 - Enable personnel and/or vehicle authorisation under the SYSTEM configuration menu before enabling remote authorisation under the COMMUNICATIONS configuration menu. When remote authorisation is enabled the COMMS TIMEOUT is automatically enabled. This timeout is the time allowed for the instrument to detect computer communications before a communications timeout error is reported. For example, if the instrument is in the idle state and does not receive any computer communications within the timeout period an error is displayed. As soon as communications are restored the error is cleared.

4.7 Displaying Messages and Getting Answers

Developers writing a communications interface to the instrument may require additional messages to be sent to the operator, and subsequent responses from the operator. Several commands (DM, DP, GA, GH, GK, and GN) involve sending text messages to the instrument display to inform or prompt the operator.

Typically the commands have the following structure:

STX

[DM] 0 [a] 0 [b] ... [h] 0 [ETX]

Where

a = line 1 (top line) [justify character & message]

b = line 2 [justify character & message]

c = line 3 [justify character & message]

d = line 4 [justify character & message]

e = line 5 [justify character & message]

f = line 6 [justify character & message]

g = line 7 [justify character & message]

h = line 8 (bottom line) [justify character & message] Justify character options

| centre justified (vertical bar, 7CH)

_ left justified (underscore, 5FH)

+ right justified (plus, 2BH)

a number between 0 and 30 in the justify field will justify the text that number of spaces from the left (must be two characters, i.e. 03 for 3 spaces)

Message options

-1 leave line as is (if previous message still being displayed)

-2 clear line (if previous message still being displayed) up to 30 characters of text (in addition to the justify character)

The instrument has an 8 line x 30 character display. However, because meter totals must remain on the screen at most times it is not always possible to display 8 lines. A message of 8 lines) can be displayed only during the idle, RL or RA states. Load Scheduling mode messages can be displayed only during the idle, RA, RC, and PL states. In RC and PL states the instrument can display messages of only two lines. These two line messages are displayed on the bottom two lines of the display. Two line messages should contain either '-1' or '-2' for the first six line parameters.

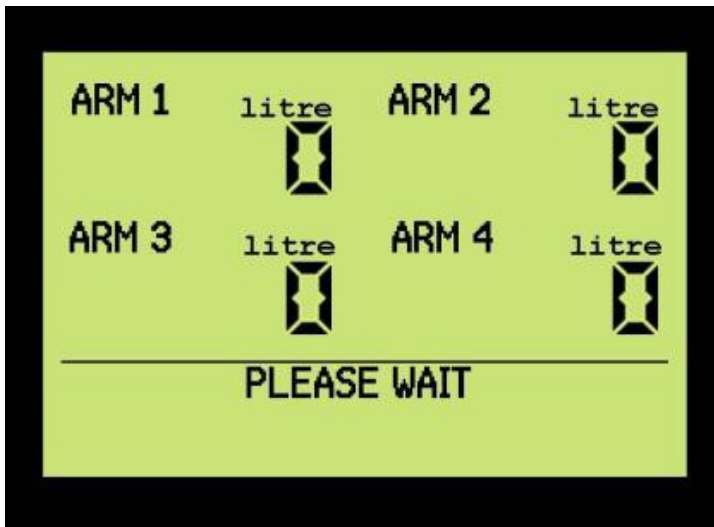
The commands all have a similar structure and involve the use of a justification character to set the spacing on each line. The justify character is the first character of each parameter of the command.

While the instrument is in the idle state, you can send either a two line message or a full screen message.

To display a two line message to the operator (ignoring the field separator nulls):

```
DM -2 -2 -2 -2 -2 -2 | PLEASE WAIT -2 ETX
```

This results in the following being displayed:



To display a full screen message to the operator (ignoring the field separator nulls):

```
DM -2 -2 | HONEYWELL ENRAF -2 -2 -2
```

```
| PLEASE WAIT -2 ETX
```

This will result in the following being displayed:



The instrument can determine a two line message by checking the first six line parameters to see that they are all either '-1' or '-2'. If any of these first six message parameters is not a '-1' or '-2' then the instrument will assume that you wish to display a full screen message, clear the meters from the screen, and then display the message.

For best messaging performance we suggest the following:

- After messaging starts continue with the same type of messaging (full screen or two line) until complete. Otherwise the screen is cleared each time a full screen message is placed after a two line message slowing down prompting to the screen.
- Use one message command directly after the other, for example a DM command then immediately the GA command. This allows for creative interfaces such as scrolling menus. For more information see the operator presses "No" for Load another compartment.
- Use the CM command only after messaging is complete to return the instrument to its original state. Do not use the CM command after each message is displayed, as this clears the screen and displays the meter totals. This takes extra time and will result in poor usability.

NOTE: Enter the justify character otherwise the first character of the line of text is taken as the justify character and it will not be displayed.

4.8 Messaging Commands

DM (Display Message)

DP (Display Prompt)

GA (Get Answer)

GH (Get Hidden Answer)

GK (Get Touch Key)

GN (Get NexWatch Card)

CM (Clear Message)

4.8.1 DM

Use DM to display a message to the operator without requiring a response, such as "BAY CLOSED".

After the instrument receives the DM command, the instrument response to the ENQ command is DM.

To clear the message can from the computer, send the CM or any other message command.

4.8.2 DP

The DP command requires the operator to press the Enter/Yes key.

To clear the message from the computer, send the CM or any other message command.

To automatically clear the message, send an automatic timeout period as part of the DP command.

After the instrument receives the DP command, the instrument response to the ENQ command is DP. After the operator acknowledges a DP command by pressing the Enter/Yes key, the instrument displays 'PLEASE WAIT', and the response to the ENQ command from the computer is MT (message taken).

The host computer, knowing the state of the instrument from the ENQ response, can then return the instrument to its normal operating mode by sending a CM command or continue with other messages as required.

4.8.3 GA, GH, GK or GN

Use these commands to get an answer from the instrument operator in the form of data. For example, if using the GA command to get a response from the operator: The operator must answer the displayed question by either entering a number and pressing Enter, or by pressing the Yes, No, Display, ALPHA/LINE, or START keys.

After the instrument has received the GA command, the instrument response to the ENQ command is GA. After the operator answers the message, the instrument displays the answer and the message 'PLEASE WAIT'. The instrument response to

the ENQ command from the computer will now be AA (Answer Available). The answer is returned as the last parameter in the AA ENQ response.

To retrieve a PIN or password, use GH, which hides the operator's response.

If a touch key is fitted to the instrument then the GK (Get Touch Key), and GN (Get NexWatch Card) commands may be available. These commands allow a message to be displayed, prompting the operator to touch their key or present their card.

ENQ response after a message is acknowledged by the operator, the instrument response is one of the following: MT (Message Taken), AA (Answer Available); CA (NexWatch Card Available), KA (Touch Key Answer Available).

After using either the DM, DP, GA, GH, GK or GN commands, return the instrument to its original display with the CM command. Use the DM, DP, GA, GH, GN, and GK commands carefully, otherwise the operator may become confused.

These commands can only be used for full screen messaging when the instrument is in the idle, RL or RA states. The RL and RA states requiring Load Scheduling and Remote Authorise respectively to be enabled.

4.8.3.1 Simple scrolling menu example using the GA command

To display a full screen message containing a scrolling menu (ignoring the field separator nulls), send the following command:

GA |ITEM 1 -2 |ITEM 2 -2 |ITEM 3 -2 |PRESS DISPLAY TO SCROLL -2 ETX

The ENQ response changes from SS to GA. The following is displayed:



The operator presses the DISPLAY key and the ENQ response changes from GA to AA, with the last parameter indicating the key that was pressed, a 'D' in this case.

The computer can now display second menu page to the operator (ignoring the field separator nulls):

DM |ITEM 4 -2 |ITEM 5 -2 |ITEM 6 -2 |PRESS DISPLAY TO SCROLL -2 ETX

The ENQ response changes from AA to GA. The following is displayed:



If complete the screen can be cleared using the CM command.

4.9 Communications Timeout

When either Load Scheduling and/or Remote Authorisation Mode are selected, the instrument automatically enables the "COMMS TIMEOUT" function. This function sets the amount of time that the instrument will allow without communications from the host. Alter the timeout period from the COMMUNICATIONS menu (see the [1010CB Programming Manual](#)).

After this timeout period has elapsed the instrument assumes that communications have failed and allows any load currently in progress to complete before forcing the operator to the disconnect prompt. It then displays a Communications failure error message until communications are restored.

If the master TAS override is enabled and the communication fails, the operator has the option to do a single load in standalone mode after entering a valid master ID.

After the load is complete the instrument returns to the earlier state to check if the communications are restored.

4.10 Retrieval of Loading Records

ST (Send Transaction) SY (Send Batch) Loading data for each vehicle is stored in two sections in the instruments. The two sections are called TRANSACTION and BATCH. The transaction contains information about the load that is common to all the compartments loaded, for example personnel, vehicle, date, start time, load number and so on.

The Batch data contains information for each compartment that the instrument has attempted to load, for example compartment number, arm number, preset quantity, gross loaded and so on.

The instrument stores 1000 transactions in the non-volatile memory. If the computer database is destroyed or cleared, the 1000 transactions can be read from the instrument. There is no restriction on the order in which transactions or batches must be uploaded. Each transaction records the number of batches associated with it, by storing the first batch and the last batch in the Batch start and Batch stop fields of the transaction. Each Batch records the transaction with which it is associated by storing the transaction number in its transaction number field. Batches are stored in a circular buffer, 10000 batches long. The batches are numbered 0 to 9999 inclusive.

When a transaction is uploaded to the computer, the batch start and batch stop fields should be examined to determine which batches should be uploaded from the instrument. If the transaction has a batch start value of 9998 and a batch stop value of 1, the batch numbers associated with the transaction are 9998, 9999, 0 and 1.

Programming tip for C programmers:

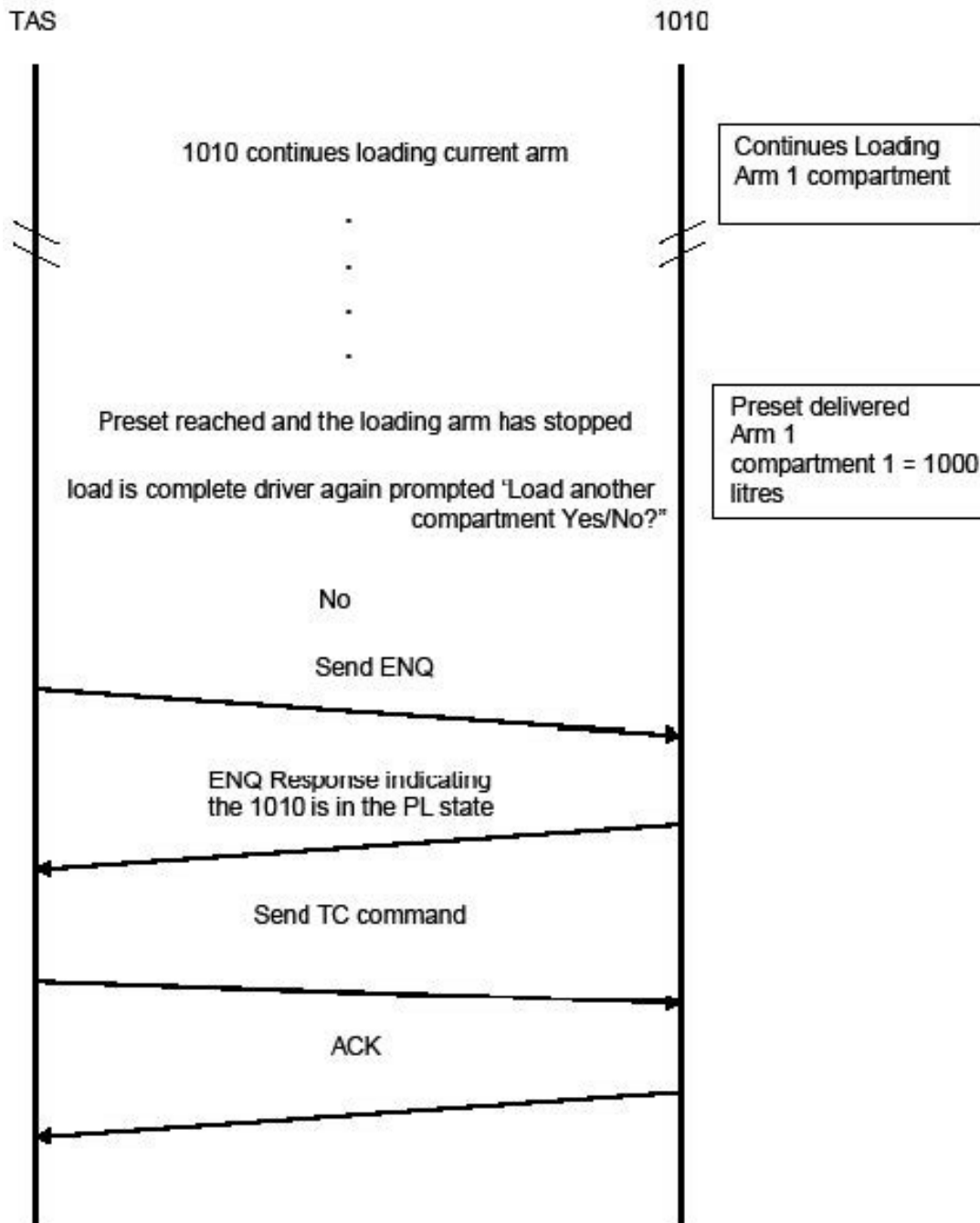
```
/* if batch_start = 9998 and batch_stop = 1, add 10000 to
batch_stop*/ if (batch_stop < batch_start)
batch_stop += 10000;
/* When requesting batches from the instrument, use the
modulus operator with 10000 to request the batch. */ for
(i=batch_start; i<=batch_stop; i++)
Request_batch (i % 10000);
```

When the data is stored for each batch and transaction in the instrument, a checksum value is calculated and stored with the data. When the data is retrieved, the checksum is again calculated and compared with the checksum calculated when the data was initially stored. The result of this comparison is sent to the computer in the checksum result field. When all the batches associated with a transaction are stored in the computer, a Bill of Lading for that transaction may be printed.

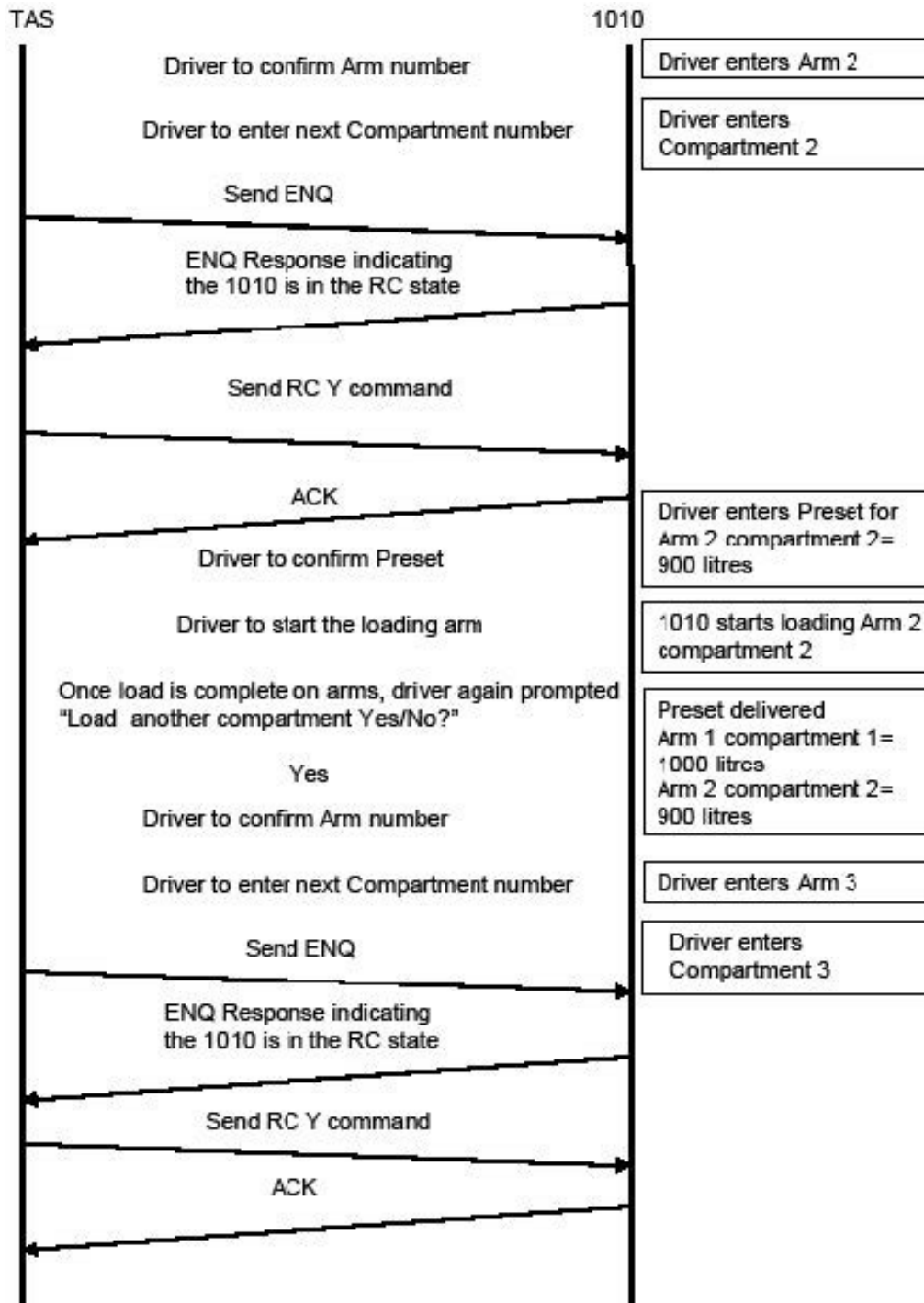
4.11 Retrieval of Batch Records during the Loading Process

Entry/batch information is sometimes required before the load operation is complete. Because the ST and SY commands can only be used while the instrument is in the idle state, use the BT command during the loading process to obtain entry/batch information. The computer must monitor the loading process via the ENQ command. After the computer establishes that a batch is complete (arm completed bit set - see [Table 6-33: Arm Status Byte](#)) the BT command can then be used to obtain the batch information. The BT command is not available while a batch is in progress.

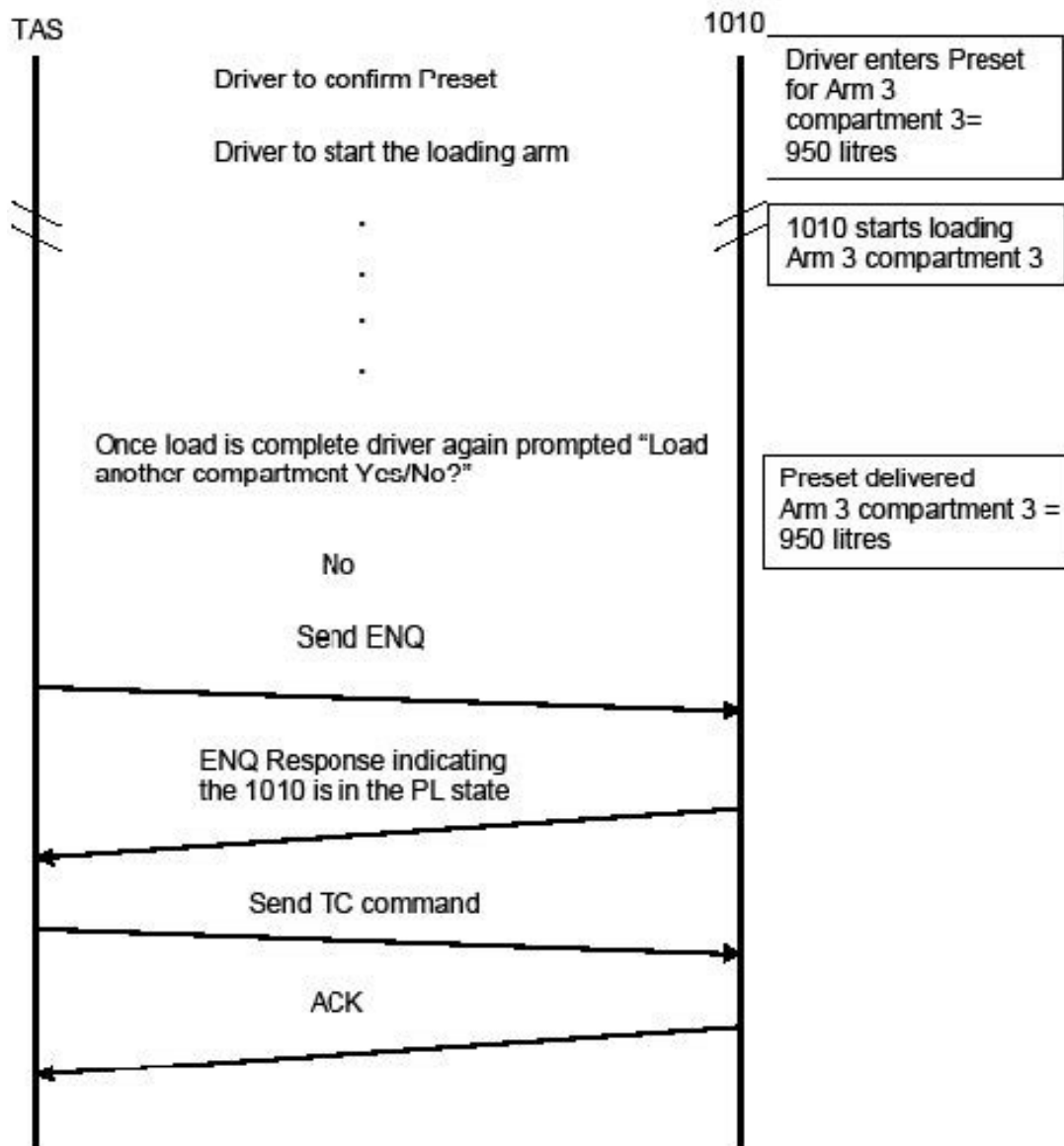


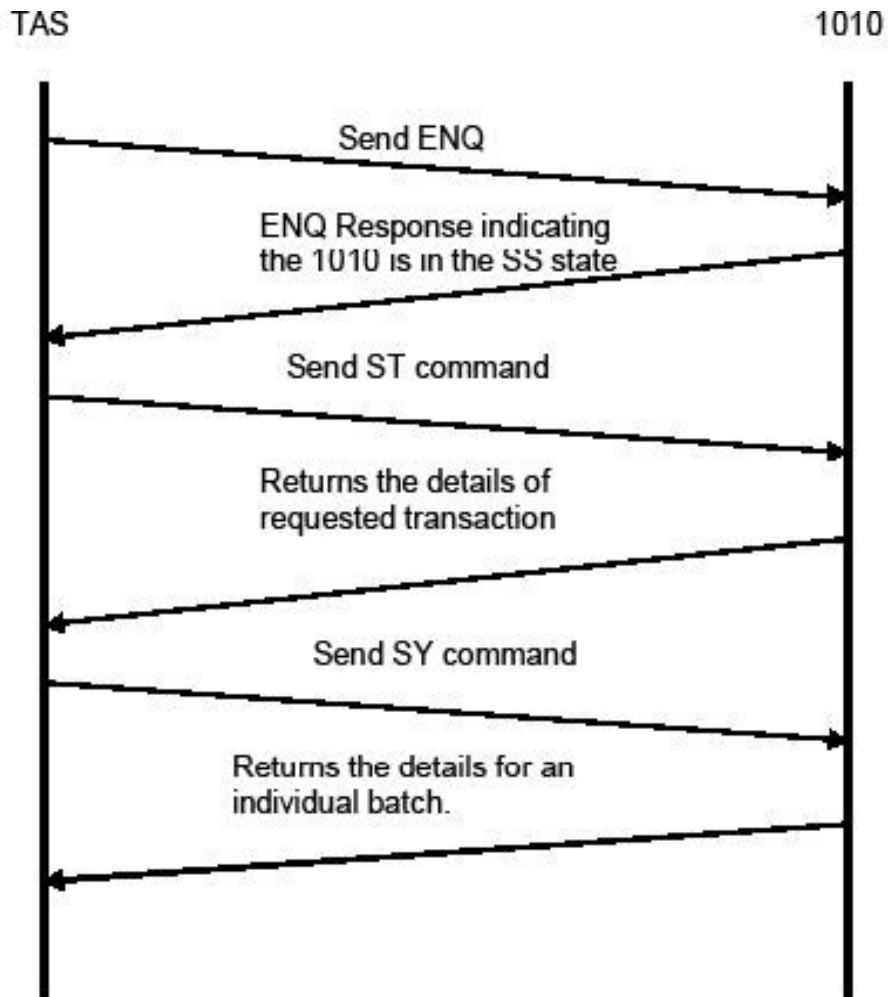


4.11.2 The operator presses "Yes" for Load another compartment



4.11.3 Using the TAS to obtain the transaction details and the Batch details





5 Error Status Codes

5.1 Description

When an instrument detects an error or fault condition, the error code for that condition is recorded in the batch segment of the transaction file.

The following Error Status Codes are valid for the instrument:

- 0 - No Error
- 1 - ESD/Emergency Stop
- 2 - Overfill/Ground Disconnect
- 3 - Vapour Rec. Disconnected
- 4 - Flowmeter Error
- 5 - Flowmeter Timeout
- 6 - Temperature Fault
- 7 - Valve Fault
- 8 - Deadman Timeout
- 9 - Density Fault
- 10 - Power Failure
- 11 - Additive Leakage
- 12 - Additive Volume
- 13 - No Activity on Additive
- 14 - No Additive Flow
- 15 - Remote Stop
- 16 - LCD Failure

- 17 - Phase Error
- 18 - Pressure Error
- 19 - Programmable Permissive Disconnected
- 20 - Programmable Input 1 Disconnected
- 21 - Programmable Input 2 Disconnected
- 22 - Programmable Input 3 Disconnected
- 23 - Programmable Input 4 Disconnected
- 24 - Programmable Input 5 Disconnected
- 25 - Programmable Input 6 Disconnected
- 26 - Additive Firmware
- 27 - Additive EPROM
- 28 - Additive Communication Failure
- 29 - No Additive Comms Response
- 30 - Arm input 1 disconnected
- 31 - Arm input 2 disconnected
- 32 - Arm input 3 disconnected
- 33 - Arm input 4 disconnected
- 34 - Arm input 5 disconnected
- 35 - Arm input 6 disconnected
- 36 - Arm input 7 disconnected
- 37 - Arm input 8 disconnected
- 38 - Transaction Terminated Remotely
- 41 - Blend Tolerance High Alarm*
- 42 - Blend Tolerance Low Alarm*
- 51 - High Flow - High Alarm*

- 52 - High Flow - Low Alarm*
- 53 - Low Flow - High Alarm*
- 54 - Low Flow - Low Alarm*
- 55 - Slow Flow High
- 56 - Slow Flow low
- 60 - Stopped by operator
- 61 - Arm 1 stopped by RIT
- 62 - Arm 2 stopped by RIT
- 70 - Internal additive No flow
- 71 - Internal additive Leakage
- 72 - Internal additive high
- 73 - Internal additive low
- 80 - Illegal Argument
- 81 - Volume Correction Factor Out of Range
- 84 - Density or Exp Coefficient Out of Range
- 85 - Pressure Out of Range
- 86 - Supercritical Fluid
- 87 - No Reference Fluids
- 88 - Calculation No Solution
- 90 - Meter Fault* (refer to meter error status)
- 99 - Transaction File in Use
- 100 -Illegal Flow
- 101 -Communication Fail
- 102 -Unauthorise flow
- 103- Overrun

- 104-Push Button
- 105 - Battery Switch Off
- 106 - Fire Extinguisher
- 107 - Hand Breaks Applied
- 108 - Weighbridge Comms Fail
- 109 - Unexpected Weighbridge Weight
- 110 - Arm input 9 disconnected
- 111 - Arm input 10 disconnected
- 112 - Arm input 11 disconnected
- 113 - Arm input 12 disconnected
- 114 - Arm input 13 disconnected
- 115 - Arm input 14 disconnected
- 116 - Arm input 15 disconnected
- 117 - Arm input 15 disconnected
- 118 - Arm input 17 disconnected
- 119 - Arm input 18 disconnected

5.2 Error Status 1 - ESD/Emergency Stop

The instrument detects this error if the Emergency Stop signal is disconnected during loading.

All arms are stopped and the instrument is disabled from further use until restored by the Manager Reset (MR). The MR bit in the enquiry will also be set indicating that a MR is requested.

5.3 Error Status 2 - Overfill/Ground Disconnected

This error is detected if the overfill/ground is disconnected or tripped during loading. The mode in which the loading effect is programmed determines whether the instrument displays a reconnect message. For more information, see [Section 5.47: Loading Effect](#).

5.4 Error Status 3 - Vapour Recovery Disconnected

This error is detected if the vapour recovery is disconnected or tripped during loading. The mode in which the loading effect is programmed determines whether the instrument displays a reconnect message. For more information, see [Section 5.47: Loading Effect](#).

5.5 Error Status 4 - Flow Meter Error

This error is detected if the lost pulses on the 'a' channel of the flow meter exceeds 0.1% of the total number of pulses on the 'b' channel while the 'b' pulse input frequency exceeds the cutoff frequency, or vice versa during loading. For this error to be detected the instrument must be configured for a dual pulse flow meter.

5.6 Error Status 5 - Flow Meter Timeout

This error is detected during a load when there is an absence of flow meter pulses for a time exceeding the no flow timeout period. The batch is terminated.

5.7 Error Status 6 - Temperature Fault

This error is recorded when the temperature probe fault is detected on a meter during a batch. If a breakdown value is enabled, the user can continue the batch with the breakdown temperature value, otherwise the batch is terminated and an error recorded. This disables the arm from further use and requires the MR to re-enable the arm.

5.8 Error Status 7 - Valve Fault

This error is recorded at the completion of the batch when the actual flow rate is outside the deadband limit during prestop. This error is recorded in the transaction but the batch is not terminated.

5.9 Error Status 8 - Deadman Timeout

This error is recorded and all batches terminated if the operator has not pressed any key for five minutes after starting a load. Typically an external reminder indicator is activated after 2.5 minutes. All loads are paused if the operator has not pressed a key for 3 minutes since the start of loading. This error is recorded and the traction is terminated only after 5 minutes without any key press.

NOTE: All the deadman timers are configurable, the examples given are default values.

5.10 Error Status 9 - Density Fault

This error is recorded when a densitometer fault is detected on a meter during a batch. If a breakdown value is enabled, the user can continue the batch with the breakdown density value. Otherwise the batch is terminated and an error recorded. This disables the arm from further use, and requires the MR to re-enable the arm.

5.11 Error Status 10 - Power Failure

This error is recorded and the transaction terminated when the instrument detects a power failure during a load.

5.12 Error Status 11 - Additive Leakage/Low Additive

This error is recorded when an attached additive injector controller cannot deliver enough additive for an additive injector during a batch. The batch is terminated.

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument.

5.13 Error Status 12 - Additive Volume/High Additive

This error is recorded when an attached additive injector controller cannot slow down the additive delivery for an additive injector during a batch. The batch is terminated.

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument.

5.14 Error Status 13 - No Activity on Additive/AdditiveCommunications

This error is recorded when communication with an attached additive injector controller fails, and all active arms are stopped. The transaction is terminated.

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument.

5.15 Error Status 14 - No Additive Flow

This error is recorded when an attached additive injector controller detects no additive flow for an additive injector during a batch. The batch is terminated.

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument.

5.16 Error Status 15 - Remote Stop

This error is recorded when the instrument receives a valid external remote stop (SM) command. The specified batch (indicated by the arm number in the command) is terminated.

5.17 Error Status 16 - LCD Failure

This error is recorded when a LCD failure is detected on the graphics display. The batch is terminated and the instrument restarted. On restart a warning is displayed.

5.18 Error Status 17 - Phase Error

This error is recorded when the flow meter phase error is detected on an arm during a batch. The instrument must be configured for a dual pulse flow meter. The batch is terminated.

5.19 Error Status 18 - Pressure Error

This error is recorded when the pressure sensor fault is detected on an arm during a batch. If a breakdown value is enabled, the user can continue the batch with the breakdown pressure value. Otherwise the batch is terminated and an error recorded. This disables the arm from further use, and requires the MR to re-enable the arm.

5.20 Error Status 19 - Programmable Permissive Disconnected

This error is detected if the programmable permissive is disconnected or tripped during loading. The mode in which the loading effect is programmed determines whether the instrument displays a reconnect message. For more information, see [Section 5.47: Loading Effect](#).

5.21 Error Status 20 to 25 - Programmable Input n

Disconnected

- Error Status 20 - Programmable Input 1 Disconnected
- Error Status 21 - Programmable Input 2 Disconnected
- Error Status 22 - Programmable Input 3 Disconnected
- Error Status 23 - Programmable Input 4 Disconnected
- Error Status 24 - Programmable Input 5 Disconnected
- Error Status 25 - Programmable Input 6 Disconnected

These errors are detected if the programmable input is disconnected or tripped during loading. The mode in which the loading effect is programmed determines

whether the instrument displays a reconnect message. For more information, see [Section 5.47: Loading Effect](#).

5.22 Error Status 26 - Additive Firmware

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument. This error is recorded when the additive controller detects a firmware failure. The transaction is terminated.

5.23 Error Status 27 - Additive EPROM

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument. This error is recorded when the additive controller detects an EPROM failure. The transaction is terminated.

5.24 Error Status 28 - Additive Communication Failure

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument. This error is recorded when communication with an attached additive injector controller fails, and all active arms are stopped. The transaction is terminated.

5.25 Error Status 29 - No Additive Comms Response

Only applicable when a MiniPak additive controller is used in conjunction with the 1010 instrument. This error is recorded when there is no response to specific communication commands sent to an attached additive injector controller, and all active arms are stopped. The transaction is terminated.

5.26 Error Status 30 to 37 - Arm Input n Disconnected

- Error Status 30 - Arm Input 1 Disconnected
- Error Status 31 - Arm Input 2 Disconnected
- Error Status 32 - Arm Input 3 Disconnected
- Error Status 33 - Arm Input 4 Disconnected
- Error Status 34 - Arm Input 5 Disconnected
- Error Status 35 - Arm Input 6 Disconnected
- Error Status 36 - Arm Input 7 Disconnected
- Error Status 37 - Arm Input 8 Disconnected

These errors are detected if the arm input is disconnected or tripped during loading. The mode in which the loading effect is programmed determines whether the instrument displays a reconnect message. For more information, see [Section 5.47: Loading Effect](#).

5.27 Error Status 38 - Transaction Terminated Remotely

Only applicable when the transaction is terminated by the protocol command TT (Terminate Transaction). This error is recorded in all batches that are active at the time of the command being received. All active arms are stopped and the transaction is terminated.

5.28 Error Status 41 - Blend Tolerance High Alarm

This error is recorded when the blend tolerance exceeds the high tolerance setting on an arm during a batch. The instrument must be configured for a blend tolerance alarm. The batch is suspended, with the option to either continue with the blend tolerance error by restarting the arm, or terminate the batch.

5.29 Error Status 42 - Blend Tolerance Low Alarm

This error is recorded when the blend tolerance falls below the low tolerance setting on an arm during a batch. The instrument must be configured for a blend tolerance alarm. The batch is suspended, with the option to either continue with the blend tolerance error by restarting the arm, or terminate the batch.

5.30 Error Status 51 - High Flow - High Alarm

This error is recorded when the flow rate during the high flow stage exceeds the arm high flow rate by the high alarm percentage. The instrument must be configured for a high flow alarm. The batch is terminated.

5.31 Error Status 52 - High Flow - Low Alarm

This error is recorded when the flow rate during the high flow stage falls below the arm high flow rate by the low alarm percentage. The instrument must be configured for a high flow alarm. The batch is terminated.

5.32 Error Status 53 - Low Flow - High Alarm

This error is recorded when the flow rate during the low flow stage exceeds the arm low flow rate by the high alarm percentage. The instrument must be configured for a low flow alarm. The batch is terminated.

5.33 Error Status 54 - Low Flow - Low Alarm

This error is recorded when the flow rate during the low flow stage falls below the arm low flow rate by the low alarm percentage. The instrument must be configured for a low flow alarm. The batch is terminated.

5.34 Error Status 55 - Slow Flow High

This error is recorded when the flow rate during the slow flow stage exceeds the arm slow flow rate by the high alarm percentage. The instrument must be configured for a slow flow alarm. The batch is terminated.

5.35 Error Status 56 - Slow Flow Low

This error is recorded when the flow rate during the slow flow stage exceeds the arm slow flow rate by the low alarm percentage. The instrument must be configured for a slow flow alarm. The batch is terminated.

5.36 Error Status 60 - Stopped by operator

This error is recorded when the operator stops the batch with the stop button and does not restart the batch. The batch is terminated.

5.37 Error Status 61 - Arm 1 stopped by RIT

This error is recorded only for batches running on arm 1 when the operator stops the batch with the RIT stop button for arm 1. The batch is terminated.

5.38 Error Status 62 - Arm 2 stopped by RIT

This error is recorded only for batches running on arm 2 when the operator stops the batch with the RIT stop button for arm 2. The batch is terminated.

5.39 Error Status 70 - Internal additive No flow

This error is recorded when the control solenoid opens and no additive flow is detected for an internal additive injector point during a batch. The batch is terminated.

Only applicable for internal additive injection points when available with the instrument.

5.40 Error Status 71 - Internal additive leakage

This error is recorded when additive flow is detected on an internal additive injector and the control solenoid is closed.

Only applicable for internal additive injection points when available with the instrument.

5.41 Error Status 72 - Internal additive high

This error is recorded when the additive amount exceeds a predetermined higher deviation percentage set point for an internal additive injector point during a batch. The batch is terminated.

Only applicable for internal additive injection points when available with the instrument.

5.42 Error Status 73 - Internal additive low

This error is recorded when the additive amount exceeds a predetermined lower deviation percentage set point for an internal additive injector point during a batch. The batch is terminated.

Only applicable for internal additive injection points when available with the instrument.

5.43 Error Status 80 - 89 - Correction Calculation Errors

These errors are generated should an error occur during any of the correction calculations used in the instrument. These are internal errors that result in the instrument terminating the current batch. Contact Guidant if these errors are encountered.

- Error Status 80 - Illegal Argument
- Error Status 81 - Volume Correction Factor Out of Range
- Error Status 82 - Non-convergence
- Error Status 83 - Temperature Out of Range
- Error Status 84 - Density or Exp Co-efficient Out of Range
- Error Status 85 - Pressure Out of Range

- Error Status 86 - Supercritical Fluid
- Error Status 87 - No Reference Fluids
- Error Status 88 - Calculation No Solution
- Error Status 89 - Spare

5.44 Error Status 90 - Meter Fault (refer to meter error status)

This error is recorded when an error occurs on one of the meters associated with the current loading arm. Refer to the meter error status to determine which meter was in error and the error type.

5.45 Error Status 99 - Transaction File in use

This error is recorded when either:

- The transaction and/or batch is not successfully completed
- The instrument is writing or internally using the transaction and/or batch, and the BT command is used to attempt to access the transaction or batch.

5.46 Error Status 100 - Illegal Flow

Unauthorised flow needs to be enabled by setting an unauthorised flow value other than 0 for each metering line before this error is possible.

This error is recorded when unauthorised flow is detected. A new batch and/or transaction is started to record the event.

5.47 Loading Effect

Permissive and programmable inputs pause or terminate a load while arm inputs pause or stop a batch for the associated arm.

The loading effect is programmed as follows:

- None

Disabled — has no effect on the load or batch operation.

- Pause

The load or batch is paused as soon as the error is detected. The screen displays a reconnect message. You can restart the load or batch after reconnecting.

- Timeout

The load or batch is paused as soon as the error is detected. The screen displays a reconnect message. You must reconnect within a preconfigured time or the load or batch is terminated.

- Terminate

The load or batch is terminated as soon as the error is detected. The reconnect message is not displayed.

- Manager Reset

The load or batch is paused as soon as the error is detected. The screen displays a reconnect message. You must reconnect within a preconfigured time or the arm is disabled and then requires the Manager Reset (MR) to re-enable it. The load or batch can continue once the manager password is entered and authorised.

6 SLIP+ Command Summary

This chapter describes the command format for the instrument using the SLIP+ command set. For other instruments please refer the appropriate software protocol manual.

If the two byte command within any information field is invalid for the unit addressed, the unit will not respond.

6.1 AA - Alter Arm Name

6.1.1 Description

The command allows the arm name to be altered.

6.1.2 Send

6.1.2.1 STX

[AA] 0 [a] 0 [b] 0 [ETX]

Where

a = Arm number [x]

b = Arm name [yyyyyyyy]

'y' can be an alphanumeric character or the ASCII space character

6.1.3 Receive

6.1.3.1 ACK

The command was processed without error.

6.1.3.2 NAK

- Arm number does not exist.
- Arm name is longer than 8 characters
- Number of parameters is not equal to 2

6.1.3.3 BS

- The instrument is not in the idle state

6.1.4 Constraints

- Instrument must be in the idle state.
- Extended Wait Period of at least three seconds is required for both waiting for an acknowledge (ACK) response, and before another command is sent to the instrument.

6.1.5 Note

The arm name can also be edited from within the LOADING ARM configuration menu.

6.2 AD - Internal Additive Injectors

6.2.1 Description

Returns the internal additive injector settings of the instrument.

6.2.2 Option 1 — Send

6.2.2.1 STX

[AD] 0 [ETX]

6.2.3 Option 1 — Receive

6.2.3.1 STX

[AD] 0 [a] 0 [b] 0 [c] 0. [h] 0 [ETX]

Where

a = Additive injector 1 enable/disable (0 = disable, 1= enable)

b = Additive injector 1 allocated arm number [x] (0 if not configured)

c= Additive injector 2 enable/disable (0 = disable, 1= enable)

d= Additive injector 2 allocated arm number [x] (0 if not configured)

e= Additive injector 3 enable/disable(0 = disable, 1= enable)

f= Additive injector 2 allocated arm number [x] (0 if not configured)

g= Additive injector 4 enable/disable(0 = disable, 1= enable)

h= Additive injector 4 allocated arm number [x] (0 if not configured)

6.2.3.2 NAK

- If number of parameters in the command are wrong.

6.2.4 Option 2 — Send

6.2.4.1 STX

[AD] 0 [AL] 0 [b] 0 [ETX]

Where

b= internal injector number [xx]

6.2.5 Option 2 — Receive

6.2.5.1 STX

[AD] 0 [AL] 0 [a] 0 [b] 0 [c] 0. [j] 0 [ETX]

Where

a = internal injector number [xx]

b = leaking sodium alarm enable/disable (0= disable, 1= enable)

c = leaking solenoid volume time [x] seconds (range 0 to 9)

d= leaking solenoid volume time [xxx] ml/CC(range 0 to 999)

e= No flow alarm enable/disable (0= disable, 1 enable)

f= No additive flow timeout [x] seconds (range 1 to 9)

g= Number of additive solenoid retries [x] (range 0 to 2)

h= Additive deviation enable/disable (0 = disable, 1= enable)

i= Additive deviation basis [xx] injection cycles (range 1 to 99)

j= Additive volume deviation [xxx] percentage (range 1 to 100)

6.2.5.2 NAK

- If the specified injector is not available
- If the number of parameters in the command are wrong.
- If there are no Internal Intelligent additives available or configured

6.2.6 Option 3 — Send

6.2.6.1 STX

[AD] 0 [MS] 0 [b] 0 [ETX]

Where

b = internal injector number [xx]

6.2.7 Option 3 — Receive

6.2.7.1 STX

[AD] 0 [MS] 0 [a] 0 [b] 0 [C] 0. [h] 0 [ETX]

Where

a = Internal injector number [xx]

b = Internal injector enable/disable (0 = disable, 1 = enable)

c = Allocated arm number [x] (0 if not configured)

d = Additive code [xxxxxxxxx]

e = Pacing volume [xxx] litter (range 1 to 9999)

f = Pump off delay [x] seconds (range 1 to 999)

g = Additive meter K-factor [xxxxx.xxx]

h = Additive meter-factor [xxxxx.xxx]

6.2.7.2 NAK

- If the specified injector is not used
- If the number of parameters in the command are wrong.
- If Type = None

6.2.8 Notes

There must be available meter inputs to be able to configure Internal Intelligent additives. For more information, see [Section 6.85: TI - Type of Instrument](#).

6.2.9 Related Commands

AS, TI

6.3 AI - External Additive Injectors

6.3.1 Description

Returns the external additive injector settings of the instrument.

6.3.2 Option 1 — Send

6.3.2.1 STX

[AI] 0 [ETX]

6.3.3 Option 1 — Receive

6.3.3.1 STX

[AI] 0 [a] 0 [b] [ETX]

Where

a = additive injection type [x] (0 = None, 1 = EFT Minipak, 2 = Pulse Output)

b = number of injection points [xx] (if type = EFT Minipak) or additive pulse width [xxx.x] seconds (if type = Pulse Output) or [0] (if type = None)

6.3.3.2 NAK

- If number of parameters in command are wrong.

6.3.4 Option 2 — Send

6.3.4.1 STX

[AI] 0 [a] 0 [ETX]

Where

a = injector number [xx] (Range 1 to 24)

6.3.5 Option 2 — Receive

6.3.5.1 STX

[AI] 0 [a] 0 [b] 0 [c] 0 [d] 0 [ETX]

Where

a = injector number [xx]

b = allocated arm number [x] (0 if not configured)

c = address of injection point [xxx]

d = additive injector code [xxxxxxxxxx]

6.3.5.2 NAK

- If specified injector is not available
- If number of parameters in command are wrong
- If there are no Internal Intelligent additives available or configured

6.3.6 Notes

Currently the instrument supports both Minipak products, the MP6 and MP3000 additive injection systems from Guidant Measurement.

6.3.7 Related Commands

AS

6.4 AL - Alarm Status

6.4.1 Description

Retrieves the alarm status from the instrument. Separate status information can be retrieved for arms, meters, additive injection, recipes, and system.

The alarm status is latched and is retained after a power failure. Only the RT command can clear the alarms.

6.4.2 Send — Option 1

6.4.2.1 STX

Will return all the sources containing alarms. [AL] 0 [ETX]

6.4.3 Receive — Option 1

6.4.3.1 STX

[AL] 0 [a] 0 [b] 0 [c] 0 [d] 0 [e] 0 [f] 0 [g] 0 [ETX]

Where

a = Parameter a

b = Parameter b

c = Parameter c

d = Parameter d

e = Parameter e

f = Parameter f

g = Parameter g

See [Table 6-1: Alarm Source — Parameter a](#) to [Table 6-19: System Alarms — Parameter f](#) for descriptions of parameters.

6.4.3.2 NAK

- If second and/or third byte is irrelevant
- If the number of parameters is greater than 3

6.4.4 Send — Option 2

6.4.4.1 STX

[AL] 0 [xx] 0 [ETX]

Where xx is one of the following:

An = Arm Alarms (range A1 to A4)

Mn = Meter Alarms (range M1 to M4)

SS = System Alarms

6.4.5 Receive — Option 2

6.4.5.1 STX

For xx = An: [AL] 0 [xx] 0 [a] 0 [b] 0 [ETX]

Refer to [Table 6-8: Arm Alarms - a](#) for descriptions of parameters.

For xx = Mn: [AL] 0 [xx] 0 [a] 0 [b] 0 [c] 0 [ETX]

Refer to [Table 6-11: Meter Alarm - a](#) for description of parameters.

For xx = SS:

[AL] 0 [xx] 0 [a] 0 [b] 0 [c] 0 [d] 0 [e] 0 [f] 0 [ETX]

Refer to [Table 6-14: System Alarms — Parameter a](#) to [Table 6-19: System Alarms — Parameter f](#) for descriptions of parameters.

6.4.5.2 NAK

- If arm number is invalid
- If meter number is invalid
- If the number of parameters is greater than 1

6.4.6 Send — Option 3

6.4.6.1 STX

[AL] 0 [xx] 0 [a] 0 [ETX]

Where xx is one of the following:

RS = Recipe Alarms

IP = Internal/External Additive Alarms

a = Recipe number [xx] (range 1 to 16) or Additive number [xx] (range 1 to 24)

first 4 are assigned to external additives

5 to 8 are assigned to internal additives

6.4.7 Receive — Option 3

6.4.7.1 STX

For xx = RS: [AL] 0 [RS] 0 [a] 0 [b] 0 [ETX]

Where

a = Recipe number

b = Refer [Table 6-20: Recipe Alarms](#).

For xx = IP: [AL] 0 [IP] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = Additive number [xx]

b = Refer [Table 6-21: Additive Alarm — parameter a](#)

c = Refer [Table 6-22: Additive Alarm — parameter b](#)

6.4.7.2 NAK

- If recipe number is invalid
- If additive injection point number is invalid
- If the number of parameters is not equal to 2

6.4.8 Notes

Alarms are latched and are retained after a power cycle. Alarms are triggered only once per event.

The following tables contain descriptions of the AL command parameters:

Table 6-1: Alarm Source — Parameter a

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Arm 1
x	1	x	x	x	x	x	x	64	Arm 2
x	x	1	x	x	x	x	x	32	Arm 3
x	x	x	1	x	x	x	x	16	Arm 4
x	x	x	x	1	x	x	x	8	Meter 1
x	x	x	x	x	1	x	x	4	Meter 2
x	x	x	x	x	x	1	x	2	Meter 3
x	x	x	x	x	x	x	1	1	Meter 4

Table 6-2: Alarm Source — Parameter b

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	NA
x	1	x	x	x	x	x	x	64	NA
x	x	1	x	x	x	x	x	32	NA
x	x	x	1	x	x	x	x	16	System
x	x	x	x	1	x	x	x	8	Recipe 1
x	x	x	x	x	1	x	x	4	Recipe 2
x	x	x	x	x	x	1	x	2	Recipe 3
x	x	x	x	x	x	x	1	1	Recipe 4

Table 6-3: Alarm Source — Parameter c

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Recipe 5
x	1	x	x	x	x	x	x	64	Recipe 6
x	x	1	x	x	x	x	x	32	Recipe 7
x	x	x	1	x	x	x	x	16	Recipe 8
x	x	x	x	1	x	x	x	8	Recipe 9
x	x	x	x	x	1	x	x	4	Recipe 10
x	x	x	x	x	x	1	x	2	Recipe 11
x	x	x	x	x	x	x	1	1	Recipe 12

Table 6-4: Alarm Source — Parameter d

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Recipe 13
x	1	x	x	x	x	x	x	64	Recipe 14
x	x	1	x	x	x	x	x	32	Recipe 15
x	x	x	1	x	x	x	x	16	Recipe 16
x	x	x	x	1	x	x	x	8	Injection point 1
x	x	x	x	x	1	x	x	4	Injection point 2
x	x	x	x	x	x	1	x	2	Injection point 3
x	x	x	x	x	x	x	1	1	Injection point 4

Table 6-5: Alarm Source — Parameter e

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Injection point 5
x	1	x	x	x	x	x	x	64	Injection point 6
x	x	1	x	x	x	x	x	32	Injection point 7
x	x	x	1	x	x	x	x	16	Injection point 8
x	x	x	x	1	x	x	x	8	Injection point 9
x	x	x	x	x	1	x	x	4	Injection point 10
x	x	x	x	x	x	1	x	2	Injection point 11
x	x	x	x	x	x	x	1	1	Injection point 12

Table 6-6: Alarm Source — Parameter f

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Injection point 13
x	1	x	x	x	x	x	x	64	Injection point 14
x	x	1	x	x	x	x	x	32	Injection point 15
x	x	x	1	x	x	x	x	16	Injection point 16
x	x	x	x	1	x	x	x	8	Injection point 17
x	x	x	x	x	1	x	x	4	Injection point 18
x	x	x	x	x	x	1	x	2	Injection point 19
x	x	x	x	x	x	x	1	1	Injection point 20

Table 6-7: Alarm Source — Parameter g

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Injection point 21
x	1	x	x	x	x	x	x	64	Injection point 22
x	x	1	x	x	x	x	x	32	Injection point 23
x	x	x	1	x	x	x	x	16	Injection point 24
x	x	x	x	1	x	x	x	8	Spare
x	x	x	x	x	1	x	x	4	Spare
x	x	x	x	x	x	1	x	2	Spare
x	x	x	x	x	x	x	1	1	Spare

Table 6-8: Arm Alarms - a

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	SF	Slow Flow Low
x	1	x	x	x	x	x	x	64	SH	Slow Flow High
x	x	1	x	x	x	x	x	32	HL	High Flow Low
x	x	x	1	x	x	x	x	16	HH	High Flow High
x	x	x	x	1	x	x	x	8	BL	Blend error Low
x	x	x	x	x	1	x	x	4	BH	Blend error High
x	x	x	x	x	x	1	x	2	LL	Low Flow Low
x	x	x	x	x	x	x	1	1	LH	Low Flow High

Table 6-9: Arm Alarms - b

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	RS	Remote Stop
x	1	x	x	x	x	x	x	64	RT	Remote Terminate
x	x	1	x	x	x	x	x	32	LB	Leaking Blend Stream
x	x	x	1	x	x	x	x	16		Spare
x	x	x	x	1	x	x	x	8		Spare
x	x	x	x	x	1	x	x	4		Spare
x	x	x	x	x	x	1	x	2		Spare
x	x	x	x	x	x	x	1	1		Spare

Table 6-10: Arm Alarms - c

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	A1	Arm input 1 disconnected
x	1	x	x	x	x	x	x	64	A2	Arm input 2 disconnected
x	x	1	x	x	x	x	x	32	A3	Arm input 3 disconnected
x	x	x	1	x	x	x	x	16	A4	Arm input 4 disconnected
x	x	x	x	1	x	x	x	8	A5	Arm input 5 disconnected
x	x	x	x	x	1	x	x	4	A6	Arm input 6 disconnected
x	x	x	x	x	x	1	x	2	A7	Arm input 7 disconnected
x	x	x	x	x	x	x	1	1	A8	Arm input 8 disconnected

Table 6-11: Meter Alarm - a

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	TP	Temperature probe
x	1	x	x	x	x	x	x	64	VF	Valve fault
x	x	1	x	x	x	x	x	32	DP	Dual pulse
x	x	x	1	x	x	x	x	16	PE	Phase error
x	x	x	x	1	x	x	x	8	UF	Unauthorised flow
x	x	x	x	x	1	x	x	4	NF	No flow timeout
x	x	x	x	x	x	1	x	2	PP	Pressure Probe
x	x	x	x	x	x	x	1	1	OE	Overrun Error

Table 6-12: Meter Alarm - b

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	IA	Illegal Argument
x	1	x	x	x	x	x	x	64	VC	Volume Correction Factor Out of Range
x	x	1	x	x	x	x	x	32	NC	Non-convergence
x	x	x	1	x	x	x	x	16	TR	Temperature Out of Range
x	x	x	x	1	x	x	x	8	DR	Density or Exp. co-efficient Out of Range
x	x	x	x	x	1	x	x	4	PR	Pressure Out of Range
x	x	x	x	x	x	1	x	2	SC	Supercritical Fluid
x	x	x	x	x	x	x	1	1	RF	No Reference Fluid

Table 6-13: Meter Alarm - c

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	NS	Calculation No solution
x	1	x	x	x	x	x	x	64		Spare
x	x	1	x	x	x	x	x	32		Spare
x	x	x	1	x	x	x	x	16		Spare
x	x	x	x	1	x	x	x	8		Spare
x	x	x	x	x	1	x	x	4		Spare
x	x	x	x	x	x	1	x	2		Spare
x	x	x	x	x	x	x	1	1		Spare

Table 6-14: System Alarms — Parameter a

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	MR	Manager Reset
x	1	x	x	x	x	x	x	64	CA	Communication Alarm
x	x	1	x	x	x	x	x	32	CF	Calibration Factor changed
x	x	x	1	x	x	x	x	16	ED	Watchdog
x	x	x	x	1	x	x	x	8	ES	Emergency Stop
x	x	x	x	x	1	x	x	4	DI	Deadman Indicator
x	x	x	x	x	x	1	x	2	DB	Deadman Bell
x	x	x	x	x	x	x	1	1	DC	Deadman Callout

Table 6-15: System Alarms — Parameter b

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	SC	System Corruption
x	1	x	x	x	x	x	x	64	ST	System Trap
x	x	1	x	x	x	x	x	32	SS	System Stack
x	x	x	1	x	x	x	x	16	MZ	Multiple 100 ms
x	x	x	x	1	x	x	x	8	PF	Power Failure
x	x	x	x	x	1	x	x	4	DF	Display Failure
x	x	x	x	x	x	1	x	2	OD	Overfill Disconnected
x	x	x	x	x	x	x	1	1	VD	Vapour Disconnected

Table 6-16: System Alarms — Parameter c

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	PD	Program Disconnection
x	1	x	x	x	x	x	x	64	RC	RAM corruption
x	x	1	x	x	x	x	x	32	NC	NexWatch Communications
x	x	x	1	x	x	x	x	16	SF	SDF Failure
x	x	x	x	1	x	x	x	8	CL	SDF Cleared
x	x	x	x	x	1	x	x	4	TF	Transaction storage Full
x	x	x	x	x	x	1	x	2	SD	SDF Data corruption
x	x	x	x	x	x	x	1	1	RF	Reprogram Flash

Table 6-17: System Alarms — Parameter d

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	RP	Reprogramming in Progress
x	1	x	x	x	x	x	x	64	IC	Instrument type Corrupt
x	x	1	x	x	x	x	x	32	CC	Critical data Corrupt
x	x	x	1	x	x	x	x	16	AS	Assert
x	x	x	x	1	x	x	x	8	II	Illegal Instruction
x	x	x	x	x	1	x	x	4	CP	CPU Address
x	x	x	x	x	x	1	x	2	UA	User alarm A
x	x	x	x	x	x	x	1	1	UB	User alarm B

Table 6-18: System Alarms — Parameter e

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	UC	User alarm C
x	1	x	x	x	x	x	x	64	UD	User alarm D
x	x	1	x	x	x	x	x	32	NP	Comport not assigned to NexWatch
x	x	x	1	x	x	x	x	16	AC	Comport not assigned to Intelligent Additive
x	x	x	x	1	x	x	x	8	S1	System input 1 disconnected
x	x	x	x	x	1	x	x	4	S2	System input 2 disconnected
x	x	x	x	x	x	1	x	2	S3	System input 3 disconnected
x	x	x	x	x	x	x	1	1	S4	System input 4 disconnected

Table 6-19: System Alarms — Parameter f

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	S5	System input 5 disconnected
x	1	x	x	x	x	x	x	64	S6	System input 6 disconnected
x	x	1	x	x	x	x	x	32		Spare
x	x	x	1	x	x	x	x	16		Spare
x	x	x	x	1	x	x	x	8		Spare
x	x	x	x	x	1	x	x	4		Spare
x	x	x	x	x	x	1	x	2		Spare
x	x	x	x	x	x	x	1	1		Spare

Table 6-20: Recipe Alarms

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	DA	Disabled Alarm
x	1	x	x	x	x	x	x	64	SF	Slow Flow alarm
x	x	1	x	x	x	x	x	32	HF	High Flow alarm
x	x	x	1	x	x	x	x	16	LF	Low Flow alarm
x	x	x	x	1	x	x	x	8		Spare
x	x	x	x	x	1	x	x	4		Spare
x	x	x	x	x	x	1	x	2		Spare
x	x	x	x	x	x	x	1	1		Spare

Table 6-21: Additive Alarm — parameter a

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	LA	Low Additive (Internal Additive)
x	1	x	x	x	x	x	x	64	HA	High Additive (Internal Additive)
x	x	1	x	x	x	x	x	32	NA	No Additive
x	x	x	1	x	x	x	x	16	LS	Leaking Additive
x	x	x	x	1	x	x	x	8	CF	Communications Failure
x	x	x	x	x	1	x	x	4	FF	Firmware Fail
x	x	x	x	x	x	1	x	2	EF	EEPROM Fail
x	x	x	x	x	x	x	1	1	NA	No activity

Table 6-22: Additive Alarm — parameter b

Parameter Byte								Value	Alarm Code	Description
7	6	5	4	3	2	1	0			
1	x	x	x	x	x	x	x	128	MR	MPK Reserved
x	1	x	x	x	x	x	x	64	CR	Communications Response (MPK)
x	x	1	x	x	x	x	x	32	CN	Comms Response No (MPK)
x	x	x	1	x	x	x	x	16	VT	Additive Volume Tolerance (MPK)
x	x	x	x	1	x	x	x	8		Spare
x	x	x	x	x	1	x	x	4		Spare
x	x	x	x	x	x	1	x	2		Spare
x	x	x	x	x	x	x	1	1		Spare

6.4.9 Related Commands

RT

6.4.10 Constraints

None

6.5 AM - Arm Status

6.5.1 Description

Returns the status of the specified arm

6.5.2 Send

6.5.2.1 STX

[AM] 0 [a] [ETX]

Where

a = Arm number [x]

6.5.3 Receive

6.5.3.1 STX

[AM] 0 [a] 0 [b] ... [g] 0 [ETX]

Where

a = Arm number [x]

b = Arm status [0, 1, 2]

0 = DISABLED

1 = ENABLED

2 = FAULTY

c = Current arm error status [xx] (as shown in [Table 6-8: Arm Alarms - a](#))

d = Current meter 1 error status [xx] (as shown in [Table 6-11: Meter Alarm - a](#))

e = Current meter 2 error status [xx] (as shown in [Table 6-21: Additive Alarm — parameter a](#))

f = Current system Interrupt/Pause status [xx] (as shown in [Table 6-21: Additive Alarm — parameter a](#))

g = Current arm Interrupt/Pause status [xx] (as shown in [Table 6-21: Additive Alarm — parameter a](#))

6.5.3.2 NAK

- Requested arm number does not exist
- Number of parameters is incorrect

6.5.4 Notes

None

6.5.5 Related Commands

CA

6.5.6 Constraints

The error status indicates the previous batch error status for a particular arm only. The error status is updated only when a new batch on that arm is completed.

6.6 AN - Net Accumulated Totals

6.6.1 Description

Retrieves the net accumulated totals for all arms or meters from the instrument. This represents the gross totals, for each arm or meter, of all transactions performed since the instrument was first used or since the accumulated totals were last set in the Metering Line Net Accumulated Totals configuration menu item for each meter.

6.6.2 Send — Option 1

6.6.2.1 STX

[AN] 0 [ETX]

6.6.3 Receive — Option 1

6.6.3.1 STX

[AN] 0 [a] 0 [b] ... [g] 0 [ETX]

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = net accumulated total for first arm [xxxxxxxx]

e = net accumulated total for second arm [xxxxxxxx] (only if number of arms > 1)

f = net accumulated total for third arm [xxxxxxxx] (only if number of arms > 2)

g net accumulated total for fourth arm [xxxxxxx] (only if number of arms > 3)

6.6.4 Send — Option 2

6.6.4.1 STX

[AN] 0 [An] 0 [ETX]

Where n is the arm number (range is 1 to 4)

6.6.5 Receive — Option 2

6.6.5.1 STX

[AN] 0 [An] 0 [a] 0 [ETX]

Where

a = net accumulated total for the arm An [xxxxxxx]

6.6.6 Send — Option 3

6.6.6.1 STX

[AN] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.6.7 Receive — Option 3

6.6.7.1 STX

[AN] 0 [Mn] 0 [a] 0 [ETX]

Where

a = net accumulated total for the meter Mn [xxxxxxx]

6.6.8 Notes

Parameter b indicates how many “net accumulated total” parameters follow. For example, if b = 2 then only parameters [a] through [e] are received.

For Side Stream blending the arm total is equal to the total of the downstream meter or first meter associated with that arm. For Ratio blending the arm total is equal to the addition of both meters associated with the arm.

6.6.9 Related Commands

AT, FR, GT, ID, IP, IT, LP, LT, NT, PR, TB, TF, VC

6.6.10 Constraints

None.

6.7 AO – Authorise Overrun

6.7.1 Description

This command should be used when authorising overrun using remote database.

After prompt to enter pin/ show card operator will enter pin/ show card.

TAS will get the information in ENQ command. After checking with TAS database use AO command to authorise.

6.7.2 Send — Option 1

6.7.2.1 STX

[AS] 0 [a] 0 [ETX]

Where

a = 1 waiting for authorisation a = 2 invalid card /pin

a = 3 card / pin authorised.

6.7.3 Receive — Option 1

6.7.3.1 ACK

The command was processed without error.

6.7.3.2 NAK

- If the number of parameters is incorrect

6.8 AR - Allocate Recipes

6.8.1 Description

Instructs the 1010 instrument to use a particular blend/additive recipe

6.8.2 Send — Option 1

Instructs the instrument to use a recipe in the 1010 memory (these can be uploaded via the BR command)

6.8.2.1 STX

[AR] 0 [a] 0 [ETX]

Where

a = recipe number [xx] (range 0 to 16, 0 = Cancel AR state - proceeds to prompt "LOAD ANOTHER COMPARTMENT?")

6.8.3 Receive — Option 1

6.8.3.1 ACK

The command was processed without error.

6.8.3.2 NAK

- No blending or additive injectors associated with the current arm number.
- The recipe is not associated with the current arm number.
- Number of command parameters is incorrect.
- The recipe is disabled.
- Recipe number does not exist
- The instrument is not in the AR state

6.8.4 Send — Option 2

For an arm configured for additive injection and straight product loading (that is, no blending)

6.8.4.1 STX

[AR] 0 [a] 0 [b] ... [g] 0 [ETX]

Where

a = line 1 additive amount [xxxx] ppm or 0 if disabled

b = line 2 additive amount [xxxx] ppm or 0 if disabled

c = line 3 additive amount [xxxx] ppm or 0 if disabled

d = line 4 additive amount [xxxx] ppm or 0 if disabled

e = line 5 additive amount [xxxx] ppm or 0 if disabled

f = line 6 additive amount [xxxx] ppm or 0 if disabled

g = additive flush volume [xxx] (range is 0 to 999 where 0 = no flush)

6.8.5 Receive — Option 2

6.8.5.1 ACK

The command was processed without error.

6.8.5.2 NAK

- No additive injectors associated with the current arm number.
- Number of command parameters is incorrect.
- The instrument is not in the AR state

6.8.6 Send — Option 3

For an arm configured for blending, with or without additive injection.

6.8.6.1 STX

[AR] 0 [a] 0 [b] ... [i] 0 [ETX]

Where

a = target blend percentage [xxx.x] (range 0.0 to 100.0%)

b = clean line volume [xxx] (range is 0 to 999 where 0 = no clean line flush)

c = line 1 additive amount [xxxx] ppm or 0 if disabled

d = line 2 additive amount [xxxx] ppm or 0 if disabled

e = line 3 additive amount [xxxx] ppm or 0 if disabled

f = line 4 additive amount [xxxx] ppm or 0 if disabled

g = line 5 additive amount [xxxx] ppm or 0 if disabled

h = line 6 additive amount [xxxx] ppm or 0 if disabled

i = additive flush volume [xxx] (range is 0 to 999 where 0 = no flush)

6.8.7 Receive — Option 3

6.8.7.1 STX

[AR] 0 [a] 0 [b] ... [j] 0 [ETX]

Where

a = recipe error code [Fxx] where xx is the error number (Refer [Table 6-23: Recipe Error Codes \(Fxx\)](#))

b = recipe status [x] (0 = disabled, 1 = enabled)

c = associated loading arm

d = base calculated slow flow [xxxx]

e = base calculated high flow [xxxx]

f = base calculated low flow [xxxx]

g = blend calculated slow flow [xxxx]

h = blend calculated high flow [xxxx]

i = blend calculated low flow [xxxx]

j = calculated recipe minimum preset [xxxx]

6.8.8 Notes

Table 6-23: Recipe Error Codes (Fxx)

XX	Description	XX	Description
00	No error	17	Calculated parameters fault
01	1010 in programming mode	18	Manager reset required
02	Flow is active	19	No meter enabled
03	No transaction in progress or complete	20	Additive batch setup not complete
04	Operation not allowed	21	Arm disabled in configuration
05	Wrong control mode	22	Arm faulty MR required
06	Transaction in progress	23	Arm position fault
07	Alarm condition	24	Overfill ground fault
08	Storage full	25	Transaction record not found
09	Operation out of sequence	26	MR is not required
10	Power fail during transaction	27	Permissive delay activ
11	1010 authorised	28	Batch record not found
12	Option not installed	29	SDF read fault
13	Parameter size incorrect	30	Option not configured
14	Invalid slip command struc-ture	31	Recipe not available
15	Value rejected	32	Arm number does not exist
16	Incorrect number of parameters	33	Meter number does not exist

6.8.9 Related Commands

BR

6.8.10 Constraints

Instrument must be in the AR state

Additive injector should be enabled if sending an additive injection quantity.

6.9 AS - Arm Settings

Returns setup information unique to each arm.

6.9.1 Send — Option 1

6.9.1.1 STX

[AS] 0 [a] 0 [ETX]

Where

a = arm number [x]

6.9.2 Receive — Option 1

6.9.2.1 STX

[AS] 0 [a] 0 [b] ... [k] 0 [ETX]

Where

a = arm number [x]

b = arm type [x] (range 1 to 5 — Refer [Table 6-24: Arm Codes](#) for more information)

c = arm name [xxxxxxxxxxxx]

d = arm status [x] (0 = DISABLE, 1 = ENABLED, 2 = FAULTY)

e = load units [x] (0 = litres/liters, 1 = meters³, 2 = kg, 3 = tonnes, 4 = grams, 5 = gallons, 6 = pounds)

f = maximum preset [xxxxxxx]

g = arm slow flow [xxx]

h = slow start quantity [xxxx]

i = arm full flow [xxxx]

j = meter 1 number [x] (base meter)

k = meter 2 number [x] (blend meter, 0 if not applicable)

6.9.2.2 NAK

- Requested arm number does not exist
- If the number of parameters is incorrect

6.9.3 Send — Option 2

6.9.3.1 STX

[AS] 0 [AL] 0 [a] 0 [ETX]

Where

a = arm number [x]

6.9.4 Receive — Option 2

6.9.4.1 STX

[AS] 0 [AL] 0 [a] 0 [b] ... [q] 0 [ETX]

Where

a = arm number [x]

b = blend tolerance alarm [x] (0 = DISABLE, 1 = ENABLE)

c = blend tolerance low percentage [xx.xx]

d = blend tolerance high percentage [xx.xx]

e = minimum blend volume [xxx]

f = slow flow alarm [x] (0 = DISABLE, 1 = ENABLE)

g = slow flow low percentage [xx.xx]

h = slow flow high percentage [xx.xx]

i = slow flow alarm delay [xxxx] (load units)

j = high flow alarm [x] (0 = DISABLE, 1 = ENABLE)

k = high flow low percentage [xx.xx]

l = high flow high percentage [xx.xx]

m = high flow alarm delay [xxxx] (load units)

n = low flow alarm [x] (0 = DISABLE, 1 = ENABLE)

o = low flow low percentage [xx.xx]

p = low flow high percentage [xx.xx]

q = low flow alarm delay [xxx] (load units)

6.9.4.2 NAK

- Requested arm number does not exist
- If the number of parameters is incorrect

6.9.5 Notes

These settings can be edited from within the ARM configuration menu

Table 6-24: Arm Codes

Code	Arm Type	Description
1	STRAIGHT	Net Accumulative Total of Arm = Meter (only one meter associated with the arm)
2	Not used	N/A
3	SIDE STREA	Net Accumulative Total of Arm = First/Base Meter
4	Not used	N/A
5	RATIO	Net Accumulative Total of Arm = First Meter + Second/Blend Meter

6.9.6 Related Commands

AD, CS, MS

6.9.7 Constraints

Instrument must be in the idle state.

6.10 AT - Accumulative Totals

6.10.1 Description

Retrieves the gross accumulated totals for all arms or meters from the instrument. This represents the gross totals, for each arm or meter, of all transactions performed since the instrument was first used or since the accumulated totals were last set in the Metering Line Gross Accumulated Totals configuration menu item for each meter.

6.10.2 Send — Option 1

6.10.2.1 STX

[AT] 0 [ETX]

6.10.3 Receive — Option 1

6.10.3.1 STX

[AT] 0 [a] ... [g] 0 [ETX]

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = accum. total for first arm [xxxxxxxx]

e = accum. total for second arm [xxxxxxxx] (only if number of arms > 1)

f = accum. total for third arm [xxxxxxxx] (only if number of arms > 2)

g = accum. total for fourth arm [xxxxxxxx] (only if number of arms > 3)

6.10.4 Send — Option 2

6.10.4.1 STX

[AT] 0 [An] 0 [ETX]

Where n is the arm number (range is 1 to 4)

6.10.5 Receive — Option 2

6.10.5.1 STX

[AT] 0 [An] 0 [a] 0 [ETX]

Where

a = gross accumulated total for the arm An [xxxxxxxxx]

6.10.6 Send — Option 3

6.10.6.1 STX

[AT] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.10.7 Receive — Option 3

6.10.7.1 STX

[AT] 0 [Mn] 0 [a] 0 [ETX]

Where

a = gross accumulated total for the meter Mn [xxxxxxxxx]

6.10.8 Notes — Option 1

Parameter b indicates how many “accum. gross total” parameters follow. For example, if b = 2 then only parameters [a] through [e] are received.

For Side Stream blending the arm total is equal to the total of the downstream meter or first meter associated with that arm. For Ratio blending the arm total is equal to the addition of both meters associated with the arm.

6.10.9 Notes — Option 2

For Side Stream blending the arm total is equal to the total of the downstream meter or first meter associated with that arm. For Ratio blending the arm total is equal to the addition of both meters associated with the arm.

6.10.10 Related Commands

AN, FR, GT, ID, IP, IT, LP, LT, NT, PR, TB, TF, VC

6.10.11 Constraints

None.

6.11 AV - Application Version

6.11.1 Description

Retrieves the application version, date and time from the instrument.

6.11.2 Send

6.11.2.1 STX

[AV] 0 [ETX]

6.11.3 Receive

6.11.3.1 STX

[AV] 0 [a] ... [j] 0 [ETX]

Where

a = software version [Vx-xxx-]/[Px-xxx-]

b = instrument model and application pack [1010A –CB-]

c = software version and card selection [Vyyxx.xxx-xxxx] where yy = language option (default = EO for English)

d = date [mmm dd yyyy]

e = time [hh:mm:ss]

f = ROM type [FLASH]

g = FLASH ROM size [xxx]

h = display type [GRAPHIC]

6.11.3.2 BS

- The instrument must be in an idle state.

6.11.4 Notes

None

6.11.5 Related Commands

LV, SV

6.11.6 Constraints

Instrument must be in the idle state.

6.12 BR - Blend/Additive Recipes

6.12.1 Description

Uploads blend/additive recipes to the computer or downloads blend/ additive recipes to the instrument. These recipes contain both blend and additive components. They apply when either blending two products or when using intelligent additive injection (MiniPak additive injection system), or when blending two products and using intelligent additive injection.

6.12.2 Send (Upload) - Option 1

6.12.2.1 STX

[BR] 0 [a] 0 [ETX]

Where

a = recipe number [xx] (range 1 to 16)

6.12.3 Receive (Upload) — Option 1

6.12.3.1 STX

[BR] 0 [a] 0 [b] ... [t] 0 [ETX]

Where

a = recipe number [xx] (range 1 to 16)

b = recipe status [x] (0 = DISABLED, 1 = ENABLED)

c = recipe name [xxxxxxxxxxxx] (string of up to 12 characters)

d = arm number [x] (number of the arm associated with this recipe)

e = target blend percentage [xxx.x] (range 0.0 to 100.0%)

f = post blend volume % of preset (Range is 80 to 100).

g = line 1 additive amount [xxxx] in ppm or 0 if disabled

h = line 2 additive amount [xxxx] in ppm or 0 if disabled

i = line 3 additive amount [xxxx] in ppm or 0 if disabled

j = line 4 additive amount [xxxx] in ppm or 0 if disabled

k = line 5 additive amount [xxxx] in ppm or 0 if disabled

l = line 6 additive amount [xxxx] in ppm or 0 if disabled

m = additive flush volume [xxx] (range is 0 to 999 where 0 = no flush)

n = base calculated slow flow [xxxx]

o = base calculated high flow [xxxx]

p = base calculated low flow [xxxx]

q = blend calculated slow flow [xxxx] or [0] if no blend meter

r = blend calculated high flow [xxxx] or [0] if no blend meter

s = blend calculated low flow [xxxx] or [0] if no blend meter

t = calculated recipe minimum preset [xxxx]

6.12.3.2 NAK

- If the instrument is in programming mode
- If the recipe number is not within the range 1 to 16
- If the number of parameters in the BR command is incorrect
- If a manager reset is required

6.12.3.3 BS

- Instrument must be in the idle state

6.12.4 Send (Download) — Option 2

6.12.4.1 STX

[BR] 0 [a] 0 [b] ... [m] 0 [ETX]

Where

a = recipe number [xx] (range 1 to 16)

b = recipe status [x] (0 = DISABLED, 1 = ENABLED)

c = recipe name [xxxxxxxxxxxx] (string of up to 12 characters)

d = arm number [x] (number of the arm associated with this recipe)

e = target blend percentage [xxx.x] (range 0.0 to 100.0%, ignored if straight product loading)

f = post blend volume % of preset (Range is 80 to 100).

g = line 1 additive amount [xxxx] in ppm or 0 if disabled

h = line 2 additive amount [xxxx] in ppm or 0 if disabled

i = line 3 additive amount [xxxx] in ppm or 0 if disabled

j = line 4 additive amount [xxxx] in ppm or 0 if disabled

k = line 5 additive amount [xxxx] in ppm or 0 if disabled

l = line 6 additive amount [xxxx] in ppm or 0 if disabled

m = additive flush volume [xxx] (range is 0 to 999 where 0 = no flush)

6.12.5 Receive — Option 2

6.12.5.1 STX

[BR] 0 [a] 0 [b] ... [l] 0 [ETX]

Where

a = recipe number [x]

b = recipe error code [Fxx] where xx is the error number (Refer [Table 6-23: Recipe Error Codes \(Fxx\)](#))

c = recipe status [x] (0 = disabled, 1 = enabled)

d = recipe name

e = associated loading arm

f = base calculated slow flow [xxxx] or [0] if straight product loading

g = base calculated high flow [xxxx] or [0] if straight product loading

h = base calculated low flow [xxxx] or [0] if straight product loading

i = blend calculated slow flow [xxxx] or [0] if straight product loading

j = blend calculated high flow [xxxx] or [0] if straight product loading

k = blend calculated low flow [xxxx] or [0] if straight product loading

l = calculated recipe minimum preset [xxxx] or [0] if straight product loading

6.12.5.2 NAK

- If the instrument is in programming mode
- If the recipe number is not within the range 1 to 16
- If the number of parameters in the BR command is incorrect
- If a manager reset is required

6.12.5.3 BS

- Instrument must be in the idle state

6.12.6 Notes

Additive recipes can be edited from the RECIPES configuration menu.

Table 6-25: Recipe Error Codes (Fxx)

XX	Description	XX	Description
00	No error	17	Calculated parameters fault
01	1010 in programming mode	18	Manager reset required
02	Flow is active	19	No meter enabled
03	No transaction in progress or complete	20	Additive batch setup not complete
04	Operation not allowed	21	Arm disabled in configuration
05	Wrong control mode	22	Arm faulty MR required
06	Transaction in progress	23	Arm position fault
07	Alarm condition	24	Overfill ground fault
08	Storage full	25	Transaction record not found
09	Operation out of sequence	26	MR is not required
10	Power fail during transaction	27	Permissive delay activ
11	1010 authorised	28	Batch record not found
12	Option not installed	29	SDF read fault
13	Parameter size incorrect	30	Option not configured
14	Invalid slip command structure	31	Recipe not available
15	Value rejected	32	Arm number does not exist
16	Incorrect number of parameters	33	Meter number does not exist

6.12.7 Related Commands

AR

6.12.8 Constraints

Instrument must be in the idle state

6.13 BT - Batch Totals

6.13.1 Description

Retrieves the Batch Totals (similar to an SY command) of the last completed batch for a specified arm.

6.13.2 Send

6.13.2.1 STX

[BT] 0 [xx] 0 [a] 0 [ETX]

Where

xx = one of the following:

AA = Arm Batch information

M1 = Base Meter Batch information

M2 = Blend Meter Batch information

IV = Additive Injection Batch Information

a = arm number

6.13.3 Receive - AA

6.13.3.1 STX

[BT] 0 [AA] 0 [a] 0 [b] 0 [c] ... [n] 0 [ETX]

Where

a = batch number [xxxx]

b = transaction number [xxxxxxx]

c = arm number [x]

d = start time [hh:mm:ss]

e = stop time [hh:mm:ss]

f = units setting [litres]/[liters]/[meters3]/[kg]/[grams]/[gallons]/ [pounds]

g = 0 = No Selected Recipe

1 to 16 for Internal Recipe

17 = downloaded recipe - dynamic recipe used

h = compartment number [xx]

i = returned quantity [xxxxx]

j = preset quantity [xxxxxx.x]

k = blend type [x] (range 1 to 5, Refer [Table 6-23: Recipe Error Codes \(Fxx\)](#))

l = blend accuracy [x] (0 = No fault, 1 = High Alarm, 2 = Low Alarm)

m = error status [xxx] Refer [Section 5: Error Status Codes](#)

n = checksum result [FAULT] or [OK]

6.13.3.2 NAK

- Requested batch number does not exist
- Requested arm number does not exist

6.13.4 Receive - Mn

6.13.4.1 STX

[BT] 0 [Mn] 0 [a] 0 [b] 0 [c] ... [r] 0 [ETX]

Where

a = batch number [xxxx]

b = transaction number [xxxxxxx]

c = meter number [x]

d = gross (unconverted) total [xxxxxx.x]

e = net (converted) total [xxxxxx.x]

f = accum. (unconverted) total before [xxxxxxx]

g = accum. (unconverted) total after [xxxxxxx]

h = net accum. (converted) total before [xxxxxxx]

i = net accum. (converted) total after [xxxxxxx]

j = meter preset quantity [xxxxxx.x]

k = manual product density (kg/m³) [xxxx.x] or manual relative density (RD60) [x.xxx] (US units)

l = commodity setting [x] (0 = NONE, 1 = CRUDE OILS (A), 2 = REFINED (B), 3 = SPECIAL (C), 4 = LUBE OILS (D), 5 = NGL AND LPG (E), 6 = FAME (F))

m = Expansion Co-efficient/Thermal Exp. Factor [x.xxxxxxx] (commodity C) or Equilibrium Pressure (Pe) [xxxx.x] (commodity E) or 0.0 if neither used

n = weighted average temperature [xxxx.x] or [Bxxxx.x] if break down value is used

o = weighted average pressure [xxxx.x] or [Bxxxx.x] if break down value is used

p = weighted average density [xxxx.x] or [Bxxxx.x] if break down value is used or [M] if a manual value in use (refer to parameter k)

q = error status [xxx] (Refer [Section 5: Error Status Codes](#))

r = checksum result [FAULT] or [OK]

6.13.4.2 NAK

- Requested batch number does not exist
- Requested arm number does not exist

6.13.5 Receive - IV

6.13.5.1 STX

[BT] 0 [In] 0 [a] 0 [b] 0 [c] ... [i] 0 [ETX]

Where

a = batch number [xxxx]

b = transaction number [xxxxxxx]

c = additive 1 preset quantity [xxxx.x] (cc or ml)

d = additive 1 gross quantity [xxxx.x] (cc or ml)

e = additive 2 preset quantity [xxxx.x] (cc or ml)

f = additive 2 gross quantity [xxxx.x] (cc or ml)

g = additive 3 preset quantity [xxxx.x] (cc or ml)

h = additive 3 gross quantity [xxxx.x] (cc or ml)

i = additive 4 preset quantity [xxxx.x] (cc or ml)

j = additive 4 gross quantity [xxxx.x] (cc or ml)

k = checksum result [FAULT] or [OK]

6.13.5.2 NAK

- Requested batch number does not exist

6.13.6 Notes

This command can be used during loading operations (while other arms are loading), but not while the particular arm is loading for which Batch Totals are required. Monitor the ENQ response arm status, in particular the batch totals complete bit, to determine when a load has completed on a particular arm. From the time an instrument is first powered up or firmware update is made, the instrument will respond with a NAK until a batch has been completed on the requested arm.

6.13.7 Related Commands

ST, SY

6.13.8 Constraints

Once a particular arm has been selected for loading, the BT command will return a NAK until a new batch is completed on that arm.

6.14 CA - Control Arm

Allows the host to disable or enable a particular arm.

6.14.1 Send

6.14.1.1 STX

[CA] 0 [a] 0 [b] 0 [ETX]

Where

a = arm number [x]

b = disable/enable arm [x] (ENABLE = 1, DISABLE = 0)

6.14.2 Receive

6.14.2.1 STX

[CA] 0 [a] 0 [b] 0 [c] 0 [d] 0 [e] 0 [ETX]

Where

a = total number of arms [x]

b = first arm status [x]

c = second arm status [x] (if number of arms >1)

d = third arm status [x] (if number of arms >2)

e = fourth arm status [x] (if number of arms >3)

6.14.2.2 NAK

- Requested arm number does not exist
- Instrument is in the RC state.

6.14.3 Notes

Arm Status byte: 0 = DISABLED, 1 = ENABLED, 2 = FAULTY

Parameter a indicates how many parameters follow, for example if only 2 arms then only b and c follow.

6.14.4 Related Commands

AS

6.14.5 Constraints

Cannot enable or disable an arm that is already faulty. If the host system tries to enable/disable a faulty arm, the arm status will remain faulty and enable/disable is ignored.

6.15 CC - Clear Power Cycle

6.15.1 Description

Clears/resets the power failure flag. The flag is available from the ENQ response bit 4 of the status byte. Refer the ENQ command.

6.15.2 Send

6.15.2.1 STX

[CC] 0 [ETX]

6.15.3 Receive

6.15.3.1 ACK

- The command was processed without error.

6.15.3.2 NAK

- Power Cycle/Failure Flag is not set.

6.15.4 Notes

None.

6.15.5 Related Commands

None

6.15.6 Constraints

None.

6.16 CL - Clear General Purpose Input Latches

6.16.1 Description

Clears the latched status byte sent in the IS command for general purpose digital inputs.

This command also clears the RIT status byte in the ENQ command where applicable.

6.16.2 Send

6.16.2.1 STX

[CL] 0 [a] 0 [ETX]

Where a is one of the following:

1 = clears RIT latched inputs for arm 1

2 = clears RIT latched inputs for arm 2

3 = clears RIT latched inputs for both arms

4 = clears all latched inputs

5 = clears bit [b] of byte 1 (Latched status byte 1 — Refer “Notes” following)

6 = clears bit [b] of byte 2 (Latched status byte 2) and where

b = individual bit to clear (range 0 to 7. 0 unless used in conjunction with parameter a = 5 or 6)

Parameter b is ignored if a is not 5 or 6.

6.16.3 Receive

6.16.3.1 ACK

- The command was processed without error.

6.16.3.2 NAK

- If a is equal to 2 or 3 on one arm system
- Parameter a is more than 6
- Parameter b is not present when parameter a is 5 or 6
- Parameter a is 1, 2, or 3 and RIT is disabled or not offered on the model

6.16.4 Notes

Refer the IS command for latched status byte details

6.16.5 Related Commands

ENQ, IS, SL

6.16.6 Constraints

None

6.17 CM - Clear Message

6.17.1 Description

Clears the on-screen message sent as part of a DM, DP, GA, GH, GK, or GN command and clears the status associated with the relevant command.

6.17.2 Send

6.17.2.1 STX

[CM] 0 [ETX]

6.17.3 Receive

6.17.3.1 ACK

The command was processed without error.

6.17.3.2 NAK

- If there is no message to clear

6.17.4 Notes

None

6.17.4.1 Related Commands

DM, DP, GA, GH, GK, GN

6.17.5 Constraints

None.

6.18 CO - Communication Settings

6.18.1 Description

Returns either the general communication settings, printer settings or the specific communications port settings from the instrument.

6.18.2 Send

6.18.2.1 STX

[CO] 0 [a] 0 [ETX]

Where

a = Communication settings [xx]

Where [xx] is one of the following:

GS = General Settings

Cn = Communications port x settings (Where n = 1 to 3)

En = Ethernet port x settings (Where n = 1 to 2)

6.18.3 Receive GS

6.18.3.1 STX

[CO] 0 [GS] 0 [a] 0 [b] 0 [c] 0 [d] 0 [ETX]

Where

a = terminal automation mode [x]

(0 = [STAND ALONE], 1 = [LOAD SCHEDULING])

b = remote authorise [x] [0 = DISABLED, 1 = ENABLED]

c = comms timeout [xxx] seconds (range 0 to 600 seconds)

[0] if terminal automation mode is [STAND ALONE] and Remote Authorise = [DISABLED]

d = no of communications ports [x] (2 to 3)

e = debug response [x] [0 = DISABLED, 1 = ENABLED]

6.18.3.2 NAK

- Number of command parameters is incorrect.

6.18.4 Receive Cn (n = 1 to 3)

6.18.4.1 STX

[CO] [a] 0 [b] 0 [c] 0 [d] ...[g] 0 [ETX]

Where

a = Cn (where n is the communications port number 1 to 3)

b = comm. port n device [x]

(0 = COMPUTER, 1 = INTELLIGENT ADDITIVE, 2 = NEXWATCH)

c = comm. port n mode [x] (0 = RS232, 1 = RS485)

d = comm. port n baud rate [x]

(0 = 1200, 1 = 2400, 2 = 4800, 3 = 9600, 4 = 19200, 5 = 38,400)

e = comm. port n parity [x]

(0 = NONE, 1 = EVEN, 2 = ODD)

f = comm. port n stop bits [x] (1 = ONE, 2 = TWO)

g = comm. port n unit address [xx] (range 0 to 31) [0] if comm. port 1 device is not [COMPUTER]

6.18.5 Receive En (n = 1 to 2)

6.18.5.1 STX

[CO] [a] 0 [b] 0 [c] 0 [d] 0 [e] 0 [f] 0 [ETX]

Where

a = En (where n is the ethernet port number 1 to 2)

b = mac id [xxxxxxxxxxxxx]

c = ip address [xxx.xxx.xxx.xxx]

d = subnet mask [xxx.xxx.xxx.xxx]

e = gateway [xxx.xxx.xxx.xxx]

f = port [xxxxx]

g = protocol [1 = SLIP, 2* = Modbus]

6.18.5.2 NAK

- Number of command parameters is incorrect
- Communications port does not exist BS
- Instrument must be in the idle state

6.18.6 Notes

None.

6.18.7 Related Commands

AS, CS, OP, SO, VA

6.18.8 Constraints

Instrument must be in the idle state.

6.19 CP - Authorisation Configuration

6.19.1 Description

Programs individual authorisation numbers.

6.19.2 Send

6.19.2.1 STX

[CP] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = [DR]/[PE] for driver/personnel or [TR]/[VE] for truck/vehicle or [MA] for master

b = [xx]/[XX] to clear all existing driver/personnel or truck/vehicle numbers

or

[nnnn] to program an index number or clear a single driver/personnel or truck/vehicle index at location nnnn

c = [n1 ... n12] to program Touch at location nnnn or [n1 ... n4] to program PIN at location nnnn or

[n1... n10] to program NexWatch at location nnnn or

[xx]/[XX] to clear all existing index numbers.

6.19.3 Receive

6.19.3.1 ACK

The command was processed without error.

6.19.3.2 NAK

- DR\PE or TR\VE or MA not found nnnn < 0 or
nnnn > 85 if [MA] or
nnnn > 2750 if [DR]/[PE] or [TR]/[VE]

6.19.3.3 BS

- Instrument must be in the idle state

6.19.4 Notes

None.

6.19.5 Related Commands

None.

6.19.6 Constraints

Instrument must be in the idle state.

This command requires at least 3 seconds of extra time for both waiting for an acknowledge (ACK) response and before another command is sent to the instrument.

6.20 CR – Control Room Stop

6.20.1 Description

Pause/Resume/Terminate loading arm in Remote mode.

6.20.2 Send

6.20.2.1 STX

[CR] 0 [a] 0 [ETX]

Where

a = Operation to control BCU [x] Parameter a – Operation to Control BCU

For more details refer [Section A.2.1: Control Room Stop](#).

6.20.3 Receive

Control byte: ACK

The command was processed without error. Control byte: NAK

- Not in Remote Mode
- For resume, if bath not started and valve is close

6.20.4 Notes

None.

6.21 CS - Correction Settings

6.21.1 Description

Returns the commodity based correction settings for each meter.

6.21.2 Send — Option 1

6.21.2.1 STX

[CS] 0 [ETX]

6.21.3 Receive — Option 1

6.21.3.1 STX

[CS] 0 [a] 0 [b] [l] 0 [ETX]

Where

a = commodity setting for meter 1 [x] - Refer [Table 6-26: Commodity Types](#).

b = volume correction table for meter 1 [string] - "NONE" if not available - Refer [Table 6-27: Volume Correction](#)

c = density correction table for meter 1 [string] - "NONE" if not available - Refer [Table 6-28: Density Correction](#)

d = commodity setting for meter 2 [x] - Refer [Table 6-26: Commodity Types](#)

e = volume correction table for meter 2 [string] - "NONE" if not available - Refer [Table 6-26: Commodity Types](#)

f = density correction table for meter 2 [string] - "NONE" if not available - Refer [Table 6-28: Density Correction](#)

g = commodity setting for meter 3 [x] - Refer [Section Table 6-26: Commodity Types](#)

h = volume correction table for meter 3 [string] - "NONE" if not available - Refer [Table 6-27: Volume Correction](#)

i = density correction table for meter 3 [string] - "NONE" if not available - Refer [Table 6-28: Density Correction](#)

j = commodity setting for meter 4 [x] - Refer [Table 6-26: Commodity Types](#)

k = volume correction table for meter 4 [string] - "NONE" if not available - Refer [Table 6-27: Volume Correction](#)

l = density correction table for meter 4 [string] - "NONE" if not available - Refer [Table 6-28: Density Correction](#)

Table 6-26: Commodity Types

0	NONE
1	CRUDE OILS (A)
2	REFINED (B)
3	SPECIAL (C)
4	LUBE OILS (D)
5	NGL AND LPG (E)
6	FAME (F)

Table 6-27: Volume Correction

Commodity Type					Base temp.
Crude Oils (A)	Refined (B)	Special (C)	Lube Oils (D)	NGL and LPG (E)	
54A	54B	54C	54D	54E	15 °C
60A	60B	60C	60D	60E	20 °C
24A	24B	24C	24D	24E	60 °F

Table 6-28: Density Correction

Commodity Type					Base temp.
Crude Oils (A)	Refined (B)	Special (C)	Lube Oils (D)	NGL and LPG (E)	
53A	53B	53C	53D	53E	15 °C
59A	59B	59C	59D	59E	20 °C
23A	23B	23C	23D	23E	60 °F

6.21.3.2 BS

- Instrument must be in the idle state

6.21.4 Send — Option 2

6.21.4.1 STX

[CS] 0 [xx] 0 [a] 0 [ETX]

Where

xx = one of the following:

BD (break down settings) DS (density settings)

PS (pressure settings) TS (temperature settings)

a = meter number [x] (Range = 1 to 4)

6.21.5 Receive — Option 2, BD

6.21.5.1 STX

[CS] 0 [BD] 0 [a] 0 [b] 0 ... [g] 0 [ETX]

Where

a = meter number [x]

b = Pressure break down value [1=ENABLED, 0=DISABLED]

c = Pressure break down value [xxx.x] or [0] if disabled

d = Temperature break down value [1=ENABLED, 0=DISABLED]

e = Temperature break down value [xxx.x] or [0] if disabled

f = Density break down value [1=ENABLED, 0=DISABLED]

g = Density break down value (kg/m³) [xxxx.x] or relative density (RD60) [x.xxx] (US units) or [0] if disabled

6.21.5.2 NAK

- Meter number is invalid or missing

6.21.5.3 BS

- Instrument must be in the idle state

6.21.6 Receive — Option 2, DS

6.21.6.1 STX

[CS] 0 [DS] 0 [a] 0 [b] 0 ... [f] 0 [ETX]

Where

a = meter number [x]

b = Density correction [1=ENABLED, 0=DISABLED]

c = Type of density value [0 = None, 1 = Manual, 2 = Analog]

d = Manual density value (kg/m³) [xxxx.x] or relative density (RD60) [x.xxx] (US units)

e = 4 mA density (kg/m³ or lb/ft³ US units) [xxxx.x] or 0 if density compensation is disabled

f = 20 mA density [xxx.x] (kg/m³ or lb/ft³ US units) [xxxx.x] or 0 if density compensation is disabled)

6.21.6.2 NAK

- Meter number is invalid or missing

6.21.6.3 BS

- Instrument must be in the idle state

6.21.7 Receive — Option 2, PS

6.21.7.1 STX

[CS] 0 [PS] 0 [a] 0 [b] 0 ... [g] 0 [ETX]

Where

a = meter number [x]

b = commodity setting [x] - Refer [Table 6-26: Commodity Types](#)

c = pressure correction [1=ENABLED, 0=DISABLED]

d = 4 mA pressure [xxx.x] or [0] if pressure is disabled

e = 20 mA pressure [xxx.x] or [0] if pressure is disabled

f = manual entry of Dp (if regulated Pm) [xxx.x] or [0] if commodity type is not equal to 5

g = manual compressibility factor [x.xxxxxxxx] or [0] if commodity type is not equal to 5

6.21.7.2 NAK

- Meter number is invalid or missing

6.21.7.3 BS

- Instrument must be in the idle state

6.21.8 Receive — Option 2, TS

6.21.8.1 STX

[CS] 0 [TS] 0 [a] 0 [b] 0 ... [f] 0 [ETX]

Where

a = meter number [x]

b = temperature correction [1=ENABLED, 0=DISABLED]

c = temperature sensor type [0 = 4-20 mA, 1=RTD]

d = RTD minimum error temperature [xxx.x] or 4 mA temperature [xxx.x] or [0] if temperature sensor is disabled

e = RTD maximum error temperature [xxx.x] or 20 mA temperature [xxx.x] or [0] if temperature sensor is disabled

f = expansion Coeff (/ $^{\circ}$ C) [x.xxxxxxxx] or expansion Coeff (/ $^{\circ}$ F) [x.xxxxxxxx] (US units) or [0] if commodity type is not equal to 3

6.21.8.2 NAK

- Meter number is invalid or missing

6.21.8.3 BS

- Instrument must be in the idle state

6.21.9 Notes

If the instrument sales code supports internal additives then the meter allocated to internal additives will return a commodity type = NONE.

6.21.10 Related Commands

AS, MS

6.21.11 Constraints

Instrument must be in idle state.

6.22 DC - Display LCD Contrast

6.22.1 Description

Returns the current display contrast setting or sets a new display contrast setting.

6.22.2 Send

6.22.2.1 STX

[DC] 0 [a] 0 [ETX]

Where

a = display contrast setting [xxx] (Range 1 to 64) or [0] for current display contrast setting

6.22.3 Receive

6.22.3.1 STX

[DC] 0 [a] 0 [ETX]

Where

a = display contrast setting [xxx]

6.22.3.2 NAK

- If number of parameters is not equal to 1
- If parameter [a] is < 1 or > 64

6.22.3.3 BS

- Instrument must be in the idle state

6.22.4 Notes

None.

6.22.5 Related Commands

None.

6.22.6 Constraints

Instrument must be in the idle state.

6.23 DM - Display Message

6.23.1 Description

Displays a message up to 8 lines each of 30 characters on the instrument screen. The instrument status then goes to DM and responds to the ENQ command with DM. Clear the message displayed by this command with the CM command. Operator input is ignored while the message is being displayed.

6.23.2 Send

6.23.2.1 STX

[DM] 0 [a] 0 [b] ... [h] 0 [ETX]

Where

a = line 1 (top line) [justify character & message]

b = line 2 [justify character & message]

c = line 3 [justify character & message]

d = line 4 [justify character & message]

e = line 5 [justify character & message]

f = line 6 [justify character & message]

g = line 7 [justify character & message]

h = line 8 (bottom line) [justify character & message] Justify character options

| centre justified (vertical bar, 7CH)

_ left justified (underscore, 5FH)

+ right justified (plus, 2BH)

a number between 0 and 30 in the justify field will justify the text that number of spaces from the left (must be two characters, i.e. 03 for 3 spaces)

Message options

-1 leave line as is (if previous message still being displayed)

-2 clear line (if previous message still being displayed)

up to 30 characters of text (in addition to the justify character)

6.23.3 Receive

6.23.3.1 ACK

The command was processed without error.

6.23.3.2 NAK

- Number of parameters is < 1

6.23.4 Notes

Always enter the justify character, otherwise the first character of the line is used as the justify character, and is not displayed.

Some response delay may result when displaying a message to the entire screen (i.e. when the instrument is in the idle or RL state).

6.23.5 Example

To display a message to the operator (ignoring the field separator nulls): DM -2 -2
-2 -2 -2 -2 | PLEASE WAIT -2 ETX

6.23.6 Related Commands

CM, DP, GA, GH, GK, GN

6.23.7 Constraints

The justify character is not used when the message parameter is either -1 or -2.

If in Load Scheduling mode messages can be displayed only during the idle, AR, LA, RA, RC, RL, and PL states.

Only two line messages can be displayed during the AR, LA, RC and PL state where only the last two line parameters are accepted and the other line parameters are ignored. These messages appear on the bottom two lines of the display.

6.24 DN - Set Meter Density

6.24.1 Description

Downloads the product density for the specified fluid group for a particular meter to the instrument.

6.24.2 Send

6.24.2.1 STX

[DN] 0 [a] 0 [b] 0 [ETX]

Where

a = meter number [x] (Range 1 to 4)

b = Manual Base/Reference [xxxx.x] kg/m³ or [x.xxxx] (relative density RD60 for US units)

6.24.3 Receive

6.24.3.1 ACK

The command was processed without error.

6.24.3.2 NAK

- Density is outside allowable limits for the fuel type selected (Refer the following tables for allowable values)
- Requested meter number does not exist.
- Number of parameters is >2

Table 6-29: Density and Volume Correction

Units	Base temp.	Fluid Group/Commodity Based Density Range				
		Crude Oils (A)	Refined (B)	Special\$ (C - thermal exp.)	Lube Oils (D)	NGL and LPG (E)
Relative Density (RD60)	60 °F	0.61120 to 1.16464		0.2298 0.9290*	0.80168 to 1.1646	0.3500 to 0.6880
				0.61120 to 1.16464#		

Units	Base temp.	Fluid Group/Commodity Based Density Range				
KG/M ³	15 °C	611.16 to 1163.79	611.16 to 1163.86	230.0 930.0* 611.16 1163.79#	801.25 to 1163.85	351.7 to 687.8
	20 °C	606.12 to 1161.15	606.12 to 1160.62	230.0 930.0* 611.16 1163.79#	798.11 to 1160.71	331.7 to 683.6

\$ Density not used in correction calculations for these fluid groups — it is recorded in the transaction for reference only

MTBE or GASOHOL

* Expansion Coefficient

Table 6-30: Density Range for US units

Fluid Groups	Density Max (kg/m)	Density Min (SG@60 °F)	Density Max (SG@60 °F)
FLUID NONE		0.0	0.0
FLUID REFINED		0.61176	1.1649
FLUID LUBE OILS		0.80169	1.1649
FLUID CRUDE OILS		0.61176	1.1649
FLUID EXPANSION*		0.2298	0.9290
FLUID LIGHT HYDROCARBONS		0.50049	0.6536
FLUID GASOHOL*		0.61176	1.1649
FLUID MTBE*		0.61176	1.1649

6.24.3.3 BS

- Instrument must be in the idle state

6.24.4 Notes

The density can also be edited from within the METERING LINE configuration menu. Although the density command can be used for commodity Special (C) the

density parameter is not used in the temperature correction calculation.

6.24.5 Related Commands

AS

6.24.6 Constraints

Instrument must be in the idle state.

6.25 DP - Display Prompt

6.25.1 Description

Displays a message on the instrument screen with an automatic timeout period. The instrument status then goes to DP. If the response is received from an operator (Yes/No) the status moves to MT (Message taken). If the timeout period is allowed to expire before a response is received the status reverts to its previous state.

6.25.2 Send

Constraints: STX

[DP] 0 [a] 0 [b] ... [j] 0 [ETX]

Where

a = always set to 1

b = time period in seconds before the prompt will automatically timeout

c = line 1 (top line) [justify character & message]

d = line 2 [justify character & message]

e = line 3 [justify character & message]

f = line 4 [justify character & message]

g = line 5 [justify character & message]

h = line 6 [justify character & message]

i = line 7 [justify character & message]

j = line 8 (bottom line) [justify character & message] Justify character options

| centre justified (vertical bar, 7CH)

_ left justified (underscore, 5FH)

+ right justified (plus, 2BH)

a number between 0 and 30 in the justify field will justify the text that number of spaces from the left (must be two characters, i.e. 03 for 3 spaces)

Message options

-1 leave line as is (if previous message still being displayed)

-2 clear line (if previous message still being displayed)

up to 30 characters of text (in addition to the justify character)

6.25.3 Receive

6.25.3.1 ACK

The command was processed without error.

6.25.3.2 NAK

Number of parameters is < 1

- Parameters [a] and [b] are not digits.

6.25.4 Notes

Always enter the justify character, otherwise the first character of the line is used as the justify character, and is not displayed.

Some response delay may result when displaying a message to the entire screen (i.e. when the instrument is in the idle or RL state).

6.25.5 Example

To display a message to the operator (ignoring the field separator nulls): DP 1 10 -2
-2 -2 -2 -2 -2 | FINISHED? YES/NO -2 ETX

6.25.6 Related Commands

CM, DM, GA, GH, GK, GN

6.25.7 Constraints

The justify character is not used when the message parameter is either -1 or -2.

If in Load Scheduling mode messages can be displayed only during the idle, AR, LA, RA, RC, RL, and PL states.

Only two line messages can be displayed during the AR, LA, RC and PL state where only the last two line parameters are accepted and the other line parameters are ignored. These messages appear on the bottom two lines of the display.

6.26 DT - Deadman Settings

6.26.1 Description

Returns the user configuration settings the Deadman setup information.

6.26.2 Send

6.26.2.1 STX

[DT] 0 [ETX]

6.26.3 Receive

6.26.3.1 STX

[DT] 0 [a] 0 [b] 0 [c] 0 [d] 0 [ETX]

Where

a = deadman [x] [0 = DISABLED, 1 = ENABLED]

b = deadman warning [xxx] seconds

c = deadman pause [xxx] seconds

d = deadman timeout [xxx] seconds

6.26.3.2 BS

- Instrument must be in the idle state

6.26.4 Notes

None.

6.26.5 Related Commands

OP.

6.26.6 Constraints

Instrument must be in the idle state.

6.27 ENQ - Operational State Enquiry

6.27.1 Description

Checks the operational state of the instrument.

6.27.2 Send

6.27.2.1 ENQ

6.27.3 Receive

6.27.3.1 STX

[SS] 0 [a] 0 [b] 0 [c] 0 [d] ... 0 [ETX]

Or the command field is one of the others shown in [Table 6-31: Command Fields](#).

Where

a = system status byte [x] – Refer [Table 6-32: Status Byte](#)

b = last transaction number [xxxxxxx]

c = first arm number [x]

d = total number of arms [x]

e = arms 1 and 2 status byte [x], Refer [Table 6-33: Arm Status Byte](#)

f = arms 3 and 4 status byte [x] (if more than 2 arms), Refer [Table 6-33: Arm Status Byte](#)

or

RIT status (if no more than 2 arms and RIT enabled), [Table 6-34: RIT Status Byte — Latched Status only](#) or

0 if no more than 2 arms and RIT disabled

g = acknowledge waiting status [x], (Refer [Section A.2.9: Acknowledge Waiting Status](#))

h = compartment loading status [x], (Refer [Section A.2.10: Compartment Loading Status](#))

i = error status byte (which is display on BCU screen) – [Section 5: Error Status Codes](#).

j= message Code (message which are displaying on the 1010 screen during SS mode)

k = instrument mode [x]

(0 = Stand alone mode, 1 = Load scheduling mode)

l = arm 1 current batch number [xxxx]

m = arm 2 current batch number [xxxx]

n = nexwatch id [xxxxxxxxxxxxxxxx]

If Loadspot RIT is Enabled

o = current Loadspot number [x]

p = current wagon number [xxxxxxxxxxxx] (up to 12 characters))

or Loadspot RIT is Disabled

o = overrun card id /pin

operator answer [xxxxxxxxxxxxxx] (up to 14 characters))

p = overrun id/pin [xxxxxxxxxxxxxx] (up to 14 characters))

q = overrun status [x], refer [Section A.2.11: Overrun Status](#)

r = top/bottom loading status [x]

(0 = top, 1 = bottom)

or where the command field is AR

r = arm number [x]

s = recipes available [x] (0 = None, 1 = Recipes available associated with this arm)

or where the command field is LA

r = load number [xxxx]

s = compartment number [xx]

t = returned quantity [xxxxxxx]

or where the command field is RA

r = personnel index number [xxxx] s = vehicle index number [xxxx]

t = personnel touch key/card/PIN number/NexWatch [xxxxxxxxxxxxxxxxxx]/
[xxxxxxxxxxxxxxxxxx]/[xxx-xxxxx]/ [xxxx]/ [xxxxxxxxxxxx]

(15) (16) (3 + "-" + 5) (4)(10)

u = vehicle touch key/card/PIN number/NexWatch [xxxxxxxxxxxxxxxxxx]/
[xxxxxxxxxxxxxxxxxx]/[xxx-xxxxx]/ [xxxx]/ [xxxxxxxxxxxx]

(15) (16) (3 + "-" + 5) (4)(10)

v = master index number [xx]

w = master touch key/card/PIN number/NexWatch

[xxxxxxxxxxxxxxxxxx] [xxxxxxxxxxxxxxxxxx]/ [xxx-xxxxx]/ [xxxx]/ [xxxxxxxxxx]
/

(16)(15)(3 + "-" + 5)(4)(10)

or where the command field is RL r = load number [xxxx]

s = personnel index number [xxxx] t = vehicle index number [xxxx]

u = personnel touch key/card/PIN number/NexWatch [xxxxxxxxxxxxxxxxxx]/
[xxxxxxxxxxxxxxxxxx]/[xxx-xxxxx]/ [xxxx]/ [xxxxxxxxxx] (15)(16)(3 + "-" + 5)(4)(10)

v = vehicle touch key/card/PIN number/NexWatch [xxxxxxxxxxxxxxxxxx]/
[xxxxxxxxxxxxxxxxxx]/[xxx-xxxxx]/ [xxxx]/ [xxxxxxxxxx]

(15)(16)(3 + "-" + 5)(4)(10)

w = master index number [xx]

x = master touch key/card/PIN number/NexWatch [xxxxxxxxxxxxxxxxxx]/
[xxxxxxxxxxxxxxxxxx]/[xxx-xxxxx]/ [xxxx]/ [xxxxxxxxxx]

(15)(16)(3 + "-" + 5)(4)(10)

or where the command field is RC

r = load number [xxxx]

s = arm number [x] (if no arm selected = 0, compartment cannot be authorized)

t = compartment number [xx]

u = returned quantity [xxxxxxx] or where the command field is AR

r = arm number [x]

s = recipes available [x] (0 = None, 1 = Recipes available associated with this arm)

or where the command field is LA

r = load number [xxxx]

s = compartment number [xx]

t = returned quantity [xxxxxxx]

Table 6-31: Command Fields

Command Field	Description
AA	Indicates that a question that was posted to the operator using the GA or GH commands has been answered. Refer Table 6-35: Operator Answer
AR	The instrument is in the Allocate Recipe state (Load Schedule is ENABLED)
DM	The instrument is displaying a message via the DM command.
DP	The instrument is displaying a message prompt via the DP command.
GA	The instrument is displaying a question to the operator via the GA command.
GH	The instrument is displaying a question to the operator via the GH command.
GK	The instrument is requesting the presentation of a touch key via the GK command.
GN	The instrument is requesting the presentation of a NexWatch card via the GN command.
KA	A touch key has been read in response to a GK command.
LA	The instrument is in the Loading Arm information state (Load Schedule and RIT panel are ENABLED)
MT	The message prompt (DP command) has been acknowledged.
NA	A NexWatch card has been read in response to a GN command.
RA	The instrument is waiting for entry authorisation (Remote Authorise is ENABLED)
RC	The instrument is in the compartment authorisation state (Load Schedule is ENABLED)
RL	The instrument is in the load authorisation state (Load Schedule is ENABLED)
SS	Standard enquiry response, the instrument is not in a special state.
PL	The instrument is in the post loading state (Load Schedule is ENABLED)
PB	The Instrument In Push button mode will Ask to press push button on Batch controller.

Table 6-32: Status Byte

Status Body								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	The instrument is not in the idle state.
x	1	x	x	x	x	x	x	64	A MR (Manager Reset) command is required.
x	x	1	x	x	x	x	x	32	Programmable inputs are connected.
x	x	x	1	x	x	x	x	16	A power failure has been detected.
x	x	x	x	1	x	x	x	8	Overfill/vapour recovery/programmable permissives are connected.
x	x	x	x	x	1	x	x	4	Programming/Hardware Test/Diagnostics Mode is active.
x	x	x	x	x	x	1	x	2	Alarm pending (use AL command to check alarm status)
x	x	x	x	x	x	x	1	1	Unauthorised flow is in progress on an arm.

Table 6-33: Arm Status Byte

Arm status Bytes								Value	Description
Arm 1 (3)				Arm 2 (4)					
1	x	x	x	x	x	x	x	128	Arm 1 (3) Batch in progress
x	1	x	x	x	x	x	x	64	Arm 1 (3) Batch paused
x	x	1	x	x	x	x	x	32	Arm 1 (3) Batch totals complete
x	x	x	1	x	x	x	x	16	Arm 1 (3) Batch error
x	x	x	x	1	x	x	x	8	Arm 2 (4) Batch in progress
x	x	x	x	x	1	x	x	4	Arm 2 (4) Batch paused
x	x	x	x	x	x	1	x	2	Arm 2 (4) Batch totals complete
x	x	x	x	x	x	x	1	1	Arm 2 (4) Batch error

Table 6-34: RIT Status Byte — Latched Status only

Arm status Bytes								Value	Description
Arm 1				Arm 2					
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	RIT start arm 1
x	1	x	x	x	x	x	x	64	RIT stop arm 1
x	x	1	x	x	x	x	x	32	RIT ack arm 1
x	x	x	1	x	x	x	x	16	Not used
x	x	x	x	1	x	x	x	8	RIT start arm 2
x	x	x	x	x	1	x	x	4	RIT stop arm 2
x	x	x	x	x	x	1	x	2	RIT ack arm 2
x	x	x	x	x	x	x	1	1	Not used

NOTE: RIT Stop keys are considered to be of normally closed type inputs. The latched status is 1 if the key is pressed and 0 if not pressed. To clear latched status use the CL command.

Table 6-35: Operator Answer

Operator Answer	Command Key	Value	Operator response to GA/GH command
Answer	None	String <=14 characters (0-9,A-Z)	Entered a string
'L'	LINE/ALPHA	The letter L(0x4C)	Pressed the LINE/ALPHA key
'+'	START	The PLUS character (0x2B)	Pressed the START key
'#'	STOP	The HASH character (0x23)	Pressed the STOP key
'D'	Display	the letter D (0x44)	Pressed the Display key
'YES'	Enter	String = "YES"	Pressed the Enter key
'NO'	Cancel	String = "NO"	Pressed the Cancel key

6.27.3.2 BS

- Instrument must be in the idle state

6.27.4 Notes

To clear the latched status of the RIT input status byte use the CL command.

6.27.5 Related Commands

None.

6.27.6 Constraints

The instrument must be in the idle state.

6.28 FL - Send Flash Log File

6.28.1 Description

Retrieves the details of the Flash log file.

6.28.2 Send

6.28.2.1 STX

[FL] 0 [ETX]

This will provide the details of the Flash log file index and the Unique ID.

or

[FL] 0 [a] 0 [ETX]

Where

a = flash log number (the log number for which the details are required) this log number should be less than 65000.

6.28.3 Receive

6.28.3.1 STX

[FL] 0 [a]0 [b5] 0 [ETX]

(This is received when details for Flash log index and unique id are required)

Where

a = log file index number [xxxxx]

b1 = Unique id [xxxxxxxxxxxxxxxxxx]

b2 = Unique id [xxxxxxxxxxxxxxxxxx]

b3 = Unique id [xxxxxxxxxxxxxxxxxx]

b4 = Unique id [xxxxxxxxxxxxxxxxxx]

b5 = Unique id [xxxxxxxxxxxxxxxxxx]

b6 = Unique id [xxxxxxxxxxxxxxxxxx]

b7 = Unique id [xxxxxxxxxxxxxxxxxx]

b8 = Unique id [xxxxxxxxxxxxxxxxxx] or

[FL] 0 [a]0 [i] 0[ETX]

This is received when details for a particular log number are required Where

a = log index [xx]

b = flash attempt time [hh:mm:ss]

c = flash attempt date [dd/mm/yyyy]

d = master password index [xxx]

Software Version

e = version project [xxxxxxxx]

f = version instrument type [xxxxxxxxxx]

g = version hardware [xxxxxxxxxxxxxxxx]

h = random number [xxxxxxxxxx] i = flash log status [x]

(ATTEMPT, FAILED, SUCCESS)

6.28.3.2 NAK

- If the Flash log details are required for a particular log number, the log number should not be greater than 65000

6.28.4 Notes

Parameter h: the PC flash programming tool generates the random number

6.28.5 Related Commands

None.

6.28.6 Constraints

None.

6.29 FR - Flow rate

6.29.1 Description

Returns the flow rates for arms.

6.29.2 Send — Option 1

6.29.2.1 STX

[FR] 0 [ETX]

6.29.3 Receive — Option 1

6.29.3.1 STX

[FR] 0 [a] ... [g] 0 [ETX]

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = flow rate for first arm [xxxxxxxx]

e = flow rate for second arm [xxxxxxxx] (only if number of arms > 1)

f = flow rate for third arm [xxxxxxxx] (only if number of arms > 2)

g = flow rate for fourth arm [xxxxxxxx] (only if number of arms > 3)

6.29.4 Send — Option 2

6.29.4.1 STX

[FR] 0 [An] 0 [ETX]

Where n is the arm number (range is 1 to 4)

6.29.5 Receive — Option 2

6.29.5.1 STX

[FR] 0 [An] 0 [a] 0 [ETX]

Where

a = flow rate for the arm An [xxxxxxxx]

6.29.6 Send — Option 3

6.29.6.1 STX

[FR] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.29.7 Receive — Option 3

6.29.7.1 STX

[FR] 0 [Mn] 0 [a] 0 [ETX]

Where

a = flow rate for the meter Mn [xxxxxxxx]

6.29.8 Notes — Option 1

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

For Side Stream blending the arm flow rate is equal to the flow rate of the downstream meter or first meter associated with that arm. For Ratio blending the arm flow rate is equal to the addition of both meters associated with the arm.

6.29.9 Related Commands

AN, AT, GT, ID, IP, IT, LP, LT, NT, PR, TB, TF, VC

6.29.10 Constraints

None.

6.30 GA - Get Answer

6.30.1 Description

Displays a message up to two lines long on the alphanumeric display. Respond with alphanumeric keys or the Yes/No/START keys. The instrument status then goes to GA until an answer is entered, the response to an ENQ command will then be AA.

6.30.2 Send

6.30.2.1 STX

[GA] 0 [a] 0 [b] ... [h] 0 [ETX]

Where

a = line 1 (top line) [justify character & message]

b = line 2 [justify character & message]

c = line 3 [justify character & message]

d = line 4 [justify character & message]

e = line 5 [justify character & message]

f = line 6 [justify character & message]

g = line 7 [justify character & message]

h = line 8 (bottom line) [justify character & message] Justify character options

| centre justified (vertical bar, 7CH)

_ left justified (underscore, 5FH)

+ right justified (plus, 2BH)

a number between 0 and 30 in the justify field will justify the text that number of spaces from the left (must be two characters, i.e. 03 for 3 spaces)

Message options

-1 leave line as is (if previous message still being displayed)

-2 clear line (if previous message still being displayed)

up to 30 characters of text (in addition to the justify character)

6.30.3 Receive

6.30.3.1 ACK

The command was processed without error.

6.30.3.2 NAK

- Number of parameters received is < 1.
- Current state of instrument does not allow it to display a message

6.30.4 Notes

Always enter the justify character, otherwise the first character of the line is used as the justify character, and is not displayed.

Some response delay may result when displaying a message to the entire screen (i.e. when the instrument is in the idle or RL state).

The alphanumeric keyboard response is always terminated using the Enter/Yes key. The Cancel key results in a No response. The START key results in a '+' response.

6.30.5 Example

To display a message to the operator and get an answer (ignoring the field separator nulls):

```
GA -2 -2 -2 -2 -2 -2 | ENTER TRUCK ID -2 ETX
```

6.30.6 Related Commands

CM, DM, DP, GH, GK, GN

6.30.7 Constraints

The justify character is not used when the message parameter is either -1 or -2.

If in Load Scheduling mode messages can be displayed only during the idle, AR, LA, RA, RC, RL, and PL states.

Only two line messages can be displayed during the AR, LA, RC and PL state where only the last two line parameters are accepted and the other line parameters are ignored. These messages appear on the bottom two lines of the display.

6.31 GD - Get Date and Time

6.31.1 Description

Retrieves the date and time from the instrument.

6.31.2 Send

6.31.2.1 STX

```
[GD] 0 [ETX]
```

6.31.3 Receive

6.31.3.1 STX

[GD] 0 [a] 0 [b] 0 [ETX]

Where

a = date [dd:mm:yyyy]

b = time [hh:mm:ss]

6.31.3.2 BS

- Instrument must be in the idle state

6.31.4 Notes

None.

6.31.5 Related Commands

RD

6.31.6 Constraints

The instrument must be in the idle state.

6.32 GH - Get Hidden

6.32.1 Description

Displays a message to which the operator should respond using numeric keys and/or the Yes/No/START keys. After sending, the instrument status then goes to GH state until the operator responds. After receiving a response, the instrument enters AA state. To provide security each key press displays an asterisk.

An alphanumeric keyboard response is always terminated using the Enter/Yes key.

6.32.2 Send

6.32.2.1 STX

[GH] 0 [a] 0 [b] ... [h] 0 [ETX]

Where

a = line 1 (top line) [justify character & message]

b = line 2 [justify character & message]

c = line 3 [justify character & message]

d = line 4 [justify character & message]

e = line 5 [justify character & message]

f = line 6 [justify character & message]

g = line 7 [justify character & message]

h = line 8 (bottom line) [justify character & message] Justify character options

| centre justified (vertical bar, 7CH)

_ left justified (underscore, 5FH)

+ right justified (plus, 2BH)

a number between 0 and 30 in the justify field will justify the text that number of spaces from the left (must be two characters, i.e. 03 for 3 spaces)

Message options

-1 leave line as is (if previous message still being displayed)

-2 clear line (if previous message still being displayed)

up to 30 characters of text (in addition to the justify character)

6.32.3 Receive

6.32.3.1 ACK

The command was processed without error.

6.32.3.2 NAK

- Number of parameters received is < 1.

6.32.4 Notes

Always enter the justify character, otherwise the first character of the line is used as the justify character, and is not displayed.

Some response delay may result when displaying a message to the entire screen (i.e. when the instrument is in the idle or RL state).

6.32.5 Example

The following displays a message requesting information from the operator and retrieves the hidden answer (ignoring the field separator nulls):

```
GH -2 -2 -2 -2 -2 -2 | ENTER DRIVER PIN -2 ETX
```

6.32.6 Related Commands

CM, DM, DP, GA, GK, GN

6.32.7 Constraints

The justify character is not used when the message parameter is either -1 or -2.

If in Load Scheduling mode messages can be displayed only during the idle, AR, LA, RA, RC, RL, and PL states.

Only two line messages can be displayed during the AR, LA, RC and PL state where only the last two line parameters are accepted and the other line parameters are ignored. These messages appear on the bottom two lines of the display.

6.33 GI - General Purpose Inputs

6.33.1 Description

Provides the configuration setting and status for the requested general purpose input.

6.33.2 Send

6.33.2.1 STX

[GI] 0 [a] 0 [ETX]

Where

a = general purpose input number [xx]

6.33.3 Receive

6.33.3.1 STX

[GI] 0 [a] ... [d] 0 [ETX]

Where

a = General purpose input number [xx]

b= Input type assigned to the requested general purpose input.

[0 = None, 1 = Emergency stop, 2 = Permissive 3 = System Input, 4 = Arm Input, 5 = RIT input]

c = General purpose input function assigned to the requested general purpose input number. Refer [Table 6-36: General Purpose Input Functions](#) for list of possible inputs

d = Arm number assigned to requested input.

[0= Not Applicable, 1 = Arm 1, 2 = Arm 2, 3 = Arm 3, 4 = Arm 4]

Range for arm programmable inputs: 1 to the number of arms available on system.

Range for RIT input: 1 for one arm system; 1 to 2 for a two arm system.

This is not applicable for other inputs.

e = general purpose input loading effect.

[0 = NONE, 1 = PAUSE, 2 = TIMEOUT, 3 = TERMINATE, 4 = MANAGER RESET]

f = current general purpose input status. [0 = Open, 1 = Closed]

6.33.3.2 NAK

- General purpose input does not exist
- No parameter is received

Table 6-36: General Purpose Input Functions

0 = None	1 = Emergency Stop	2 = Overfill/Ground
3 = Vapour Recovery	4 = Programmable Permissive	5 = System Programmable 1
6 = System Programmable 2	7 = System Programmable 3	8 = System Programmable 4
9 = System Programmable 5	10 = System Programmable 6	11 = Arm Programmable 1
12 = Arm Programmable 2	13 = Arm Programmable 3	14 = Arm Programmable 4
15 = Arm Programmable 5	16 = Arm Programmable 6	17 = Arm Programmable 7
18 = Arm Programmable 8	19 = RIT Start arm	20 = RIT Stop Arm
21 = RIT Ack		

6.33.4 Notes

All the programmable inputs except the emergency stop can have one of the following modes:

Mode 1: None

Mode 2: Pause

Mode 3: Timeout

Mode 4: Terminate Mode 5: Manager Reset

Programmable Permissive, Vapour Recovery Permissive and the Overfill/Ground Permissive by default is NONE. Set the timeout from Clear/Reconnect timeout in the system configuration. They will default to TIMEOUT if set up via the Initial Messages configuration menu.

The Overfill/Ground will also default to TIMEOUT if set up via the MI SLIP command.

This is not applicable for Emergency Stop, which by default requires the Manager Reset.

6.33.5 Constraints

Loading effect for RIT inputs is NONE.

6.34 GK - Get Touch Key

6.34.1 Description

Displays a message up to 8 lines each 30 characters on the graphics display. The instrument status goes to GK (the response to the ENQ command is GK). After the touch key is read the response changes to KA.

6.34.2 Send

6.34.2.1 STX

[GK] 0 [a] 0 [b] ... [h] 0 [ETX]

Where

a = line 1 (top line) [justify character & message]

b = line 2 [justify character & message]

c = line 3 [justify character & message]

d = line 4 [justify character & message]

e = line 5 [justify character & message]

f = line 6 [justify character & message]

g = line 7 [justify character & message]

h = line 8 (bottom line) [justify character & message] Justify character options

| centre justified (vertical bar, 7CH)

_ left justified (underscore, 5FH)

+ right justified (plus, 2BH)

a number between 0 and 30 in the justify field will justify the text that number of spaces from the left (must be two characters, i.e. 03 for 3 spaces)

Message options

-1 leave line as is (if previous message still being displayed)

-2 clear line (if previous message still being displayed)

up to 30 characters of text (in addition to the justify character)

6.34.3 Receive

6.34.3.1 ACK

The command was processed without error.

6.34.3.2 NAK

- Number of parameters received is < 1.

6.34.4 Notes

Always enter the justify character, otherwise the first character of the line is used as the justify character, and is not displayed.

Some response delay may result when displaying a message to the entire screen (i.e. when the instrument is in the idle or RL state).

6.34.5 Example

The following displays a message requesting the operator to present their touch key (ignoring the field separator nulls):

```
GK -2 -2 -2 -2 -2 -2 | PRESENT TOUCH KEY -2 ETX
```

6.34.6 Related Commands

CM, DM, DP, GA, GH, GN

6.34.7 Constraints

The justify character is not used when the message parameter is either -1 or -2.

If in Load Scheduling mode messages can be displayed only during the idle, AR, LA, RA, RC, RL, and PL states.

Only two line messages can be displayed during the AR, LA, RC and PL state where only the last two line parameters are accepted and the other line parameters are ignored. These messages appear on the bottom two lines of the display.

Touch key must be enabled for this command to function.

6.35 GN - Get NexWatch Card

6.35.1 Description

Displays a message up to 8 lines each 30 characters on the graphics display. The instrument status goes to GN (the response to the ENQ command is GN). After the touch key is read the response changes to NA.

6.35.2 Send

6.35.2.1 STX

```
[GN] 0 [a] 0 [b] ... [h] 0 [ETX]
```

Where

a = line 1 (top line) [justify character & message]
b = line 2 [justify character & message]
c = line 3 [justify character & message]
d = line 4 [justify character & message]
e = line 5 [justify character & message]
f = line 6 [justify character & message]
g = line 7 [justify character & message]
h = line 8 (bottom line) [justify character & message] Justify character options

| centre justified (vertical bar, 7CH)

_ left justified (underscore, 5FH)

+ right justified (plus, 2BH)

a number between 0 and 30 in the justify field will justify the text that number of spaces from the left (must be two characters, i.e. 03 for 3 spaces)

Message options

-1 leave line as is (if previous message still being displayed)

-2 clear line (if previous message still being displayed)

up to 30 characters of text (in addition to the justify character)

6.35.3 Receive

6.35.3.1 ACK

The command was processed without error.

6.35.3.2 NAK

- Number of parameters received is < 1.

6.35.4 Notes

Always enter the justify character, otherwise the first character of the line is used as the justify character, and is not displayed.

Some response delay may result when displaying a message to the entire screen (i.e. when the instrument is in the idle or RL state).

6.35.5 Example

The following displays a message requesting the operator to present their NexWatch card (ignoring the field separator nulls):

```
GN -2 -2 -2 -2 -2 -2 | PRESENT NEXWATCH -2 ETX
```

6.35.6 Related Commands

CM, DM, DP, GA, GH, GN

6.35.7 Constraints

The justify character is not used when the message parameter is either -1 or -2.

If in Load Scheduling mode messages can be displayed only during the idle, AR, LA, RA, RC, RL, and PL states.

Only two line messages can be displayed during the AR, LA, RC and PL state where only the last two line parameters are accepted and the other line parameters are ignored. These messages appear on the bottom two lines of the display.

NexWatch card reader must be enabled and connected for this command to function.

6.36 GO - General Purpose Outputs

6.36.1 Description

Provides the configuration setting and status for the requested general purpose output.

6.36.2 Send

6.36.2.1 STX

[GO] 0 [a] 0 [ETX]

Where

a = general purpose output number

6.36.3 Receive

6.36.3.1 STX

[GO] 0 [a] ... [f] 0 [ETX]

Where

a = general purpose output number [xx]

b = output type assigned to the requested general purpose output

[xx] [0 = None, 1 = Alarm output, 2 = Stream Control output, 3 = Control valve output, 4 = Additive output, 5 = Internal additive output 6 = RIT output]

c = output function assigned to the requested general purpose output.

Refer [Table 6-37: General Purpose Output Functions](#).

d = Arm /stream number assigned to requested output. [0= Not Applicable, 1 = Arm/stream 1, 2 = Arm/stream 2,

3 = Arm/stream 3, 4 = Arm/stream 4].

The ranges for this parameter are given in Output Function parameter Ranges.

e = general purpose output condition

[0 = normally open, 1 = normally closed]

f = General purpose output status [0 = inactive, 1= active]

6.36.3.2 NAK

- General purpose output does not exist
- No parameter received for output number

6.36.4 Notes

Table 6-37: General Purpose Output Functions

0 = None	1 = Deadman Indicator	2 = Deadman Bell
3 = Deadman Callout	4 = System Alarm	5 = Instrument Alarm
6 = Bay Active	7 = ESD	8 = Pump Demand
9 = Isolation Valve	10 = DCV Inlet	11 = DCV Outlet
12 = Additive Pulse Prod	13 = Int. Additive Pulse 1	14 = Int. Additive Pulse 2
15 = Int. Additive Pulse 3	16 = Int. Additive Pulse 4	17 = Int. Additive Pulse 5
18 = Int. Additive Pulse 6	19 = Additive Pump Demand 1	20 = Additive Pump Demand 2
21 = Additive Pump Demand 3	22 = Additive Pump Demand 4	23 = Additive Pump Demand 5
24 = Additive Pump Demand 6	25 = RIT Red	26 = RIT Amber
27 = RIT Green		

Table 6-38: Output Function parameter Ranges

Output Function	Arm/Stream (Range)
Pump Demand	Stream 1 to max available on system
Isolation Valve	Stream 1 to max available on system
DCV inlet	Stream 1 to max available on system
DCV outlet	Stream 1 to max available on system
RIT Red	Arm 1 to max available on system
RIT Amber	Arm 1 to max available on system

Output Function	Arm/Stream (Range)
RIT Green	Arm 1 to max available on system

6.36.5 Related Commands

None.

6.36.6 Constraints

None.

6.37 GT - Gross Totals

6.37.1 Description

Returns the Gross totals for values currently displayed (current or last transaction) on the instrument for each arm irrespective of batch type.

6.37.2 Send — Option 1

6.37.2.1 STX

[GT] 0 [ETX]

6.37.3 Receive — Option 1

6.37.3.1 STX

[GT] 0 [a] 0 [b] ... [g] 0 [ETX]

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = gross total for first arm [xxxxxxxx]

e = gross total for second arm [xxxxxxxx] (only if number of arms > 1)

f = gross total for third arm [xxxxxxxx] (only if number of arms > 2)

g = gross total for fourth arm [xxxxxxxx] (only if number of arms > 3)

6.37.4 Send — Option 2

6.37.4.1 STX

[GT] 0 [An] 0 [ETX]

Where n is the arm number (range is 1 to 4)

6.37.5 Receive — Option 2

6.37.5.1 STX

[GT] 0 [An] 0 [a] 0 [ETX]

Where

a = gross total for the arm An [xxxxxxxx]

6.37.6 Send — Option 3

6.37.6.1 STX

[GT] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.37.7 Receive — Option 3

6.37.7.1 STX

[GT] 0 [Mn] 0 [a] 0 [ETX]

Where

a = gross total for the meter Mn [xxxxxxxx]

6.37.8 Notes — Option 1

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

For Side Stream blending the arm total is equal to the total of the downstream meter or first meter associated with that arm. For Ratio blending the arm total is equal to the addition of both meters associated with the arm.

6.37.9 Notes — Option 2

For Side Stream blending the arm total is equal to the total of the downstream meter or first meter associated with that arm. For Ratio blending the arm total is equal to the addition of both meters associated with the arm.

6.37.10 Related Commands

AN, AT, FR, ID, IP, IT, LP, LT, NT, PR, TB, TF, VC

6.37.11 Constraints

None.

6.38 HT- Hardware Test

6.38.1 Description

Test all hardware of 1010CB.

6.38.2 Send

6.38.2.1 STX

[HT] 0 [a] 0 [ETX]

Where 'a'

1. – General purpose inputs status
2. – General purpose output status
3. – 4-20mA current/RTD readings
4. – Flow pulse counts
5. – General purpose activate/de-activate
6. – Analog output
7. – Disable Hardware Test

6.38.3 Send — Option 1 (GP Inputs Status)

6.38.3.1 STX

[HT] 0 [1] 0 [ETX]

6.38.4 Receive — Option 1 (GP Inputs Status)

6.38.4.1 STX

[HT] 0 [a] 0 [b] 0 [c] 0 [d] 0 [ETX]

Where:

a = General purpose input status byte for inputs CA20 to CA28

b = General purpose input status byte for inputs CB20 to CB28

c = General purpose input status byte for inputs DA13 to DA18

d = General purpose input status byte for inputs DB13 to DB18

Table 6-39: Digital Input Status Bytes

Parameter	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
[a] Status Byte 1	CA28	CA27	CA26	CA25	CA24	CA23	CA22	CA21
[b] Status Byte 2	CB28	CB27	CB26	CB25	CB24	CB23	CB22	CB21
[c] Status Byte 3	DB14	DB13	DB18	DA17	DA16	DA15	DA14	DA13
[d] Status Byte 4	x	x	x	x	DB18	DB17	DB16	DB15

6.38.5 Send — Option 2 (GP Output Status)

6.38.5.1 STX

[HT] 0 [3] 0 [ETX]

6.38.6 Receive — Option 2 (GP Output Status)

6.38.6.1 STX

General purpose output status

- 0 = inactive

- 1 = active

[HT] 0 [a] 0 [b] 0 [c] 0 [d] 0 [e] 0 [ETX]

Where:

a = General purpose output status byte for outputs A9 to A16

b = General purpose output status byte for outputs BA1 to BA12

c = General purpose output status byte for outputs BA13 to BA18

d = General purpose output status byte for output BB1 to BB12

e = General purpose output status byte for output BB13 to BB18

Table 6-40: Digital Input Status Bytes

Parameter	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
[a] Status Byte 1	x	x	A16	A15	A14	A13	A11	A9
[b] Status Byte 2	BA12	BA10	BA9	BA7	BA6	BA4	BA3	BA1
[c] Status Byte 3	x	x	x	x	BA18	BA16	BA15	BA13
[d] Status Byte 4	BB12	BB10	BB9	BB7	BB6	BB4	BB3	BB1
[e] Status Byte 5	x	x	x	x	BB18	BB16	BB15	BB13

6.38.7 Send — Option 3 (4-20mA Current)

6.38.7.1 STX

[HT] 0 [5] 0 [ETX]

6.38.8 Receive — Option 3 (4-20mA Current)

6.38.8.1 STX

[HT] 0 [a] 0 [b] 0 0 [k] 0 [l] 0 [ETX]

Where:

a = 4-20mA 1 [xxx.xxx] or RTD 1 [xxx.xxx]

b = 4-20mA 2 [xxx.xxx] or RTD 2 [xxx.xxx]

c = 4-20mA 3 [xxx.xxx] or RTD 3 [xxx.xxx]

d = 4-20mA 4 [xxx.xxx] or RTD 4 [xxx.xxx]

e = 4-20mA 5 [xxx.xxx]

f = 4-20mA 6 [xxx.xxx]

g = 4-20mA 7 [xxx.xxx]

h = 4-20mA 8 [xxx.xxx]

i = 4-20mA 9 [xxx.xxx]

j = 4-20mA 10 [xxx.xxx]

k = 4-20mA 11 [xxx.xxx]

l = 4-20mA 12 [xxx.xxx]

6.38.9 Send— Option 4 (Pulse counts)

6.38.9.1 STX

[HT] 0 [6] 0 [ETX]

6.38.10 Receive — Option 4 (Pulse counts)

6.38.10.1 STX

[HT] 0 [a] 0 [b] 0.....0 [m] 0 [n] 0 [ETX]

Where:

a = Flow Input Meter 1A [xxxx]

b = Flow Input Meter 2A [xxxx]

c = Flow Input Meter 3A [xxxx]

d = Flow Input Meter 4A [xxxx]

e = Flow Input Meter 5A [xxxx]

f = Flow Input Meter 6A [xxxx]

g = Flow Input Meter 7A [xxxx]

h = Flow Input Meter 1B [xxxx]

i = Flow Input Meter 2B [xxxx]

j = Flow Input Meter 3B [xxxx]

k = Flow Input Meter 4B [xxxx]

l = Flow Input Meter 5B [xxxx]

m = Flow Input Meter 6B [xxxx]

n = Flow Input Meter 7B [xxxx]

6.38.11 Send — Option 6 (General purpose activate/de-activate)

6.38.11.1 STX

[HT] 0 [5] 0 [a] 0 [ETX]

Where 'a':

- 0 = inactive
- 1 = active

6.38.12 Receive — Option 6

ACK

6.38.13 Send — Option 6 (Analog output)

6.38.13.1 STX

[HT] 0 [6] 0 [a] 0 [ETX]

Where 'a' – Analog level [0 to 4085]

6.38.14 Receive — Option 6

6.38.14.1 ACK

6.38.15 Send — Option 7 (Hardware Test Disable)

6.38.15.1 STX

[HT] 0 [ETX]

6.38.16 Receive — Option 7

6.38.16.1 ACK

6.38.17 Related Commands

IT, IP, ID, IV, IS

6.38.18 Constraints

Instrument must be in the idle state

6.39 IA - Injector Accumulative Totals

6.39.1 Description

Returns the accumulative total for the requested internal or external additive injector.

6.39.2 Send - Option 1

6.39.2.1 STX

[IA] 0 [a] 0 [ETX]

Where

a = additive injector number [x] (range 1 to 24, 1 to 18 are used for external additive, 19 to 24 are used for internal additives)

6.39.3 Receive - Option 1

6.39.3.1 STX

[IA] 0 [a] 0 [b] 0 [ETX]

Where

a = additive injector number [x]

b = additive total [xxxxxx.xxx] (litres/gallons)

6.39.3.2 NAK

- If injector number is <18 and Intelligent Additives are not enabled
- Requested additive injector is not available
- Number of parameters is <1 or >2

6.39.3.3 BS

- Instrument must be in the idle state

6.39.4 Send - Option 2

6.39.4.1 STX

[IA] 0 [AA] 0 [a] 0 [ETX]

Where

a = arm number [x] (range 1 to 4)

6.39.5 Receive - Option 2

6.39.5.1 STX

[IA] 0 [AA] 0 [a] 0 [b] 0 [c] 0 [d] 0 [e] 0 [f] 0 [g] 0 [ETX]

Where

b = arm number [x] (range 1 to 4)

c = Injector point 1 additive accumulated total [xxxxxx.xxx] (ml/cc) (only if number of injectors on the arm > 0)

d = Injector point 2 additive accumulated total [xxxxxx.xxx] (ml/cc) (only if number of injectors on the arm > 1)

e = Injector point 3 additive accumulated total [xxxxxx.xxx] (ml/cc) (only if number of injectors on the arm > 2)

f = Injector point 4 additive accumulated total [xxxxxx.xxx] (ml/cc) (only if number of injectors on the arm > 3)

g = Injector point 5 additive accumulated total [xxxxxx.xxx] (ml/cc) (only if number of injectors on the arm > 4)

h = Injector point 6 additive accumulated total [xxxxxx.xxx] (ml/cc) (only if number of injectors on the arm > 5)

6.39.5.2 NAK

- Intelligent Additives are not enabled
- Requested additive injector is not available

6.39.6 Related Commands

None.

6.39.7 Constraints

Instrument must be in the idle state.

6.40 ID - Instantaneous Density

6.40.1 Description

Retrieves the instantaneous density on all meters from the instrument.

6.40.2 Send — Option 1

6.40.2.1 STX

[ID] 0 [ETX]

6.40.3 Receive — Option 1

6.40.3.1 STX

[ID] 0 [a] 0 ... [g] 0 [ETX]

Where

a = first meter number [x]

b = number of meters [x]

c = bay number [xxx]

d = density of first meter [xxx.x]

e = density of second meter [xxxxxx.x] (only if number of meters > 1)

f = density of third meter [xxxxxx.x] (only if number of meters > 2)

g = density of fourth meter [xxxxxx.x] (only if number of meters > 3)

6.40.4 Send — Option 2

6.40.4.1 STX

[ID] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.40.5 Receive — Option 2

6.40.5.1 STX

[ID] 0 [Mn] 0 [a] 0 [ETX]

Where

a = density for the meter Mn [xxxxxxxxx]

6.40.6 Notes — Option 1

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

6.40.7 Related Commands

AN, AT, FR, GT, IP, IT, LP, LT, NT, PR, TB, TF, VC

6.40.8 Constraints

None.

6.41 IN – Authorisation Index

6.41.1 Description

To get authorisation number for corresponding index..

6.41.2 Send

Control Byte: STX

Information fields: [IN] 0 [a] 0 [b] 0 [ETX]

Where

a = [DR]/[PE] for driver/personnel or [TR]/[VE] for truck/vehicle or [MA] for master

b = index number

6.41.3 Receive

Control Byte: STX

Information fields: [IN] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = [DR]/[PE] for driver/personnel or [TR]/[VE] for truck/vehicle or [MA] for master

b = index number

c = authentication number (PIN number)

6.42 IP - Instantaneous Pressure

6.42.1 Description

Retrieves the instantaneous pressure on all meters from the instrument.

6.42.2 Send — Option 1

6.42.2.1 STX

[IP] 0 [ETX]

6.42.3 Receive — Option 1

6.42.3.1 STX

[IP] 0 [a] 0 ... [g] 0 [ETX]

Where

a = first meter number [x]

b = number of meters [x]

c = bay number [xxx]

d = pressure of first meter [xxx.x]

e = pressure of second meter [xxxxxx.x] (only if number of meters > 1)

f = pressure of third meter [xxxxxx.x] (only if number of meters > 2)

g = pressure of fourth meter [xxxxxx.x] (only if number of meters > 3)

6.42.4 Send — Option 2

6.42.4.1 STX

[IP] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.42.5 Receive — Option 2

6.42.5.1 STX

[IP] 0 [Mn] 0 [a] 0 [ETX]

Where

a = pressure for the meter Mn [xxxxxxxxx]

6.42.6 Notes — Option 1

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

6.42.7 Related Commands

AN, AT, FR, GT, ID, IT, LP, LT, NT, PR, TB, TF, VC

6.42.8 Constraints

None.

6.43 IS - General purpose input status

6.43.1 Description

Returns the current status as well as the latched status since last CL command for all inputs of instrument.

6.43.2 Send

6.43.2.1 STX

[IS] 0 [ETX]

6.43.3 Receive

6.43.3.1 STX

[IS] 0 [a] 0 [b] 0 [c] 0 [d] 0 [ETX]

Where:

a = General purpose input latched (active high) status byte for inputs CA20 to CA28

b = General purpose input latched (active low) status byte for inputs CA20 to CA28

c = General purpose input current status byte for inputs CA20 to CA28

d = General purpose input latched (active high) status byte for inputs CB20 to CB28

e = General purpose input latched (active low) status byte for inputs CB20 to CB28

f = General purpose input current status byte for inputs CB20 to CB28

g = General purpose input current status byte for inputs DA13 to DA18

h = General purpose input latched (active high) status byte for input DA13 to DA18

i = General purpose input latched (active low) status byte for input DA13 to DA18

j = General purpose input current status byte for inputs DB13 to DB18

k = General purpose input latched (active high) status byte for inputs DB13 to DB18

l = General purpose input latched (active low) status byte for inputs DB13 to DB18

Table 6-41: Digital Input Status Bytes

Parameter	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
[a] Latched (active high) status Byte 1	CA28	CA27	CA26	CA25	CA24	CA23	CA22	CA21
[b] Latched (active low) status Byte 1	CA28	CA27	CA26	CA25	CA24	CA23	CA22	CA21
[c] Current status Byte 1	CB28	CB27	CB26	CB25	CB24	CB23	CB22	CB21
[d] Latched (active high) status Byte 2	CB28	CB27	CB26	CB25	CB24	CB23	CB22	CB21
[e] Latched (active low) status Byte 2	CB28	CB27	CB26	CB25	CB24	CB23	CB22	CB21
[f] Current status Byte 2	CB28	CB27	CB26	CB25	CB24	CB23	CB22	CB21
[g] Current status byte for inputs DA13 to DA18	NA	NA	DA18	DA17	DA16	DA15	DA14	DA13
[h] Latched (active high) status byte for inputs DA13 to DA18	NA	NA	DA18	DA17	DA16	DA15	DA14	DA13
[i] Latched (active low) status byte for inputs DA13 to DA18	NA	NA	DA18	DA17	DA16	DA15	DA14	DA13
[j] Current status byte for inputs DB13 to DB18	NA	NA	DB18	DB17	DB16	DB15	DB14	DB13
[k] Latched (active high) status byte for inputs DB13 to DB18	NA	NA	DB18	DB17	DB16	DB15	DB14	DB13
[l] Latched (active low) status byte for inputs DB13 to DB18	NA	NA	DB18	DB17	DB16	DB15	DB14	DB13

6.43.4 Notes

The latched status byte holds any contact closures inputs. All contact closures in this status byte are cleared with the CL command.

RIT stop keys are considered to be of normally closed type inputs for safety reasons. However the current or latched status is 1 if the key is active or pressed and 0 if inactive or not pressed.

On enabling or disabling of the RIT panel, the latched status of the RIT keys is cleared and the current status will return to active high by default.

6.43.5 Related Commands

CL, SL

6.43.6 Constraints

None

6.44 IT - Instantaneous Temperatures

6.44.1 Description

Retrieves the instantaneous temperatures on all meters from the instrument.

6.44.2 Send — Option 1

6.44.2.1 STX

[IT] 0 [ETX]

6.44.3 Receive — Option 1

6.44.3.1 STX

[IT] 0 [a] 0 ... [g] 0 [ETX]

Where

a = first meter number [x]

b = number of meters [x]

c = bay number [xxx]

d = temperature of first meter [xxx.x]

e = temperature for second meter [xxx.x] (only if number of meters > 1)

f = temperature for third meter [xxx.x] (only if number of meters > 2)

g = temperature for fourth meter [xxx.x] (only if number of meters > 3)

6.44.4 Send — Option 2

6.44.4.1 STX

[IT] 0 [mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.44.5 Receive — Option 2

6.44.5.1 STX

[IT] 0 [Mn] 0 [a] 0 [ETX]

Where

a = Temperature for the meter Mn [xxxxxxxxx]

6.44.6 Notes — Option 1

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

6.44.7 Related Commands

AN, AT, FR, GT, ID, IP, LP, LT, NT, PR, TB, TF, VC

6.44.8 Constraints

None.

6.45 IV - Instantaneous Values

6.45.1 Description

This command requests the instantaneous values from the arm.

6.45.2 Send

6.45.2.1 STX

[IV] 0 [a] 0 [ETX]

Where

a = arm number [x]

6.45.3 Receive (For Other Than Sales Code K)

6.45.3.1 STX

[IV] 0 [a] 0 [b] 0 [c] 0 ... 0 [z] 0 [ETX]

Where

a = arm number [x]

b = gross total [xxxxxxxx]

c = net total [xxxxxxxx]

d = accumulated total [xxxxxxxx]

e = net accumulated total [xxxxxxxx]

f = flow rate [xxxxxxxx]

g = meter 1 gross total [xxxxxxxx] (base meter)

h = meter 1 net total [xxxxxxxx] (base meter)

i = meter 1 accumulated total [xxxxxxxx] (base meter)

j = meter 1 net accumulated total [xxxxxxxx] (base meter)

k = meter 1 flow rate [xxxxxxxx] (base meter)
l = meter 1 temperature [xxx.x] (base meter)
m = meter 1 pressure [xxxx.x] (base meter)
n = meter 1 density [xxxx.x] (base meter)
o = meter 2 gross total [xxxxxxxx] or [0] if no blend meter
p = meter 2 net total [xxxxxxxx] or [0] if no blend meter
q = meter 2 accumulated total [xxxxxxxx] or [0] if no blend meter
r = meter 2 net accumulated total [xxxxxxxx] or [0] if no blend meter
s = meter 2 flow rate [xxxxxxxx] or [0] if no blend meter
t = meter 2 temperature [xxx.x] or [0] if no blend meter
u = meter 2 pressure [xxxx.x] or [0] if no blend meter
v = meter 2 density [xxxx.x] or [0] if no blend meter
w = additive line 1 gross total [xxxx.xxx] (ml)
x = additive line 1 accumulative total [xxxx.xxx] (ml)
y = additive line 2 gross total [xxxx.xxx] (ml)
z = additive line 2 accumulative total [xxxx.xxx] (ml)
aa = additive line 3 gross total [xxxx.xxx] (ml)
ab = additive line 3 accumulative total [xxxx.xxx] (ml)
ac = additive line 4 gross total [xxxx.xxx] (ml)
ad = additive line 4 accumulative total [xxxx.xxx] (ml)

6.45.3.2 NAK

- Incorrect number of parameters
- Requested arm number does not exist

6.45.4 Receive (For Sales Code K)

6.45.4.1 STX

[IV] 0 [a] 0 [b] 0 [c] 0 ... 0 [v] 0 [ETX]

Where

a = arm number [x]

b = gross total [xxxxxxxx]

c = net total (loaded) [xxxxxxxx]

d = accumulated total [xxxxxxxx]

e = net accumulated total [xxxxxxxx]

f = flow rate [xxxxxxxx]

g = meter 1 gross total [xxxxxxxx] (liquid meter)

h = meter 1 accumulated total [xxxxxxxx] (liquid meter)

i = meter 1 flow rate [xxxxxxxx] (liquid meter)

j = meter 1 temperature [xxx.x] (liquid meter)

k = meter 1 pressure [xxxx.x] (liquid meter)

l = meter 1 density [xxxx.x] (liquid meter)

m = meter 2 gross total [xxxxxxxx] (vapor meter)

n = meter 2 accumulated total [xxxxxxxx] (vapor meter)

o = meter 2 flow rate [xxxxxxxx] (vapor meter)

p = meter 2 temperature [xxx.x] (vapor meter)

q = meter 2 pressure [xxxx.x] (vapor meter)

r = meter 2 density [xxxx.x] (vapor meter)

s = meter 3 temperature [xxx.x] (loading arm meter)

t = meter 3 pressure [xxxx.x] (loading arm meter)

u = meter 3 density [xxxx.x] (loading arm meter)

v = Weighbridge tare weight [xxxxxxx]

w = Weighbridge gross weight [xxxxxxx]

x = Weighbridge net weight [xxxxxxx])

6.45.5 Notes

None

6.45.6 Related Commands

AN, AT, FR, GT, ID, IP, LP, LT, NT, PR, TB, TF, VC

6.45.6.1 Constraints

None.

6.46 LA - Loading Arm Information

6.46.1 Description

This command is used to send the loading arm information from the computer to the instrument.

This command can be issued when 1010 is in the LA state.

6.46.2 Send

6.46.2.1 STX

[LA] 0 [a] 0 [b] 0 [ETX]

Where

a = Arm number [x]

b = Compartment number for compartment [xx] (Range 1 to 99)

6.46.3 Receive

6.46.3.1 ACK

Command processed without error or

6.46.3.2 NAK

- Requested arm number does not exist
- Compartment number is not in the range 1 to 20
- The instrument is not in the LA state
- Ask compartment number prompt is disabled and compartment number is zero.

6.46.4 Notes

If the compartment number prompt is enabled, the compartment number sent by this command is overwritten by the user.

6.46.5 Related Commands

None

6.46.6 Constraints

None

6.47 LD - Last Load Density

6.47.1 Description

Retrieves the last load (weighted average) densities for all meters from the instrument.

6.47.2 Send — Option 1

6.47.2.1 STX

[LD] 0 [ETX]

6.47.3 Receive — Option 1

6.47.3.1 STX

[LD] 0 [a] 0 ... [g] 0 [ETX]

Where

a = first meter number [x]

b = number of meters [x]

c = bay number [xxx]

d = last load density of first meter [xxxx.x]

e = last load density of second meter [xxxx.x] (only if number of meters > 1)

f = last load density of third meter [xxxx.x] (only if number of meters > 2)

g = last load density of fourth metre [xxxx.x] (only if number of meters > 3)

6.47.4 Send — Option 2

6.47.4.1 STX

[LD] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.47.5 Receive — Option 2

6.47.5.1 STX

[LD] 0 [Mn] 0 [a] 0 [ETX]

Where

a = last load density for the meter Mn [xxxxxxxxxx]

6.47.6 Notes

Parameter [b] indicates how many parameters follow.

For example, if [b] = 2 then only parameters [a] through [e] are received.

6.47.7 Related Commands

AN, AT, FR, GT, ID, IP, IT, LP, LT, NT, PR, TB, TF, VC

6.47.8 Constraints

None.

6.48 LE - Loading Effect

6.48.1 Description

Return loading effects of all process alarms.

6.48.2 Send

6.48.2.1 STX

[LE] 0 [ETX]

6.48.3 Receive

6.48.3.1 STX

Refer [Section A.1.14: Loading Alarm Effect](#)

[LE] 0 [a] 0 ... [v] 0 [ETX]

Where

a = [SYSTEM>Alarm Loading Effect>Dual Error]

b = [SYSTEM>Alarm Loading Effect>No Flow Timeout]

c = [SYSTEM>Alarm Loading Effect>Temperature Error]
d = [SYSTEM>Alarm Loading Effect>Leaking Additive]
e = [SYSTEM>Alarm Loading Effect>Additive Volume Error]
f = [SYSTEM>Alarm Loading Effect>Additive No Activity]
g = [SYSTEM>Alarm Loading Effect>No Additive Flow]
h = [SYSTEM>Alarm Loading Effect>Stopped Remotely]
i = [SYSTEM>Alarm Loading Effect>Phase Error Meter]
j = [SYSTEM>Alarm Loading Effect>Pressure Error ARM]
k = [SYSTEM>Alarm Loading Effect>Additive Firmware Failure]
l = [SYSTEM>Alarm Loading Effect>Additive Eprom Failure]
m = [SYSTEM>Alarm Loading Effect>Additive Comms Failure]
n = [SYSTEM>Alarm Loading Effect>No Additive Response]
o = [SYSTEM>Alarm Loading Effect>Slow Flow Error]
p = [SYSTEM>Alarm Loading Effect>High Flow High]
q = [SYSTEM>Alarm Loading Effect>High flow Low]
r = [SYSTEM>Alarm Loading Effect>Low Flow High]
s = [SYSTEM>Alarm Loading Effect>Low Flow Low]
t = [SYSTEM>Alarm Loading Effect>Overflow Error]
u = [SYSTEM>Alarm Loading Effect>TAS Communication Failure]
v = [SYSTEM>Alarm Loading Effect>Density Error]
w = [SYSTEM>Alarm Loading Effect>Blend Tolerance]

6.48.4 Notes

None

6.48.5 Related Commands

None

6.48.6 Constraints

None

6.49 LP - Last Load Pressure

6.49.1 Description

Retrieves the last load (weighted average) pressures for all meters from the instrument.

6.49.2 Send — Option 1

6.49.2.1 STX

[LP] 0 [ETX]

6.49.3 Receive — Option 1

6.49.3.1 STX

[LP] 0 [a] 0 ... [g] 0 [ETX]

Where

a = first meter number [x]

b = number of meters [x]

c = bay number [xxx]

d = last load pressure of first meter [xxxx.x]

e = last load pressure of second meter [xxxx.x] (only if number of meters > 1)

f = last load pressure of third meter [xxxx.x] (only if number of meters > 2)

g = last load pressure of fourth metre [xxxx.x] (only if number of meters > 3)

6.49.4 Send — Option 2

6.49.4.0.1 STX

[LP] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.49.5 Receive — Option 2

6.49.5.1 STX

[LP] 0 [Mn] 0 [a] 0 [ETX]

Where

a = last load pressure for the meter Mn [xxxxxxxxx]

6.49.6 Notes

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

6.49.7 Related Commands

AN, AT, FR, GT, ID, IP, IT, LD, LT, NT, PR, TB, TF, VC

6.49.8 Constraints

None.

6.50 LT - Last Load Temperature

6.50.1 Description

Retrieves the last load (weighted average) temperatures for all meters from the instrument.

6.50.2 Send — Option 1

6.50.2.1 STX

[LT] 0 [ETX]

6.50.3 Receive — Option 1

6.50.3.1 STX

[LT] 0 [a] 0 [b] ... [g] 0 [ETX]

Where

a = first meter number [x]

b = number of meters [x]

c = bay number [xxx]

d = last load temperature for first meter [xxxxxxxx]

e = last load temperature for second meter [xxxxxxxx] (only if number of meters > 1)

f = last load temperature for third meter [xxxxxxxx] (only if number of meters > 2)

g = last load temperature for fourth meter [xxxxxxxx] (only if number of meters > 3)

6.50.4 Send — Option 2

6.50.4.1 STX

[LT] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.50.5 Receive — Option 2

6.50.5.1 STX

[LT] 0 [Mn] 0 [a] 0 [ETX]

Where

a = last load temperature for the meter Mn [xxxxxxxxx]

6.50.6 Notes

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

6.50.7 Related Commands

AN, AT, FR, GT, ID, IP, IT, LD, LP, NT, PR, TB, TF, VC

6.50.8 Constraints

None.

6.51 LV - Library Version

6.51.1 Description

Retrieves the Weights and Measures library and the library version numbers, dates and times from the instrument.

6.51.2 Send

6.51.2.1 STX

[LV] 0 [ETX]

6.51.3 Receive

6.51.3.1 STX

[LV] 0 [a] 0 ... [f] 0 [ETX]

Where

a = weights and measures library version [xx]

b = weights and measures date [mmm dd yyyy]

c = weights and measures time [hh:mm:ss]

d = library version [xx]

e = library date [mmm dd yyyy]

f = library time [hh:mm:ss]

6.51.4 Notes

None.

6.51.5 Related Commands

AV, SV

6.51.6 Constraints

None.

6.52 MC – Change Mode

6.52.1 Description

Change Load scheduling mode to Standalone mode and vice versa.

6.52.2 Send

6.52.2.1 STX

[MC] 0 [a] 0 [ETX]

Where:

a = 0 for Load scheduling mode to Standalone mode

b = 1 for Standalone mode to Load scheduling mode.

6.52.3 Receive

Control byte: ACK

The command was processed without error. Control byte: NAK

- If already in same mode.
- Not in idle state.

6.52.3.1 Notes

- Standalone mode can be change to Load scheduling mode when BCU is in Idle state or Authorisation State.
- Load scheduling mode can be change to Standalone mode when BCU is in Idle state or RL state.

6.52.4 Related Commands

AV, SV

6.52.5 Constraints

None.

6.53 MI - Message Initial

6.53.1 Description

Allows a custom initial message to be sent to the instrument.

6.53.2 Send

6.53.2.1 STX

[MI] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = enable/disable overfill/ground permissive [x] (0 = DISABLE, 1= ENABLE)

b = custom initial message top line

c = custom initial message bottom line

6.53.3 Receive

6.53.3.1 ACK

The command was processed without error.

6.53.3.2 NAK

- Number of parameters received is < 1 or >3
- Number of characters in b or c exceed 20

6.53.3.3 BS

- Instrument must be in the idle state

6.53.4 Notes

For example, the following displays a custom initial message with no permissive requirement (ignoring the field separator nulls):

MI 1 0 TOP1 BOTTOM1 ETX

displays: TOP1 BOTTOM1

6.53.5 Related Commands

SO

6.53.6 Constraints

- Instrument is in the idle state.

6.54 MN - Alter Meter Name

6.54.1 Description

The command allows the meter name to be altered.

6.54.2 Send

6.54.2.1 STX

[MN] 0 [a] 0 [b] 0 [ETX]

Where

a = Meter number [x] (Range 1 to 4)

b = Meter name [yyyyyyyy] (String of 8 characters)

'y' can be an alphanumeric character or the ASCII space character

6.54.3 Receive

6.54.3.1 ACK

The command was processed without error.

6.54.3.2 NAK

- Meter number does not exist.
- Meter name is longer than 8 characters

- Number of parameters is not equal to 2

6.54.3.3 BS

- The instrument is not in the idle state

6.54.4 Constraints

- Instrument must be in the idle state.
- An extended wait period of at least three seconds is required for both waiting for an acknowledge (ACK) response, and before another command is sent to the instrument.

6.54.5 Note

The meter name can also be edited from within the METERING LINES configuration menu.

6.55 MR - Manager Reset

6.55.1 Description

Clears various alarms in the instrument. Has the same effect as a manual manager reset performed by entering the manager password into the instrument.

6.55.2 Send

6.55.2.1 STX

[MR] 0 [ETX]

6.55.3 Receive

6.55.3.1 ACK

6.55.4 Notes

This command clears the following:

- Authorisation lockout due to illegal access attempts exceeding the programmed value
- Temperature and Pressure fault alarms on all arms
- Dual pulse fault alarms on all arms
- Phase error alarms on all arms
- Emergency Stop condition
- Error for programmable inputs with loading effect set to Manager Reset

6.55.5 Related Commands

None.

6.55.6 Constraints

None.

6.56 MS - Meter Settings

6.56.1 Description

Retrieves the meter settings on the requested meter.

6.56.2 Send

6.56.2.1 STX

[MS] 0 [a] 0 [ETX]

Where

a = meter number [x] (range 1 to 4)

6.56.3 Receive

[MS] 0 [a] 0 [b] ... [r] 0 [ETX]

Where

a = meter number [x]

b = meter name [xxxxxxxx]

c = calibration number [xxx]

d = calibration date [dd/mm/yyyy]

e = calibration time [hh:mm:ss]

f = linear or non-linear k-factor [L] or [N]

g = number of non-linear k-factors [xx] or [0] if linear k-factor

h1 = first frequency [xxx] for non-linear or k-factor [x.xxxx]

if linear i1 = first k-factor [xxxxx.xxx] for non-linear

h10 = tenth frequency [xxx] for non-linear

i10 = tenth k-factor [xxxxx.xxx] for non-linear

j = minimum linear flow rate [xxxx]

k = single or dual pulse [S] or [D]

l = cut off frequency [xx] for dual pulse or [0] for single pulse

m = flow meter input resistor [x] (0 = Pull Up, 1 = Pull Down)

n = flow meter input filter [x] (0 = Active, 1 = Inactive)

o = overrun quantity [xxx]

p = unauthorised flow threshold [xxx]

q = minimum preset amount [xxxxxxx]

r = meter factor [xx.xxxxx]

s = pre-batch stop quantity [xxx.x] (If RIT loadspot is disabled)

6.56.3.1 NAK

- Requested meter number is invalid.

6.56.3.2 BS

- Instrument must be in the idle state

6.56.4 Notes

None.

6.56.5 Related Commands

AS, CS, OP, SO, VA

6.56.6 Constraints

Instrument must be in the idle state.

6.57 NT - Net Totals

6.57.1 Description

Returns the Net totals for values currently displayed (current or last transaction) on the instrument for each arm or meter irrespective of batch type.

6.57.2 Send — Option 1

6.57.2.1 STX

[NT] 0 [ETX]

6.57.3 Receive — Option 1

6.57.3.1 STX

[NT] 0 [a] ... [g] 0 [ETX]

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = net total of first arm [xxxxxxxx]

e = net total of second arm [xxxxxxxx] (only if number of arms > 1)

f = net total of third arm [xxxxxxxx] (only if number of arms > 2)

g = net total of fourth arm [xxxxxxxx] (only if number of arms > 3)

6.57.4 Send — Option 2

6.57.4.1 STX

[NT] 0 [An] 0 [ETX]

Where n is the arm number (range is 1 to 4)

6.57.5 Receive — Option 2

6.57.5.1 STX

[NT] 0 [An] 0 [a] 0 [ETX]

Where

a = net total for the arm An [xxxxxxxx]

6.57.6 Send — Option 3

6.57.6.1 STX

[NT] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.57.7 Receive — Option 3

6.57.7.1 STX

[NT] 0 [Mn] 0 [a] 0 [ETX]

Where

a = net total for the meter Mn [xxxxxxxxx]

6.57.8 Notes

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

For Side Stream blending the arm net total is equal to the net total of the downstream meter or first meter associated with that arm. For Ratio blending the arm net total is equal to the addition of both meters associated with the arm.

6.57.9 Related Commands

AN, AT, FR, GT, ID, IP, IT, LD, LP, LT, PR, TB, TF, VC

6.57.10 Constraints

None.

6.58 OA –Overrun Authorisation Setting

6.58.1 Description

With this command you can set/change the overrun authorisation setting remotely.

6.58.2 Send — Option 1

6.58.2.1 STX

[AS] 0 [a] 0 [b] 0 [ETX]

Where

a = 0 Disable Overrun authorisation

a = 1 Enable Overrun authorisation

b = 0 Authorisation using remote database

b = 1 Authorisation using local database

6.58.3 Receive — Option 1

6.58.3.1 ACK

The command was processed without error.

6.58.3.2 NAK

- If the number of parameters is incorrect

6.58.4 Related command

AO

6.58.5 Note

Parameter b is ignored in case of local loading.

6.59 OC – Officer Card

6.59.1 Description

Command to set and reset show officer card.

6.59.2 Send

6.59.2.1 STX

[OC] 0 [a] 0 [ETX]

Where:

a = Show officer card [0 or 1]

1 -- Show officer card after batch resume.

0 – Remove show officer card.

6.59.3 Receive

- Show officer card configuration is not enabled

6.59.4 Notes

6.60 OP - Option Settings

6.60.1 Description

Returns the user configuration settings under the LOADING OPTIONS setup information.

6.60.2 Send

6.60.2.1 STX

[OP] 0 [ETX]

6.60.3 Receive

6.60.3.1 STX

[OP] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = configuration byte 1

b = configuration byte 2

c = number of illegal tries [x] (range 3 to 6, 0 = illegal access is disabled)

6.60.3.2 BS

- Instrument must be in the idle state

6.60.4 Notes

Table 6-42: Configuration Byte 1 Descriptions

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Test mode
x	1	x	x	x	x	x	x	64	Demonstration mode
x	x	1	x	x	x	x	x	32	Automated proving
x	x	x	1	x	x	x	x	16	Illegal access
x	x	x	x	1	x	x	x	8	Alarm on fault
x	x	x	x	x	1	x	x	4	Ask compartment number
x	x	x	x	x	x	1	x	2	Ask return quantity
x	x	x	x	x	x	x	1	1	Ask load number

Table 6-43: Configuration Byte 2 Descriptions

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Ask reference number
x	1	x	x	x	x	x	x	64	Simultaneous arm loading
x	x	1	x	x	x	x	x	32	Multiple loads per arm
x	x	x	1	x	x	x	x	16	Ask preset quantity
x	x	x	x	1	x	x	x	8	Maximum preset quantity
x	x	x	x	x	1	x	x	4	Spare
x	x	x	x	x	x	1	x	2	Spare
x	x	x	x	x	x	x	1	1	Spare

6.60.5 Related Commands

AS, CS, MS, SO

6.60.6 Constraints

Instrument must be in the idle state.

6.61 PB – Push Buttons

6.61.1 Description

This command is decide whether to press push button or skip the push button stage.

6.61.2 Send

6.61.2.1 STX

[PB] 0 [a] 0 [ETX]

Where:

0. – Push button skipped
1. – Push button to be pressed.

6.61.3 Receive

6.61.3.1 STX

[PR] 0 ETX

6.61.4 Notes

If ACK is in reply means the command succeed if NAC then Failed.

6.61.4.1 Related Commands

None

6.61.5 Constraints

Only Available in PB mode.

6.62 PR - Preset

6.62.1 Description

Returns the minimum preset for each arm or the preset entered if loading in progress or last entered preset if instrument is idle.

6.62.2 Send — Option 1

6.62.2.1 STX

[PR] 0 [ETX]

6.62.3 Receive — Option 1

6.62.3.1 STX

[PR] 0 [a] ... [g] 0 ETX

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = preset of first arm [xxxxx]

e = preset of second arm [xxxxx] (only if number of arms > 1)

f = preset of third arm [xxxxx] (only if number of arms > 2)

g = preset of fourth arm [xxxxx] (only if number of arms > 3)

6.62.4 Send — Option 2

6.62.4.1 STX

[PR] 0 [An] 0 [ETX]

Where n is the arm number (range is 1 to 4)

6.62.5 Receive — Option 2

6.62.5.1 STX

[PR] 0 [An] 0 [a] 0 [ETX]

Where

a = preset for the arm An [xxxxxxxxx]

6.62.6 Send — Option 3

6.62.6.1 STX

[PR] 0 [Mn] 0 [ETX]

Where n is the meter number (range is 1 to 4)

6.62.6.2 Receive — Option 3

6.62.7 STX

[PR] 0 [Mn] 0 [a] 0 [ETX]

Where

a = preset for the meter Mn [xxxxxxxx]

6.62.8 Notes

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [e] are received.

For Side Stream blending the arm preset is equal to the preset of the downstream meter or first meter associated with that arm. For Ratio blending the arm preset is equal to the addition of both meters associated with the arm.

6.62.9 Related Commands

AN, AT, FR, GT, ID, IP, IT, LD, LP, LT, NT, TB, TF, VC

6.62.10 Constraints

None.

6.63 PS - Product Stream Settings

6.63.1 Description

Retrieves the product stream settings on the requested stream.

6.63.2 Send

Control byte: STX

Information fields: [PS] 0 [a] 0 [ETX]

Where

a = stream number [x] (Range 1 to 4)

6.63.3 Receive

6.63.3.1 STX

[PS] 0 [a] ... [l] 0 [ETX]

Where

a = stream number [x] (range 1 to 4)

b = no flow timeout [xxx]

c = valve type [x] (0 = Digital, 1 = ON/OFF or 2-stage)

d = deadband [xxx] (only applicable if valve type = digital)

e = valve slow flow [xxx] (only applicable if valve type = digital)

f = prestop quantity [xxx]

g = valve low flow [xxx] (only applicable if valve type = digital)

h = valve response [x.x] (only applicable if valve type = digital)

i = Auto high flow [x] (0 = DISABLED, 1 = ENABLED) (only applicable if valve type = digital)

j = high flow timeout [xxx] (only applicable if valve type = digital)

k = valve full flow [xxxx] (only applicable if valve type = digital)

l = pump off delay [xxx]

6.63.4 Notes

For valve type = On/Off or 2-stage only parameters a, b, c, and k are applicable - all others will return 0.

6.63.5 Related Commands

AS, CS, OP, MS, SO, VA

6.63.6 Constraints

Instrument must be in the idle state.

6.64 RA - Remote Authorisation

6.64.1 Description

Remotely authorises the presented touch key, NexWatch card or PIN when the instrument status is RA. If the personnel/vehicle is not authorised, a message is displayed with a reason. The message can be up to 30.

6.64.2 Send

6.64.2.1 STX

[RA] 0 [Y] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = personnel index number to be stored in transaction [xxx] or [0] if not required.

b = vehicle index number to be stored in transaction [xxx] or [0] if not required.

c = master index number to be stored in transaction [xxx] or [0] if not required.

or

[RA] 0 [N] 0 [a] 0 [ETX]

Where

a = text message of up to 30 characters or an asterisk [*] to not display any message.

6.64.3 Receive

6.64.3.1 ACK

The command was processed without error.

6.64.3.2 NAK

- Command is incorrect
- Number of parameters is < 1
- Instrument not in the RA state

6.64.4 Notes

None.

6.64.5 Related Commands

RC, RL

6.64.6 Constraints

The instrument must be in RA state.

6.65 RC - Compartment Response

6.65.1 Description

In a load schedule application, once the ENQ command has determined that the instrument is waiting for compartment loading information, the RC command is used to send that information.

6.65.2 Send

6.65.2.1 STX

[RC] 0 [Y] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = preset quantity [xxxxx]

b = maximum preset [xxxxxxx]

c = skip preset prompt [S] - (optional parameter - not required) or [RC] 0 [N] 0 [a] 0 [b] 0 [ETX]

Where

a = a text message of up to 30 characters, or an asterisk [*] to display nothing

b =

[0] = allow operator to try gain [1] = force load completion

[2] = skip "load another compartment" prompt

6.65.3 Receive

6.65.3.1 ACK

The command was processed without error.

6.65.3.2 NAK

- Number of parameters for the [RC] 0 [Y] command is not equal to 2.
- Instrument is not in RC state.

6.65.4 Note

Parameter c of the RC Y response allows the TAS to force the instrument to skip the preset prompt. This prevents the operator from editing the preset that is sent from the TAS. If the parameter is not required it can simply be ignored and only parameter a and b need to be transmitted.

6.65.5 Related Commands

RA, RL

6.65.6 Constraints

Instrument must be in the RC state.

6.66 RD - Resets Date and Time

6.66.1 Description

Sets the instrument's date and time.

6.66.2 Send

6.66.2.1 STX

[RD] 0 [a] 0 [b] 0 [ETX]

Where

a = date [ddmmyyyy]

b = time [hhmmss]

6.66.3 Receive

6.66.3.1 ACK

The command was processed without error.

6.66.3.2 NAK

- The length of the parameters [a] and [b] are incorrect.
- Invalid date and/or time is sent.

6.66.3.3 BS

- Instrument must be in the idle state

6.66.4 Notes

None.

6.66.5 Example

The following sets 10:10:00am Nov 22nd 2007 (ignoring the null characters):

RD 22112007 101000

6.66.6 Related Commands

GD

6.66.7 Constraints

Instrument must be in the idle state.

This command requires at least 3 extra seconds for both waiting for an acknowledge (ACK) response and before any other command is sent to the instrument.

6.66.8 RF – Read Flow

6.66.9 Description

Read configuration setting for metering lines and loading arms

6.66.10 Send

6.66.10.1 STX

[RF] 0 [a] 0 [ETX]

Where

a = Meter Number

6.66.11 Receive

Information fields: [RF] 0 [a] 0 [b] 0 [k] 0 [ETX]

Same order as in SET FLOW Control byte: NAK

Command was process with error

6.66.12 Notes

None.

6.67 RO – Real All Outputs

6.67.1 Description

Returns the current status of all general purpose outputs of the instrument.

6.67.2 Send

6.67.2.1 STX

[RO] 0 [ETX]

6.67.3 Receive

6.67.3.1 STX

[RO] 0 [a] 0 [b] 0 [c] 0 [ETX]

Where

a = General purpose output status byte for outputs A9 to A16.

b = General purpose output status byte for outputs BA1 to BA12.

c = General purpose output status byte for outputs BA13 to BB6.

d = General purpose output status byte for outputs BB7 to BB18.

Parameter	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
[a] Current Status Byte 1	CA16	CA15	CA14	CA13	CA11	CA9	X	X
[b] Current Status Byte 2	BA12	BA10	BA9	BA7	BA6	BA4	BA3	BA1
[c] Current Status Byte 2	BB6	BB4	BB3	BB1	BA17	BA16	BA14	BA13
[d] Current Status Byte 3	BB18	BB16	BB15	BB13	BB12	BB10	BB9	BB7

6.67.4 Notes

6.67.5 Related Commands

RA, RC

6.67.6 Constraints

None

6.68 RS - Re-circulation (cooling) State

6.68.1 Description

In case of LNG loading, use this command to enable/disable cooling state.

6.68.2 Send

6.68.2.1 STX

[RS] 0 [a] 0 [ETX]

Where

a = cooling state [x] (0 = Enable, 1 = Disable)

6.68.3 Receive

6.68.3.1 ACK

The command was processed without error.

6.68.3.2 NAK

The numbers of parameters is not correct

6.68.4 Notes

None

6.69 RT - Reset Alarms

6.69.1 Description

Resets the specified alarm if registered with the instrument.

6.69.2 Send — Option 1

6.69.2.1 STX

[RT] 0 [xx] 0 [a] 0 [ETX]

Where

xx is one of the following:

An = Arm Alarms (range A1 to A4)

Mn = Meter Alarms (range M1 to M4)

SS = System Alarms a = alarm code

For xx = An, Refer [Table 6-8: Arm Alarms - a](#) for alarm codes. For xx = Mn Refer [Table 6-11: Meter Alarm - a](#) for alarm codes.

For xx = SS Refer [Table 6-14: System Alarms — Parameter a](#) to [Table 6-18: System Alarms — Parameter e](#) for alarm codes.

6.69.3 Receive — Option 1

6.69.3.1 ACK

The command was processed without error.

6.69.3.2 NAK

- If the specified alarm does not exist
- If the number of parameters is not correct

6.69.4 Send — Option 2

6.69.4.1 STX

[RT] 0 [xx] 0 [a] 0 [b] 0 [ETX]

Where

xx is one of the following:

RS = Recipe Alarms

IP = Internal/External Additive Alarms

a = Recipe (range 1 to 16)

Additive number (range 1 to 8 - 1 to 4 are assigned to external additives; 5 to 8 to internal additives)

b = alarm code

For xx = RS, Refer [Table 6-20: Recipe Alarms](#) for alarm codes For xx = IP, Refer [Table 6-22: Additive Alarm — parameter b](#) for alarm codes

6.69.5 Receive — Option 2

6.69.5.1 ACK

The command was processed without error.

6.69.5.2 NAK

- If the recipe number does not exist
- If the injection point does not exist
- If the number of parameters is not correct

6.69.6 Send — Option 3

6.69.6.1 STX

[RT] 0 [xx] 0 [ETX]

Where xx is one of the following:

CA = Clear all Arm Alarms

CM = Clear all Meter Alarms

CS = Clear all System Alarms

CR = Clear all Recipe Alarms

CI = Clear all Internal/External Additive Alarms

CL = Clear all ALARMS

6.69.7 Receive — Option 3

6.69.7.1 ACK

The command was processed without error.

6.69.7.2 NAK

- If the specified parameter is not correct
- If the number of parameters is not correct

6.69.8 Notes

Alarms must either be enabled or the feature must be in use for some alarms to register.

6.69.9 Related Commands

AL

6.69.10 Constraints

None

6.70 SA - Show Access Card

6.70.1 Description

Clear or request to read access nexwatch card.

6.70.2 Send

6.70.2.1 STX

[SA] 0 [a] 0 [ETX]

Where

a = Command to clear or read nexwatch card [x]

0 = Clear nexwatch card

1 = Request to read nexwatch card.

6.70.3 Receive

6.70.3.1 ACK

The command was processed without error.

6.70.3.2 NAK

Nexwatch card not enabled.

6.70.4 Notes

None.

6.70.5 Related Commands

None.

6.70.6 Constraints

None.

6.71 SC – Set Compartment

6.71.1 Description

Command to send maximum 8 compartment information for loading.

6.71.2 Send

6.71.2.1 STX

[SC] 0 [a] 0 [b][z] 0 [aa] 0 [ab][ag] 0 [ETX]

Where:

a = Truck Number [xx]

b = Arm Number [x]

c = Recipe [x]

d = Compartment Number [xx]

e = Preset quantity [xxxxxx]

Optional for Compartment 2

f = Arm Number [x]

g = Recipe [x]

h = Compartment Number [xx]

i = Preset quantity [xxxxxx]

Optional for Compartment 3

j = Arm Number [x]

k = Recipe [x]

l = Compartment Number [xx]

m = Preset quantity [xxxxxx]

Optional for Compartment 4

n = Arm Number [x]

o = Recipe [x]

p = Compartment Number [xx]

q= Preset quantity [xxxxxx]

Optional for Compartment 5

r = Arm Number [x]

s = Recipe [x]

t = Compartment Number [xx]

u = Preset quantity [xxxxxx]

Optional for Compartment 6

v = Arm Number [x]

w = Recipe [x]

x = Compartment Number [xx]

y = Preset quantity [xxxxxx]

Optional for Compartment 7

z = Arm Number [x]

aa = Recipe [x]

ab = Compartment Number [xx]

ac = Preset quantity [xxxxxx]

Optional for Compartment 8

ad = Arm Number [x]

ae = Recipe [x]

af = Compartment Number [xx]

ag = Preset quantity [xxxxxx]

ah = Top/bottom loading status [x] 0 = top, 1 = bottom (mandatory)

6.71.3 Receive

Control byte: ACK

The command was processed without error.

Control byte: NAK

- The instrument is not in RL state.
- No blending or additive injectors associated with the associated arm number.
- The recipe is not associated with the current arm number.
- The recipe is disabled.
- Recipe number does not exist

6.71.4 Notes

For straight loading, if no internal additive required (internal additive disabled) then Recipe number can be any value between 1 to 16. In this case 1010 will not check and use the recipe number.

6.72 SF – Set Flow

6.72.1 Description

Configuration setting for metering lines and loading arms.

6.72.2 Send

6.72.2.1 STX

[SF] 0 [a] 0 [b] 0 [k] 0 [ETX]

Where

a = Meter number [x]

b = K Factor (0 = Linear, 1 = Non-linear)

c = K Factor 1 Range[xxxxx.x]

d = Freq 2[xxxx]

e = K Factor 2[xxxxx.x]

f = Freq 3[xxxx]

g = K factor 3[xxxxx.x]

h = Freq 4[xxxx]

i = K Factor 4[xxxxx.x]

j = Freq 5[xxxx]

k = K Factor 5[xxxxx.x]

6.72.3 Receive

Control byte: ACK

The command was processed without error.

Control byte: NAK

Command was process with error

6.72.4 Notes

None.

6.72.5 Related Commands

None.

6.72.6 Constraints

The requested arm must be loading.

6.73 SL - Set RIT Lamps

6.73.1 Description

Sets the condition of the RIT lamps.

6.73.2 Send

6.73.2.1 STX

[SL] 0 [a] 0 [b] 0 [ETX]

Where

a = RIT arm 1 condition byte [xx]

b = RIT arm 2 condition byte [xx]

6.73.3 Receive

6.73.3.1 ACK

6.73.3.2 NAK

- RIT Panel not enabled

6.73.4 Notes

On one arm systems the parameter b is not required and is ignored if sent.

Bit 7	Bit 6	Bit 5 (32)	Bit 4 (16)	Bit 3 (8)	Bit 2 (4)	Bit 1 (2)	Bit 0 (1)
0	0	Flash Green	Flash Yellow	Flash Red	Steady State Green	Steady State Yellow	Steady State Red

All lamps off: SL 0 0

All Arm 1 lamps on steady Arm 2 Lamps off: SL 7 0

Arm 2 Yellow lamp on steady: SL 0 2

Arm 2 Flash red lamp: SL 0 8 or 9

Arm 2 Flash red lamp with green lamp on steady: SL 0 12

Arm 2 Flash red & green in time with each other: SL 0 45 or 40

Both Arms Flash red & green alternatively: SL 41 or 44 41 or 44

6.73.5 Related Commands

IS, CL

6.73.6 Constraints

Not available in stand-alone mode.

6.74 SM - Stop Arm

6.74.1 Description

Stops or pauses the load/batch on a particular arm.

6.74.2 Send

6.74.2.1 STX

[SM] 0 [a] 0 [ETX]

Where

a = arm number [x]

6.74.3 Receive

6.74.3.1 ACK

The command was processed without error.

6.74.3.2 NAK

- Requested arm number does not exist
- Number of parameters are incorrect
- Requested arm is not loading

6.74.4 Notes

None.

6.74.5 Related Commands

None.

6.74.6 Constraints

The requested arm must be loading.

6.75 SO - System Options

6.75.1 Description

Returns the user configuration settings of the SYSTEM set-up menu.

6.75.2 Send

6.75.2.1 STX

[SO] 0 [ETX]

6.75.3 Receive

6.75.3.1 STX

[SO] 0 [a] 0 [b] 0 [c] 0 [d] ... [q] 0 [ETX]

Where

a = initial message [SYS AVAIL]/[CONN OVRF/GND]/[CONN VAPR]/ [CONN PROGP/ERM]/[SLCTD PERM]/[CUSTOM]

b = personnel authorisation [NONE]/[PIN]/[TOUCH]/[NEXWATCH]

c = vehicle authorisation [NONE]/[PIN]/[TOUCH]/[NEXWATCH]

d = master authorisation [NONE]/[PIN]/[TOUCH]/[NEXWATCH]

e = entry timeout [xxx] seconds

f = clear/reconnect time [xxx] seconds

g = number of arms [x]

h = first arm number [x]

i = volume decimals [1]/[0.1]

j = batch type [NET]/[GROSS]

k = bay number [xxx]

l = language option [ENGLISH]/[OTHER]/[DISABLE]**

m = litre/liter spelling [LITRE]/[LITER]

n = base temperature [BASE 15°C]/[BASE 20°C]/[BASE 60°F]/[AD]. X.XX°C]/[AD]. X.XX°F]

o = system units [US UNITS]/[METRIC-ISO]

p = master ID TAS override [x] (0 - disabled, 1 - enabled)

q = hardware test via '8' key [x] (0 - disabled, 1 - enabled)

6.75.3.2 BS

- Instrument must be in the idle state.

6.75.4 Notes

If the language option is not available then the language option setting is DISABLE.

6.75.5 Related Commands

OP

6.75.6 Constraints

Instrument must be in the idle state.

6.76 SR – Set Rake

6.76.1 Description

Command to send maximum 4 wagon information for Rake loading.

6.76.2 Send

6.76.2.1 STX

[SR] 0 [a] 0 [b][z] [ETX]

Where:

a = Rake Registration Number [xxxxxxxxxxxxxxxx]

b = Wagon Number [xxxxxxxxxxxxxxxx]

c = Arm Number [x]

d = Product Number

e = Recipe [x]

f = Loadspot Number [x](Set numeric load spot number in BCU configuration (1,2 instead of LS1,LS2))

g = Preset quantity [xxxxxx]

Optional for Wagon 2

h = Wagon Number [xxxxxxxxxxxxxxxx]

i = Arm Number [x]

j = Product Number

k = Recipe [x]

l = Loadspot Number [x](Set numeric load spot number in BCU configuration (1,2 instead of LS1,LS2))

m = Preset quantity [xxxxxx]

Optional for Wagon 3

n = Wagon Number [xxxxxxxxxxxxxx]

o = Arm Number [x]

p = Product Number

q = Recipe [x]

r = Loadspot Number [x](Set numeric load spot number in BCU configuration (1,2 instead of LS1,LS2))

s = Preset quantity [xxxxxx]

Mandatory

t = TOP/BOTTOM

(Need to send mandatory at last for TOP = 0, Bottom = 1)

6.76.3 Receive

Control byte: ACK

6.77 ST - Send Transaction

6.77.1 Description

Returns the details for requested transaction.

6.77.2 Send

6.77.2.1 STX

[ST] 0 [a] 0 [ETX]

Where

a = the transaction number

6.77.3 Receive

6.77.3.1 STX

[ST] 0 [a] ... [t] 0 [ETX]

Where

a = unit address [xx]

b = transaction number [xxxxxxx]

c = date start [dd/mm/yyyy]

d = start time [hh:mm:ss]

e = stop time [hh:mm:ss]

f = calibration number [xxx]

g = batch start [xxxx]

h = batch stop [xxxx]

i = personnel index [xxxx]

j = vehicle index [xxxx]

k = master index [xxxx] l = bay number [xxx]

m = first arm number [x]

n = number of arms [x]

o = load number [xxxxxxxx]

p = reference number [yyyyyyyyyy] or 0 if not used (y = alphanumeric character)

q = unique number [xxxxxxx]

r = power cycle count [xxxxxxxx]

s = communication mode [x] (0 =Stand Alone, 1 = Load Scheduling, 2 = Load Scheduling with Stand Alone Override)

t = top/bottom loading status [x] 0 = top, 1 = bottom. (If RIT Loadspot is disabled)

u = checksum result [FAULT]/[OK]

6.77.3.2 NAK

- Requested transaction number does not exist
- If a transaction is in progress
- Instrument is not in IDLE state

6.77.3.3 BS

- Instrument must be in the idle state

6.77.4 Notes

None.

6.77.5 Related Commands

BT, SY

6.77.6 Constraints

Instrument must be in the idle state.

6.78 SV - Software Version

6.78.1 Description

Returns the instrument's software version number and the date and time the library was last modified.

6.78.2 Send

6.78.2.1 STX

[SV] 0 [ETX]

6.78.3 Receive

6.78.3.1 STX

[SV] 0 [a] 0 [f] 0 [ETX]

Where

a = application Version number [Vyyxx.xxx] where yy = language option (default = EO for English)

b = date [mmm dd yyyy]

c = time [hh:mm:ss]

d = ROM Type [FLASH]

e = Flash ROM size [xxx]

f = display type [GRAPHIC]

6.78.3.2 BS

- Instrument must be in the idle state

6.78.4 Notes

None

6.79 SY - Send Batch

6.79.1 Description

Returns an individual batch, representing a single compartment load. There may be up to 10 of these batches per transaction.

6.79.2 Send

6.79.2.1 STX

[SY] 0 [xx] 0 [a] 0 [ETX]

Where

xx = one of the following:

- AA = Arm Batch information
- M1 = Base Meter Batch information
- M2 = Blend Meter Batch information

IV = Additive Injection Batch Information a = the batch number

6.79.3 Receive - AA

6.79.3.1 STX

[SY] 0 [AA] 0 [a] 0 [b] 0 [c] ... [n] 0 [ETX]

Where

a = batch number [xxxx]

b = transaction number [xxxxxxx]

c = arm number [x]

d = start time [hh:mm:ss]

e = stop time [hh:mm:ss]

f = units setting [litres]/[liters]/[meters3]/[kg]/[grams]/[gallons]/ [pounds]

g = recipe number [x] (range 0 to 16, Refer Notes)

h = compartment number [xx]

i = returned quantity [xxxxx]

j = preset quantity [xxxxxx.x]

k = blend type [x] (range 1 to 5, Refer [Table 6-24: Arm Codes](#))

l = blend accuracy [x] (0 = No fault, 1 = High Alarm, 2 = Low Alarm)

m = error status [xxx] Refer [Section 5: Error Status Codes](#)

n = wagon number [xxxxxxxxxxxx] (if rail loading is enabled)

o = checksum result [FAULT] or [OK]

6.79.3.2 NAK

- Requested batch number does not exist

6.79.3.3 BS

- Instrument must be in the idle state

6.79.4 Receive - Mn

6.79.4.1 STX

[SY] 0 [Mn] 0 [a] 0 [b] 0 [c] ... [r] 0 [ETX]

Where

a = batch number [xxxx]

b = transaction number [xxxxxxx]

c = meter number [x]

d = gross (unconverted) total [xxxxxx.x]

e = net (converted) total [xxxxxx.x]

f = accum. (unconverted) total before [xxxxxxx]

g = accum. (unconverted) total after [xxxxxxx]

h = net accum. (converted) total before [xxxxxxx]

i = net accum. (converted) total after [xxxxxxx]

j = meter preset quantity [xxxxxx.x]

k = manual product density (kg/m³) [xxxx.x] or relative density (RD60) [x.xxx] (US units)

l = commodity setting [x] (0 = NONE, 1 = CRUDE OILS (A), 2 = REFINED (B), 3 = SPECIAL (C), 4 = LUBE OILS (D), 5 = NGL AND LPG (E), 6 = FAME (F))

m = Expansion Co-efficient/Thermal Exp. Factor [x.xxxxxxxx] (commodity C) or Equilibrium Pressure (Pe) [xxxx.x] (commodity E) - (or 0.0 if neither used)

n = weighted average temperature [xxxx.x] or [Bxxxx.x] if break down value used

o = weighted average pressure [xxxx.x] or [Bxxxx.x] if break down value used

p = weighted average density [xxxx.x] or [Bxxxx.x] if break down value used or [M] if a manual value in use (refer to parameter k)

q = error status [xxx] (Refer [Section 5: Error Status Codes](#))

r = checksum result [FAULT] or [OK]

6.79.4.2 NAK

- Requested batch number does not exist

6.79.4.3 BS

- Instrument must be in the idle state

6.79.5 Receive - IV

6.79.5.1 STX

[SY] 0 [IV] 0 [a] 0 [b] 0 [c] ... [t] 0 [ETX]

Where

a = batch number [xxxx]

b = transaction number [xxxxxxx]

c = preset quantity line 1 [xxxx.x] (cc or ml)

d = gross quantity line 1 [xxxx.x] (cc or ml)

e = preset quantity line 2 [xxxx.x] (cc or ml)

f = gross quantity line 2 [xxxx.x] (cc or ml)

g = preset quantity line 3 [xxxx.x] (cc or ml)

h = gross quantity line 3 [xxxx.x] (cc or ml)

i = preset quantity line 4 [xxxx.x] (cc or ml)

j = gross quantity line 4 [xxxx.x] (cc or ml)

k = preset quantity line 5 [xxxx.x] (cc or ml)

l = gross quantity line 5 [xxxx.x] (cc or ml)

m = preset quantity line 6 [xxxx.x] (cc or ml)

n = gross quantity line 6 [xxxx.x] (cc or ml)

6.79.5.2 NAK

- Requested batch number does not exist

6.79.5.3 BS

- Instrument must be in the idle state

6.79.6 Notes

For Receive - AA parameter g:

0 = recipe uploaded via the AR command

1 to 16 = recipes selected from the 1010 recipe configuration

6.79.7 Related Commands

BT, ST

6.79.8 Constraints

The instrument must be in the idle state.

6.80 TA- Type of Load Arm

6.80.1 Description

Returns the type of the load arm and the number of meters associated with that arm.

6.80.2 Send

6.80.2.1 STX

[TA] 0 [a] 0 [ETX]

Where

a = arm number [x]

6.80.3 Receive

6.80.3.1 STX

[TA] 0 [a] ... [d] 0 [ETX]

Where

a = arm number [x]

b = arm type [x] (range 1 to 5 — Refer [Table 6-44: Arm Codes](#))

c = Base meter number [x] (Range 1 to 4)

d = number of meters [x] (Range 1 to 2)

6.80.3.2 NAK

- If requested arm number does not exist.

6.80.4 Notes

Table 6-44: Arm Codes

Code	Arm Type	Description
1	STRAIGHT	Net Accumulative Total of Arm = Meter (only one meter associated with the arm)
2	Not Used	N/A
3	SIDE STREAM	Net Accumulative Total of Arm = First/Base Meter
4	Not Used	N/A
5	RATIO	Net Accumulative Total of Arm = First Meter + Second/Blend Meter

6.80.5 Related Commands

AS, TI

6.80.6 Constraints

Instrument must be in the idle state.

6.81 TB- Blend Target and Ratio

6.81.1 Description

Returns Blend Target and Ratio for all the arms or for a particular arm

6.81.2 Send

6.81.2.1 STX

[TB] 0 [ETX]

This will provide Blend Target and Ratio for all arms. or [TB] 0 [An] 0 [ETX]

This will provide the Blend Target and Ratio for a particular arm (n).

6.81.3 Receive

6.81.3.1 STX

[TB] 0 [a] ... [k] 0 [ETX]

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = current ratio for first arm [xxxxxxxx]

e = target ratio for first arm [xxxxxxxx]

f = current ratio for second arm [xxxxxxxx] (only if number of arms > 1)

g = target ratio for second arm [xxxxxxxx] (only if number of arms > 1)

6.81.3.2 NAK

- If the number of parameters is incorrect
- If the instrument type is > 2 arms

6.81.3.3 STX

[TB] 0 [An] 0 [a] 0 [ETX]

Where

a = arm number [x]

b = current ratio for arm n [xxxxxxxx]

c = target ratio for arm n [xxxxxxxx]

6.81.3.4 NAK

- If the number of parameters is incorrect.
- For An if the requested arm does not exist
- If the instrument type is > 2 arms

6.81.4 Notes

Parameter [b] indicates how many parameters will follow. For example if [b] = 2 then only parameters [a] through [g] are received.

6.81.5 Related Commands

AN, AT, FR, GT, ID, IP, IT, LP, LT, NT, PR, TF, VC

6.81.6 Constraints

None

6.82 TC - Transaction Complete

6.82.1 Description

Clears the PL (Post loading) state of the instrument, and displays the disconnect prompt.

6.82.2 Send

6.82.2.1 STX

[TC] 0 [ETX]

6.82.3 Receive

6.82.3.1 ACK

The command was processed without error.

6.82.3.2 NAK

- Instrument is not in the post loading (PL) state.

6.82.4 Notes

None

6.82.5 Related Commands

None

6.82.6 Constraints

Instrument must be in the PL state.

6.83 TD- Transaction details

6.83.1 Description

This command returns the details of current transaction.

6.83.2 Send

6.83.2.1 STX

[TD] 0 [ETX]

6.83.3 Receive

6.83.3.1 STX

[ST] 0 [a] ...[z].. [d1] 0 [ETX]

Where

a = Truck number

1st compartment

b = Arm number, Compartment number and status (Refer details below)

c = Arm start accumulated total

d = Arm end accumulated total

e = Main product gross quantity

f = Blend product gross quantity

g = Additive quantity

2nd compartment

h = Arm number, Compartment number and status (Refer details below)

i = Arm start accumulated total

j = Arm end accumulated total

k = Main product gross quantity

l = Blend product gross quantity

m = Additive quantity

3rd compartment

n = Arm number, Compartment number and status (Refer details below)

o = Arm start accumulated total

p = Arm end accumulated total

q = Main product gross quantity

r = Blend product gross quantity

s = Additive quantity

4th compartment

t = Arm number, Compartment number and status (Refer details below)

u = Arm start accumulated total

v = Arm end accumulated total

w = Main product gross quantity

x = Blend product gross quantity

y = Additive quantity

5th compartment

z = Arm number, Compartment number and status (Refer details below)

a1 = Arm start accumulated total

b1 = Arm end accumulated total

c1 = Main product gross quantity

d1 = Blend product gross quantity

e1 = Additive quantity

6th compartment

f1 = Arm number, Compartment number and status (Refer details below)

g1 = Arm start accumulated total

h1 = Arm end accumulated total

i1 = Main product gross quantity

j1 = Blend product gross quantity

k1 = Additive quantity

7th compartment

l1 = Arm number, Compartment number and status (Refer details below)

m1 = Arm start accumulated total

n1 = Arm end accumulated total

o1 = Main product gross quantity

p1 = Blend product gross quantity

q1 = Additive quantity

8th compartment

r1 = Arm number, Compartment number and status (Refer details below)

s1 = Arm start accumulated total

t1 = Arm end accumulated total

u1 = Main product gross quantity

v1 = Blend product gross quantity

w1 = Additive quantity

Details of parameter a g,m,s,y Bit 0-3 compartment number

Bit 7 loading status (1 if loading currently) Bit 8 -11 arm number

6.83.3.2 NAK

- Incorrect number of parameters

6.84 TF - Actual and Current Target Flow

6.84.1 Description

Returns actual and target flow rates for all the arms or the meters for the particular arm.

6.84.2 Send

6.84.2.1 STX

[TF] 0 [ETX]

This will provide actual and current target flow for all arms. or [TF] 0 [Mn] 0 [ETX]

This will provide the actual and current target flow for a particular meter (n).

6.84.3 Receive

6.84.3.1 STX

[TF] 0 [a] ... [k] 0 [ETX]

Where

a = first arm number [x]

b = number of arms [x]

c = bay number [xxx]

d = flow rate for first arm [xxxxxxxx]

e = current target flow rate for first arm [xxxxxxxx]

f = flow rate for second arm [xxxxxxx] (only if number of arms > 1)

g = current target flow rate for second arm [xxxxxxx] (only if number of arms > 1)

h = flow rate for third arm [xxxxxxx] (only if number of arms > 2)

i = current target flow rate for third arm [xxxxxxx] (only if number of arms > 2)

j = flow rate for fourth arm [xxxxxxx] (only if number of arms > 3)

k = current target flow rate for fourth arm [xxxxxxx] (only if number of arms > 3)

6.84.3.2 NAK

- If the number of parameters is incorrect

6.84.3.3 STX

[TF] 0 [Mn] 0 [a] ... [c] 0 [ETX]

Where

a = meter number [x]

b = flow rate for meter n [xxxxxxx]

c = target flow rate for meter n [xxxxxxx]

6.84.3.4 NAK

- If the number of parameters is incorrect
- For Mn if the requested arm does not exist

6.84.4 Notes

Parameter [b] indicates how many parameters follow. For example, if [b] = 2 then only parameters [a] through [g] are received.

6.84.5 Related Commands

AN, AT, FR, GT, ID, IP, IT, LP, LT, NT, PR, TB, VC

6.84.6 Constraints

None.

6.85 TI - Type of Instrument

6.85.1 Description

Returns the type of instrument.

6.85.2 Send

6.85.2.1 STX

[TI] 0 [ETX]

6.85.3 Receive

6.85.3.1 STX

[TI] 0 [a] ... [g] 0 [ETX]

Where

a = number of arms [x]

b = instrument code [xx] (for range, Refer [Table 6-45: Instrument Type](#))

c = number of product meters [x] (range 1 to 4)

d = number of internal additive injectors [x] (range 1 to 6)

e = number of Com Ports [x]

f = 4-20mA Outputs Available [x] (0 = No, 1 = Yes)

g = RIT panel [x] (0 = disabled, 1 = enabled)

6.85.3.2 BS

- Instrument must be in the idle state.

6.85.4 Notes

RIT panel (parameter g) will always return 0 if not available for that instrument type.

Table 6-45: Instrument Type

Code	Description	Code
A	One arm loading	6
B	One arm loading with ratio blending	4
C	One arm loading with side stream blending	4
D	Two arm loading	4
E	Two arm loading, one straight loading, one with ratio blending	2
F	Two arm loading, one straight loading, one with side stream blending	2
G	Two arm loading each with ratio blending	0
H	Two arm loading each with side stream blending	0
J	Four arm loading	0, and no RIT panel

6.85.5 Related Commands

AD, TA

6.85.6 Constraints

The instrument must be in the idle state.

6.86 TS - Settle Transaction

6.86.1 Description

Settles a transaction so that it can be overwritten by a new transaction every 1000 transactions. If a transaction is not settled, when the next transaction number is

equal to this unsettled transaction position in memory, no further loading can be performed until it is settled.

6.86.2 Send

6.86.2.1 STX

[TS] 0 [a] 0 [ETX]

Where

a = transaction number

6.86.3 Receive

6.86.3.1 STX

[TS] 0 [a] 0 [ETX]

Where

a =

0 - Transaction settled successfully

1 - Transaction in progress/Valves not closed

2 - Transaction not found

6.86.4 Notes

Once a transaction has been successfully upload via the ST/SY commands and the BOL printed, use this command to settle the transaction so that it can be overwritten. By settling the transaction you are indicating that the transaction information no longer needs to be stored in the instrument memory.

6.86.5 Related Commands

None

6.86.6 Constraints

No transaction in progress

6.87 TT - Terminate Transaction

6.87.1 Description

Stops a transaction that is currently in progress on the instrument. Remotely stops a transaction on the instrument authorization and forcing it to the disconnect prompt.

6.87.2 Send

6.87.2.1 STX

[TT] 0 [ETX]

6.87.3 Receive

6.87.3.1 ACK

The command was processed without error.

6.87.3.2 NAK

- Instrument is in the idle state

6.87.4 Notes

None

6.87.5 Related Commands

None

6.87.6 Constraints

Transaction must be in progress.

6.88 VC - Volume Correction Factor

6.88.1 Description

Retrieves the volume correction factor (CTPL) for all meters from the instrument.

6.88.2 Send

6.88.2.1 STX

[VC] 0 [ETX]

This will provide the volume correction factor (CTPL) for all meters. or [VC] 0 [Mn] 0 [ETX]

This will provide the volume correction factor for a particular meter (n).

6.88.3 Receive

6.88.3.1 STX

[VC] 0 [a] 0 [b] 0 [c] ... [g] 0 [ETX]

Where

a = first meter number [x]

b = number of meters [x]

c = bay number [xxx]

d = volume correction factor (CTPL) for first meter [xxxxxxxx]

e = volume correction factor (CTPL) for second meter [xxxxxxxx] (only if number of arms > 1)

f = volume correction factor (CTPL) for third meter [xxxxxxxx] (only if number of arms > 2)

g = volume correction factor (CTPL) for fourth meter [xxxxxxxx] (only if number of arms > 3)

or

6.88.3.2 NAK

- If the number of parameters is incorrect.

6.88.3.3 STX

[VC] 0 [Mn] 0 [a] 0 [ETX]

Where

a = volume correction factor (CTPL) for the meter Mn [xxxxxxxx].

6.88.3.4 NAK

- If the number of parameters is incorrect.
- For Mn if the requested meter does not exist.

6.88.4 Notes

Parameter b indicates how many “volume correction factor” parameters follow. For example, if b = 2, only parameters [a] through [e] are received.

6.88.5 Related Commands

AT, FR, GT, IP, IT, LP, LT, NT, PR, TB, TF

6.88.6 Constraints

None

6.89 SW - W&M Switch Status

6.89.1 Description

Returns W&M switch Status.

6.89.2 Send

6.89.2.1 STX

[SW] 0 [ETX]

6.89.3 Receive

6.89.3.1 STX

STX [SW] 0 [a] 0 [ETX]

a = Current W&M key status. [1=Key Pressed, 0=key not pressed]

b = Latched W&M key status [1=Key Pressed, 0=key not pressed]

c = Checksum [Returned checksum to identify if the configuration has changed]

6.89.4 Send

STX [SW] 0 [xx] 0 [ETX]

Where xx is one of the following:

CL = Clear latched W&M status.

6.89.5 Notes

None

6.89.6 Related Commands

None

6.89.7 Constraints

None

7 Modbus Protocol

7.1 General

Modbus is a widely recognized protocol in industrial applications. It is an open protocol supported by the Modbus Organization (www.modbus.org), which provides technical specifications.

With regards to 1010CB controllers, two variations of the Modbus protocol implementation can be distinguished:

- Modbus RTU is the standard Modbus protocol over serial communication line with RTU (Remote Terminal Unit) framing.
- Modbus TCP/IP is the standard Modbus TCP/IP protocol.

Refer to the Modbus Application Protocol Specification for Modbus RTU and Modbus TCP/IP protocol details.

For communication 1010CB with Host via Modbus TCP/IP protocol, response time should be greater than 60 milliseconds, scan rate should be greater than 50 milliseconds and delay between two polls should be greater than 5 milliseconds.

7.2 Modbus Register Map

7.2.1 Coils

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
System alarm - Manager Reset	000	0000	001	001
System alarm - Communication Alarm	001	0001	002	002
System alarm - Calibration Factor changed	002	0002	003	003
System alarm - Watchdog	003	0003	004	004

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
System alarm - Emergency Stop	004	0004	005	005
System alarm - Deadman Indicator	005	0005	006	006
System alarm - Deadman Bell	006	0006	007	007
System alarm - Deadman Callout	007	0007	008	008
System alarm - System Corruption	008	0008	009	009
System alarm - System Trap	009	0009	010	010
System alarm - System Stack	010	000A	011	011
System alarm - Multiple 100 ms	011	000B	012	012
System alarm - Power Failure	012	000C	013	013
System alarm - Display Failure	013	000D	014	014
System alarm - Overfill Disconnected	014	000E	015	015
System alarm - Vapour Disconnected	015	000F	016	016
System alarm - Program Disconnection	016	0010	017	017
System alarm - RAM corruption	017	0011	018	018
System alarm - NexWatch Communications	018	0012	019	019
System alarm - SDF Failure	019	0013	020	020
System alarm - SDF Cleared	020	0014	021	021
System alarm - Transaction storage Full	021	0015	022	022
System alarm - SDF Data corruption	022	0016	023	023
System alarm - Reprogram Flash	023	0017	024	024
System alarm - Reprogramming in Progress	024	0018	025	025
System alarm - Instrument type Corrupt	025	0019	026	026
System alarm - Critical data Corrupt	026	001A	027	027
System alarm - Assert	027	001B	028	028
System alarm - Illegal Instruction	028	001C	029	029
System alarm - CPU Address	029	001D	030	030

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
System alarm - User alarm A	030	001E	031	031
System alarm - User alarm B	031	001F	032	032
System alarm - User alarm C	032	0020	033	033
System alarm - User alarm D	033	0021	034	034
System alarm - Comport not assigned to NexWatch	034	0022	035	035
System alarm - Comport not assigned to Intelligent Additive	035	0023	036	036
System alarm - System input 1 disconnected	036	0024	037	037
System alarm - System input 2 disconnected	037	0025	038	038
System alarm - System input 3 disconnected	038	0026	039	039
System alarm - System input 4 disconnected	039	0027	040	040
System alarm - System input 5 disconnected	040	0028	041	041
System alarm - System input 6 disconnected	041	0029	042	042
Arm 1 alarm - Slow flow low	042	002A	043	043
Arm 1 alarm - Slow flow High	043	002B	044	044
Arm 1 alarm - High flow Low	044	002C	045	045
Arm 1 alarm - High flow High	045	002D	046	046
Arm 1 alarm - Blend error Low	046	002E	047	047
Arm 1 alarm - Blend error High	047	002F	048	048
Arm 1 alarm - Low flow Low	048	0030	049	049
Arm 1 alarm - Low flow High	049	0031	050	050
Arm 1 alarm - Remote Stop	050	0032	051	051

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
Arm 1 alarm - Remote Terminate	051	0033	052	052
Arm 1 alarm - Leaking Blend Stream	052	0034	053	053
Arm 1 alarm - Spare 1	053	0035	054	054
Arm 1 alarm - Spare 2	054	0036	055	055
Arm 1 alarm - Spare 3	055	0037	056	056
Arm 1 alarm - Spare 4	056	0038	057	057
Arm 1 alarm - Spare 5	057	0039	058	058
Arm 1 alarm - Arm input 1 disconnected	058	003A	059	059
Arm 1 alarm - Arm input 2 disconnected	059	003B	060	060
Arm 1 alarm - Arm input 3 disconnected	060	003C	061	061
Arm 1 alarm - Arm input 4 disconnected	061	003D	062	062
Arm 1 alarm - Arm input 5 disconnected	062	003E	063	063
Arm 1 alarm - Arm input 6 disconnected	063	003F	064	064
Arm 1 alarm - Arm input 7 disconnected	064	0040	065	065
Arm 1 alarm - Arm input 8 disconnected	065	0041	066	066
Arm 2 alarm - Slow flow low	066	0042	067	067
Arm 2 alarm - Slow flow High	067	0043	068	068
Arm 2 alarm - High flow Low	068	0044	069	069
Arm 2 alarm - High flow High	069	0045	070	070
Arm 2 alarm - Blend error Low	070	0046	071	071
Arm 2 alarm - Blend error High	071	0047	072	072
Arm 2 alarm - Low flow Low	072	0048	073	073
Arm 2 alarm - Low flow High	073	0490	074	074
Arm 2 alarm - Remote Stop	074	004A	075	075
Arm 2 alarm - Remote Terminate	075	004B	076	076
Arm 2 alarm - Leaking Blend Stream	076	004C	077	077
Arm 2 alarm - Spare 1	077	004D	078	078
Arm 2 alarm - Spare 2	078	004E	079	079

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
Arm 2 alarm - Spare 3	079	004F	080	080
Arm 2 alarm - Spare 4	080	0050	081	081
Arm 2 alarm - Spare 5	081	0051	082	082
Arm 2 alarm - Arm input 1 disconnected	082	0052	083	083
Arm 2 alarm - Arm input 2 disconnected	083	0053	084	084
Arm 2 alarm - Arm input 3 disconnected	084	0054	085	085
Arm 2 alarm - Arm input 4 disconnected	085	0055	086	086
Arm 2 alarm - Arm input 5 disconnected	086	0056	087	087
Arm 2 alarm - Arm input 6 disconnected	087	0057	088	088
Arm 2 alarm - Arm input 7 disconnected	088	0058	089	089
Arm 2 alarm - Arm input 8 disconnected	089	0059	090	090
Arm 3 alarm - Slow flow low	090	005A	091	091
Arm 3 alarm - Slow flow High	091	005B	092	092
Arm 3 alarm - High flow Low	092	005C	093	093
Arm 3 alarm - High flow High	093	005D	094	094
Arm 3 alarm - Blend error Low	094	005E	095	095
Arm 3 alarm - Blend error High	095	005F	096	096
Arm 3 alarm - Low flow Low	096	0060	097	097
Arm 3 alarm - Low flow High	097	0061	098	098
Arm 3 alarm - Remote Stop	098	0062	099	099
Arm 3 alarm - Remote Terminate	099	0063	100	100
Arm 3 alarm - Leaking Blend Stream	100	0064	101	101
Arm 3 alarm - Spare 1	101	0065	102	102
Arm 3 alarm - Spare 2	102	0066	103	103
Arm 3 alarm - Spare 3	103	0067	104	104
Arm 3 alarm - Spare 4	104	0068	105	105
Arm 3 alarm - Spare 5	105	0069	106	106
Arm 3 alarm - Arm input 1 disconnected	106	006A	107	107

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
Arm 3 alarm - Arm input 2 disconnected	107	006B	108	108
Arm 3 alarm - Arm input 3 disconnected	108	006C	109	109
Arm 3 alarm - Arm input 4 disconnected	109	006D	110	110
Arm 3 alarm - Arm input 5 disconnected	110	006E	111	111
Arm 3 alarm - Arm input 6 disconnected	111	006F	112	112
Arm 3 alarm - Arm input 7 disconnected	112	0070	113	113
Arm 3 alarm - Arm input 8 disconnected	113	0071	114	114
Arm 4 alarm - Slow flow low	114	0072	115	115
Arm 4 alarm - Slow flow High	115	0073	116	116
Arm 4 alarm - High flow Low	116	0074	117	117
Arm 4 alarm - High flow High	117	0075	118	118
Arm 4 alarm - Blend error Low	118	0076	119	119
Arm 4 alarm - Blend error High	119	0077	120	120
Arm 4 alarm - Low flow Low	120	0078	121	121
Arm 4 alarm - Low flow High	121	0079	122	122
Arm 4 alarm - Remote Stop	122	007A	123	123
Arm 4 alarm - Remote Terminate	123	007B	124	124
Arm 4 alarm - Leaking Blend Stream	124	007C	125	125
Arm 4 alarm - Spare 1	125	007D	126	126
Arm 4 alarm - Spare 2	126	007E	127	127
Arm 4 alarm - Spare 3	127	007F	128	128
Arm 4 alarm - Spare 4	128	0080	129	129
Arm 4 alarm - Spare 5	129	0081	130	130
Arm 4 alarm - Arm input 1 disconnected	130	0082	131	131
Arm 4 alarm - Arm input 2 disconnected	131	0083	132	132
Arm 4 alarm - Arm input 3 disconnected	132	0084	133	133
Arm 4 alarm - Arm input 4 disconnected	133	0085	134	134
Arm 4 alarm - Arm input 5 disconnected	134	0086	135	135

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
Arm 4 alarm - Arm input 6 disconnected	135	0087	136	136
Arm 4 alarm - Arm input 7 disconnected	136	0088	137	137
Arm 4 alarm - Arm input 8 disconnected	137	0089	138	138
Meter 1 alarm - Temperature probe	138	008A	139	139
Meter 1 alarm - Valve fault	139	008B	140	140
Meter 1 alarm - Dual pulse	140	008C	141	141
Meter 1 alarm - Phase error	141	008D	142	142
Meter 1 alarm - Unauthorised flow	142	008E	143	143
Meter 1 alarm - No flow timeout	143	008F	144	144
Meter 1 alarm - Pressure Probe	144	0090	145	145
Meter 1 alarm - Overrun Error	145	0091	146	146
Meter 1 alarm - Illegal Argument	146	0092	147	147
Meter 1 alarm - Volume Correction Factor Out of Range	147	0093	148	148
Meter 1 alarm - Non-convergence	148	0094	149	149
Meter 1 alarm - Temperature Out of Range	149	0095	150	150
Meter 1 alarm - Density or Exp. co-efficient Out of Range	150	0096	151	151
Meter 1 alarm - Pressure Out of Range	151	0097	152	152
Meter 1 alarm - Supercritical Fluid	152	0098	153	153
Meter 1 alarm - No Reference Fluid	153	0099	154	154
Meter 1 alarm - Calculation No solution	154	009A	155	155
Meter 1 alarm - Density Probe	155	009B	156	156
Meter 1 alarm - Spare 1	156	009C	157	157
Meter 1 alarm - Spare 2	157	009D	158	158
Meter 1 alarm - Spare 3	158	009E	159	159
Meter 1 alarm - Spare 4	159	009F	160	160

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
Meter 1 alarm - Spare 5	160	00A0	161	161
Meter 2 alarm - Temperature probe	161	00A1	162	162
Meter 2 alarm - Valve fault	162	00A2	163	163
Meter 2 alarm - Dual pulse	163	00A3	164	164
Meter 2 alarm - Phase error	164	00A4	165	165
Meter 2 alarm - Unauthorised flow	165	00A5	166	166
Meter 2 alarm - No flow timeout	166	00A6	167	167
Meter 2 alarm - Pressure Probe	167	00A7	168	168
Meter 2 alarm - Overrun Error	168	00A8	169	169
Meter 2 alarm - Illegal Argument	169	00A9	170	170
Meter 2 alarm - Volume Correction Factor Out of Range	170	00AA	171	171
Meter 2 alarm - Non-convergence	171	00AB	172	172
Meter 2 alarm - Temperature Out of Range	172	00AC	173	173
Meter 2 alarm - Density or Exp. co-efficient Out of Range	173	00AD	174	174
Meter 2 alarm - Pressure Out of Range	174	00AE	175	175
Meter 2 alarm - Supercritical Fluid	175	00AF	176	176
Meter 2 alarm - No Reference Fluid	176	00B0	177	177
Meter 2 alarm - Calculation No solution	177	00B1	178	178
Meter 2 alarm - Density Probe	178	00B2	179	179
Meter 2 alarm - Spare 1	179	00B3	180	180
Meter 2 alarm - Spare 2	180	00B4	181	181
Meter 2 alarm - Spare 3	181	00B5	182	182
Meter 2 alarm - Spare 4	182	00B6	183	183
Meter 2 alarm - Spare 5	183	00B7	184	184
Meter 3 alarm - Temperature probe	184	00B8	185	185

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
Meter 3 alarm - Valve fault	185	00B9	186	186
Meter 3 alarm - Dual pulse	186	00BA	187	187
Meter 3 alarm - Phase error	187	00BB	188	188
Meter 3 alarm - Unauthorised flow	188	00BC	189	189
Meter 3 alarm - No flow timeout	189	00BD	190	190
Meter 3 alarm - Pressure Probe	190	00BE	191	191
Meter 3 alarm - Overrun Error	191	00BF	192	192
Meter 3 alarm - Illegal Argument	192	00C0	193	193
Meter 3 alarm - Volume Correction Factor Out of Range	193	00C1	194	194
Meter 3 alarm - Non-convergence	194	00C2	195	195
Meter 3 alarm - Temperature Out of Range	195	00C3	196	196
Meter 3 alarm - Density or Exp. co-efficient Out of Range	196	00C4	197	197
Meter 3 alarm - Pressure Out of Range	197	00C5	198	198
Meter 3 alarm - Supercritical Fluid	198	00C6	199	199
Meter 3 alarm - No Reference Fluid	199	00C7	200	200
Meter 3 alarm - Calculation No solution	200	00C8	201	201
Meter 3 alarm - Density Probe	201	00C9	202	202
Meter 3 alarm - Spare 1	202	00C	203	203
Meter 3 alarm - Spare 2	203	00CB	204	204
Meter 3 alarm - Spare 3	204	00CC	205	205
Meter 3 alarm - Spare 4	205	00CD	206	206
Meter 3 alarm - Spare 5	206	00CE	207	207
Meter 4 alarm - Temperature probe	207	00CF	208	208
Meter 4 alarm - Valve fault	208	00D0	209	209
Meter 4 alarm - Dual pulse	209	00D1	210	210

Parameter Name	Starting Coil Register			
	Address (Decimal / Hex)		Number (Standard / Modicon)	
Meter 4 alarm - Phase error	210	00D2	211	211
Meter 4 alarm - Unauthorised flow	211	00D3	212	212
Meter 4 alarm - No flow timeout	212	00D4	213	213
Meter 4 alarm - Pressure Probe	213	00D5	214	214
Meter 4 alarm - Overrun Error	214	00D6	215	215
Meter 4 alarm - Illegal Argument	215	00D7	216	216
Meter 4 alarm - Volume Correction Factor Out of Range	216	00D8	217	217
Meter 4 alarm - Non-convergence	217	00D9	218	218
Meter 4 alarm - Temperature Out of Range	218	00DA	219	219
Meter 4 alarm - Density or Exp. co-efficient Out of Range	219	00DB	220	220
Meter 4 alarm - Pressure Out of Range	220	00DC	221	221
Meter 4 alarm - Supercritical Fluid	221	00DD	222	222
Meter 4 alarm - No Reference Fluid	222	00DE	223	223
Meter 4 alarm - Calculation No solution	223	00DF	224	224
Meter 4 alarm - Density Probe	224	00E0	225	225
Meter 4 alarm - Spare 1	225	00E1	226	226
Meter 4 alarm - Spare 2	226	00E2	227	227
Meter 4 alarm - Spare 3	227	00E3	228	228
Meter 4 alarm - Spare 4	228	00E4	229	229
Meter 4 alarm - Spare 5	229	00E5	230	230

7.2.2 Discrete Input

For enumeration type details, see [Section A.1.1: Digital State](#)

Parameter Name	Starting Discrete Input Register				Data Size/ Type		Enumeration Type
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
General Purpose Input 1	000	0000	001	10001	1	ENUM	
General Purpose Input 2	001	0001	002	10002	1	ENUM	
General Purpose Input 3	002	0002	003	10003	1	ENUM	
General Purpose Input 4	003	0003	004	10004	1	ENUM	
General Purpose Input 5	004	0004	005	10005	1	ENUM	
General Purpose Input 6	005	0005	006	10006	1	ENUM	
General Purpose Input 7	006	0006	007	10007	1	ENUM	
General Purpose Input 8	007	0007	008	10008	1	ENUM	
General Purpose Input 9	008	0008	009	10009	1	ENUM	
General Purpose Input 10	009	0009	010	10010	1	ENUM	
General Purpose Input 11	010	000A	011	10011	1	ENUM	
General Purpose Input 12	011	000B	012	10012	1	ENUM	

Parameter Name	Starting Discrete Input Register				Data Size/ Type		Enumeration Type
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
General Purpose Input 13	012	000C	013	10013	1	ENUM	
General Purpose Input 14	013	000D	014	10014	1	ENUM	
General Purpose Input 15	014	000E	015	10015	1	ENUM	
General Purpose Input 16	015	000F	016	10016	1	ENUM	
General Purpose Input 17	016	0010	017	10017	1	ENUM	
General Purpose Input 18	017	0011	018	10018	1	ENUM	
General Purpose Input 19	018	0012	019	10019	1	ENUM	
General Purpose Input 20	019	0013	020	10020	1	ENUM	
General Purpose Input 21	020	0014	021	10021	1	ENUM	

Parameter Name	Starting Discrete Input Register				Data Size/Type		Enumeration Type
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
General Purpose Input 22	021	0015	022	10022	1	ENUM	
General Purpose Input 23	022	0016	023	10023	1	ENUM	
General Purpose Input 24	023	0017	024	10024	1	ENUM	
General Purpose Input 25	024	0018	025	10025	1	ENUM	
General Purpose Input 26	025	0019	026	10026	1	ENUM	
General Purpose Input 27	026	001A	027	10027	1	ENUM	
General Purpose Input 28	027	001B	028	10028	1	ENUM	

7.2.3 Input Registers

Parameter Name	Starting Input Register		Data Size/Type		Description/ Reference
	Address (Decimal / Hex)	Number (Standard / Modicon)	Registers	Type	
Operational State of Instrument (Enquiry)					

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Last Transaction Number	000	0000	001	30001	2	ULONG	
Screen Mode	002	0002	002	30002	1	ENUM	Section A.1.2: Screen Mode
System Status	003	0003	004	30004	1	BITS	Table 6-32: Status Byte
Total Number of Arms	004	0004	005	30005	1	UINT	
Arm 1 and Arm 2 Status	005	0005	006	30006	1	BITS	Table 6-33: Arm Status Byte
Reserved	006	0006	007	30007	1	BITS	
RIT Status Byte	007	0007	008	30008	1	BITS	Table 6-34: RIT Status Byte — Latched Status only
Cluster Waiting Status	008	0008	009	30009	1	BITS	Section A.2.9: Acknowledge Waiting Status
Compartment Loading Status	009	0009	010	30010	1	BITS	Section A.2.10: Compartment Loading Status
Error Status	010	000A	011	30011	1	Enum	Section 5: Error Status Codes
Message Code	011	000B	012	30012	1	Enum	Section A.1.3: Message Code
BCU Mode	012	000C	013	30013	1	Enum	Section A.1.4: BCU Mode
Arm 1 Current Batch Number	013	000D	014	30014	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Arm 2 Current Batch Number	014	000E	015	30015	1	UINT	
Key read status	015	000F	016	30016	1	UINT	
Alarm Source 1	016	0010	017	30017	1	UINT	Section A.2.2: Alarm Source 1
Alarm Source 2	017	0011	018	30018	1	UINT	Section A.2.3: Alarm Source 2
Alarm Source 3	018	0012	019	30019	1	UINT	Section A.2.4: Alarm Source 3
Alarm Source 4	019	0013	020	30020	1	UINT	Section A.2.5: Alarm Source 4
Alarm Source 5	020	0014	021	30021	1	UINT	Section A.2.6: Alarm Source 5
Alarm Source 6	021	0015	022	30022	1	UINT	Section A.2.7: Alarm Source 6
Alarm Source 7	022	0016	023	30023	1	UINT	Section A.2.8: Alarm Source 7
Audio log counts	023	0017	024	30024	1		
Operator Answer	024	0018	025	30025	7	char [14]	
Nexwatch Key	031	001F	032	30032	5	char [10]	
Secure Hash Key (SHA256)	036	0024	037	30037	16	char [32]	
Reserved for future							
Reserved	052	0034	053	30053	1	UINT	
Reserved	053	0035	054	30054	1	UINT	
Reserved	054	0036	055	30055	1	UINT	
Reserved	055	0037	056	30056	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)	Number (Standard / Modicon)		Registers	Type		
Accumulated Instantaneous Values							
Arm 1 Gross Accumulated Total	056	0038	057	30057	2	ULONG	
Arm 1 Net Accumulated Total	058	003A	059	30059	2	ULONG	
Arm 2 Gross Accumulated Total	060	003C	061	30061	2	ULONG	
Arm 2 Net Accumulated Total	062	003E	063	30063	2	ULONG	
Meter 1 Gross Accumulated Total	064	0040	065	30065	2	ULONG	
Meter 1 Net Accumulated Total	066	0042	067	30067	2	ULONG	
Meter 2 Gross Accumulated Total	068	0044	069	30069	2	ULONG	
Meter 2 Net Accumulated Total	070	0046	071	30071	2	ULONG	
Meter 3 Gross Accumulated Total	072	0048	073	30073	2	ULONG	
Meter 3 Net Accumulated Total	074	004A	075	30075	2	ULONG	
Meter 4 Gross Accumulated Total	076	004C	077	30077	2	ULONG	
Meter 4 Net Accumulated Total	078	004E	079	30079	2	ULONG	
Reserved	080	0050	081	30081	2	ULONG	
Reserved	082	0052	083	30083	2	ULONG	
Reserved	084	0054	085	30085	2	ULONG	
Reserved	086	0056	087	30087	2	ULONG	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Weighbridge Values							
Weighbridge Tare Weight	088	058	089	30089	2	FLOAT	
Weighbridge Gross Weight	090	005A	091	30091	2	FLOAT	
Arm 1 Instantaneous Values							
Arm 1 Gross Total	092	005C	093	30093	2	FLOAT	
Arm 1 Net Total	094	005E	095	30095	2	FLOAT	
Arm 1 Flowrate	096	0060	097	30097	2	FLOAT	
Arm 1 Preset Quantity	098	0062	099	30099	2	FLOAT	
Arm 1 Reserved	100	0064	101	30101	2	FLOAT	
Arm 2 Instantaneous Values							
Arm 2 Gross Total	102	0066	103	30103	2	FLOAT	
Arm 2 Net Total	104	0068	105	30105	2	FLOAT	
Arm 2 Flowrate	106	006A	107	30107	2	FLOAT	
Arm 2 Preset Quantity	108	006C	109	30109	2	FLOAT	
Arm 2 Reserved	110	006E	111	30111	2	FLOAT	
Meter 1 Instantaneous Values							
Meter 1 Gross Total	112	0070	113	30113	2	FLOAT	
Meter 1 Net Total	114	0072	115	30115	2	FLOAT	
Meter 1 Flowrate	116	0074	117	30117	2	FLOAT	
Meter 1 Temperature	118	0076	119	30119	2	FLOAT	
Meter 1 Pressure	120	0078	121	30121	2	FLOAT	
Meter 1 Density	122	007A	123	30123	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 1 Reserved	124	007C	125	30125	2	FLOAT	
Meter 1 Reserved	126	007E	127	30127	2	FLOAT	
Meter 2 Instantaneous Values							
Meter 2 Gross Total	128	0080	129	30129	2	FLOAT	
Meter 2 Net Total	130	0082	131	30131	2	FLOAT	
Meter 2 Flowrate	132	0084	133	30133	2	FLOAT	
Meter 2 Temperature	134	0086	135	30135	2	FLOAT	
Meter 2 Pressure	136	0088	137	30137	2	FLOAT	
Meter 2 Density	138	008A	139	30139	2	FLOAT	
Meter 2 Reserved	140	008C	141	30141	2	FLOAT	
Meter 2 Reserved	142	008E	143	30143	2	FLOAT	
Meter 3 Instantaneous Values							
Meter 3 Gross Total	144	0090	145	30145	2	FLOAT	
Meter 3 Net Total	146	0092	147	30147	2	FLOAT	
Meter 3 Flowrate	148	0094	149	30149	2	FLOAT	
Meter 3 Temperature	150	0096	151	30151	2	FLOAT	
Meter 3 Pressure	152	0098	153	30153	2	FLOAT	
Meter 3 Density	154	009A	155	30155	2	FLOAT	
Meter 3 Reserved	156	009C	157	30157	2	FLOAT	
Meter 3 Reserved	158	009E	159	30159	2	FLOAT	
Meter 4 Instantaneous Values							
Meter 4 Gross Total	160	00A0	161	30161	2	FLOAT	
Meter 4 Net Total	162	00A2	163	30163	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 4 Flowrate	164	00A4	165	30165	2	FLOAT	
Meter 4 Temperature	166	00A6	167	30167	2	FLOAT	
Meter 4 Pressure	168	00A8	169	30169	2	FLOAT	
Meter 4 Density	170	00AA	171	30171	2	FLOAT	
Meter 4 Reserved	172	00AC	173	30173	2	FLOAT	
Meter 4 Reserved	174	00AE	175	30175	2	FLOAT	
Meter 5 Instantaneous Values (Future)							
Meter 5 Gross Total	176	00B0	177	30177	2	FLOAT	
Meter 5 Net Total	178	00B2	179	30179	2	FLOAT	
Meter 5 Flowrate	180	00B4	181	30181	2	FLOAT	
Meter 5 Temperature	182	00B6	183	30183	2	FLOAT	
Meter 5 Pressure	184	00B8	185	30185	2	FLOAT	
Meter 5 Density	186	00BA	187	30187	2	FLOAT	
Meter 51 Reserved	188	00BC	189	30189	2	FLOAT	
Meter 5 Reserved	190	00BE	191	30191	2	FLOAT	
Meter 6 Instantaneous Values (Future)							
Meter 6 Gross Total	192	00C0	193	30193	2	FLOAT	
Meter 6 Net Total	194	00C2	195	30195	2	FLOAT	
Meter 6 Flowrate	196	00C4	197	30197	2	FLOAT	
Meter 6 Temperature	198	00C6	199	30199	2	FLOAT	
Meter 6 Pressure	200	00C8	201	30201	2	FLOAT	
Meter 6 Density	202	00CA	203	30203	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 6 Reserved	204	00CC	205	30205	2	FLOAT	
Meter 6 Reserved	206	00CE	207	30207	2	FLOAT	
Additives Instantaneous Values							
Additive 1 Gross Total	208	00D0	209	30209	2	FLOAT	
Additive 1 Accumulated Gross Total	210	00D2	211	30211	2	FLOAT	
Additive 2 Gross Total	212	00D4	213	30213	2	FLOAT	
Additive 2 Accumulated Gross Total	214	00D6	215	30215	2	FLOAT	
Additive 3 Gross Total	216	00D8	217	30217	2	FLOAT	
Additive 3 Accumulated Gross Total	218	00DA	219	30219	2	FLOAT	
Additive 4 Gross Total	220	00DC	221	30221	2	FLOAT	
Additive 4 Accumulated Gross Total	222	00DE	223	30223	2	FLOAT	
Additive Reserved	224	00E0	225	30225	2	FLOAT	
Additive Reserved	226	00E2	227	30227	2	FLOAT	
Additive Reserved	228	00E4	229	30229	2	FLOAT	
Additive Reserved	230	00E6	231	30231	2	FLOAT	
Additive Reserved	232	00E8	233	30233	2	FLOAT	
Additive Reserved	234	00EA	235	30235	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Additive Reserved	236	00EC	237	30237	2	FLOAT	
Additive Reserved	238	00EE	239	30239	2	FLOAT	
Transaction Record							
Transaction Number	240	00F0	241	30241	2	ULONG	
Unique Number	242	00F2	243	30243	2	ULONG	
Power Cycle Counts	244	00F4	245	30245	2	ULONG	
Unit Address	246	00F6	247	30247	1	UINT	
Batch Start	247	00F7	248	30248	1	UINT	
Batch Stop	248	00F8	249	30249	1	UINT	
Start Date - Day	249	00F9	250	30250	1	UINT	
Start Date - Month	250	00FA	251	30251	1	UINT	
Start Date - Year	251	00FB	252	30252	1	UINT	
Start Time - Hours	252	00FC	253	30253	1	UINT	
Start Time - Minutes	253	00FD	254	30254	1	UINT	
Start Time - Seconds	254	00FE	255	30255	1	UINT	
Stop Time - Hours	255	00FF	256	30256	1	UINT	
Stop Time - Minutes	256	0100	257	30257	1	UINT	
Stop Time - Seconds	257	0101	258	30258	1	UINT	
Communication Mode	258	0102	259	30259	1	UINT	
Loading type	259	0103	260	30260	1	UINT	
Bay Number	260	0104	261	30261	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
First Arm Number	261	0105	262	30262	1	UINT	
Number of Arms	262	0106	263	30263	1	UINT	
Calibration Number	263	0107	264	30264	1	UINT	
Personnel Index	264	0108	265	30265	1	UINT	
Vehicle Index	265	0109	266	30266	1	UINT	
Master Index	266	010A	267	30267	1	UINT	
Checksum	267	010B	268	30268	1	UINT	
Load Number	268	010C	269	30269	5	char [10]	
Reference/Truck Number	273	0111	274	30274	7	char [14]	
Reserved 1	280	0118	281	30281	1	UINT	
Reserved 2	281	0119	282	30282	1	UINT	
Reserved 3	282	011A	283	30283	1	UINT	
Reserved 4	283	011B	284	30284	1	UINT	
Reserved 5	284	011C	285	30285	1	UINT	
Reserved 6	285	011D	286	30286	1	UINT	
Reserved 7	286	011E	287	30287	1	UINT	
Reserved 8	287	011F	288	30288	1	UINT	
Reserved 9	288	0120	289	30289	1	UINT	
Reserved 10	289	0121	290	30290	1	UINT	
Reserved 11	290	0122	291	30291	1	UINT	
Reserved 12	291	0123	292	30292	1	UINT	
Reserved 13	292	0124	293	30293	1	UINT	
Reserved 14	293	0125	294	30294	1	UINT	
Reserved 15	294	0126	295	30295	1	UINT	
Reserved 16	295	0127	296	30296	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Reserved 17	296	0128	297	30297	1	UINT	
Reserved 18	297	0129	2978	30298	1	UINT	
Reserved 19	298	012A	299	30299	1	UINT	
Reserved 20	299	012B	300	30300	1	UINT	
Batch Record							
Arm Number	300	012C	301	30301	1	UINT	
Batch Number	301	012D	302	30302	1	UINT	
Recipe Number	302	012E	303	30303	1	UINT	
Compartment Number	303	012F	304	30304	1	UINT	
Blend Type	304	0130	305	30305	1	UINT	
Start Time - Hours	305	0131	306	30306	1	UINT	
Start Time - Minutes	306	0132	307	30307	1	UINT	
Start Time - Seconds	307	0133	308	30308	1	UINT	
Stop Time - Hours	308	0134	309	30309	1	UINT	
Stop Time - Minutes	309	0135	310	30310	1	UINT	
Stop Time - Seconds	310	0136	311	30311	1	UINT	
Blend Accuracy	311	0137	312	30312	1	UINT	Section A.1.3: Message Code
Arm Error	312	0138	313	30313	1	UINT	
Unit Setting	313	0139	314	30314	1	UINT	
Base Meter - Compensation Set-ting	314	013A	315	30315	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Blend Meter 1 - Compensation Setting	315	013B	316	30316	1	UINT	
Blend Meter 2 - Compensation Setting	316	013C	317	30317	1	UINT	
Base Meter - Error Status	317	013D	318	30318	1	UINT	
Blend Meter 1 - Error Status	318	013E	319	30319	1	UINT	
Blend Meter 2 - Error Status	319	013F	320	30320	1	UINT	
Transaction Number	320	0140	321	30321	2	ULONG	
Base Meter - Accumulated Total Before	322	0142	323	30323	2	ULONG	
Base Meter - Accumulated Total After	324	0144	325	30325	2	ULONG	
Base Meter - Net Accumulated Total Before	326	0146	327	30327	2	ULONG	
Base Meter - Net Accumulated Total After	328	0148	329	30329	2	ULONG	
Blend Meter 1 - Accumulated Total Before	330	014A	331	30331	2	ULONG	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Blend Meter 1 - Accumulated Total After	332	014C	333	30333	2	ULONG	
Blend Meter 1 - Net Accumulated Total Before	334	014E	335	30335	2	ULONG	
Blend Meter 1 - Net Accumulated Total After	336	0150	337	30337	2	ULONG	
Blend Meter 2 - Accumulated Total Before	338	0152	339	30339	2	ULONG	
Blend Meter 2 - Accumulated Total After	340	0154	341	30341	2	ULONG	
Blend Meter 2 - Net Accumulated Total Before	342	0156	343	30343	2	ULONG	
Blend Meter 2 - Net Accumulated Total After	344	0158	345	30345	2	ULONG	
Arm Preset Quantity	346	015A	347	30347	2	FLOAT	
Arm Returned Quantity	348	015C	349	30349	2	FLOAT	
Base Meter - Gross Total	350	015E	351	30351	2	FLOAT	
Base Meter - Net Total	352	0160	353	30353	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Base Meter - Preset Quantity	354	0162	355	30355	2	FLOAT	
Base Meter - Density	356	0164	357	30357	2	FLOAT	
Base Meter - Expansion factor	358	0166	359	30359	2	FLOAT	
Base Meter - Average Tempera- ture	360	0168	361	30361	2	FLOAT	
Base Meter - Average Pressure	362	016A	363	30363	2	FLOAT	
Base Meter - Average Density	364	016C	365	30365	2	FLOAT	
Blend Meter 1 - Preset Quantity	366	016E	367	30367	2	FLOAT	
Blend Meter 1 - Gross Total	368	0170	369	30369	2	FLOAT	
Blend Meter 1 - Net Total	370	0172	371	30371	2	FLOAT	
Blend Meter 1 - Density	372	0174	373	30373	2	FLOAT	
Blend Meter 1 - Expansion factor	374	0176	375	30375	2	FLOAT	
Blend Meter 1 - Average Tem- perature	376	0178	377	30377	2	FLOAT	
Blend Meter 1 - Average Pres-sure	378	017A	379	30379	2	FLOAT	
Blend Meter 1 - Average Density	380	017C	381	30381	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Blend Meter 2 - Preset Quantity	382	017E	383	30383	2	FLOAT	
Blend Meter 2 - Gross Total	384	0180	385	30385	2	FLOAT	
Blend Meter 2 - Net Total	386	0182	387	30387	2	FLOAT	
Blend Meter 2 - Density	388	0184	389	30389	2	FLOAT	
Blend Meter 2 - Expansion factor	390	0186	391	30391	2	FLOAT	
Blend Meter 2 - Average Tem- perature	392	0188	393	30393	2	FLOAT	
Blend Meter 2 - Average Pres-sure	394	018A	395	30395	2	FLOAT	
Blend Meter 2 - Average Density	396	018C	397	30397	2	FLOAT	
Additive 1 - Preset Quantity	398	018E	399	30399	2	FLOAT	
Additive 1 - Gross Total	400	0190	401	30401	2	FLOAT	
Additive 2 - Preset Quantity	402	0192	403	30403	2	FLOAT	
Additive 2 - Gross Total	404	0194	405	30405	2	FLOAT	
Additive 3 - Preset Quantity	406	0196	407	30407	2	FLOAT	
Additive 3 - Gross Total	408	0198	409	30409	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Additive 4 - Preset Quantity	410	019A	411	30411	2	FLOAT	
Additive 4 - Gross Total	412	019C	413	30413	2	FLOAT	
Reserved 1	414	019E	415	30415	1	UINT	
Reserved 2	415	019F	416	30416	1	UINT	
Reserved 3	416	01A0	417	30417	1	UINT	
Reserved 4	417	01A1	418	30418	1	UINT	
Reserved 5	418	01A2	419	30419	1	UINT	
Reserved 6	419	01A3	420	30420	1	UINT	
Reserved 7	420	01A4	421	30421	1	UINT	
Reserved 8	421	01A5	422	30422	1	UINT	
Reserved 9	422	01A6	423	30423	1	UINT	
Reserved 10	423	01A7	424	30424	1	UINT	
Reserved 11	424	01A8	425	30425	1	UINT	
Reserved 12	425	01A9	426	30426	1	UINT	
Reserved 13	426	01AA	427	30427	1	UINT	
Reserved 14	427	01AB	428	30428	1	UINT	
Reserved 15	428	01AC	429	30429	1	UINT	
Reserved 16	429	01AD	430	30430	1	UINT	
Reserved 17	430	01AE	431	30431	1	UINT	
Audit Log							
Audit Log Number	431	01AF	432	30432	1	UINT	
Audit Log Date - Day	432	01B0	433	30433	1	UINT	
Audit Log Date - Day	433	01B1	434	30434	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Audit Log Date - Day	434	01B2	435	30435	1	UINT	
Audit Log Date - Day	435	01B3	436	30436	1	UINT	
Audit Log Date - Day	436	01B4	437	30437	1	UINT	
Audit Log Date - Day	437	01B5	438	30438	1	UINT	
User Name	438	01B6	439	30439	9	char [18]	
Config Item	447	01BF	448	30448	9	char [18]	
Old Value	456	01C8	457	30457	9	char [18]	
New Value	465	01D1	466	30466	9	char [18]	
Diagnostics Parameters							
Meter 1 DCV Inlet Solenoid Counts	474	01DA	475	30475	2	ULONG	
Meter 1 DCV Outlet Solenoid Counts	476	01DC	477	30477	2	ULONG	
Meter 2 DCV Inlet Solenoid Counts	478	01DE	479	30479	2	ULONG	
Meter 2 DCV Outlet Solenoid Counts	480	01E0	481	30481	2	ULONG	
Meter 3 DCV Inlet Solenoid Counts	482	01E2	483	30483	2	ULONG	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 3 DCV Outlet Solenoid Counts	484	01E4	485	30485	2	ULONG	
Meter 4 DCV Inlet Solenoid Counts	486	01E6	487	30487	2	ULONG	
Meter 4 DCV Outlet Solenoid Counts	488	01E8	489	30489	2	ULONG	
Reserved 1	490	01EA	491	30491	2	ULONG	
Reserved 2	492	01EC	493	30493	2	ULONG	
Reserved 3	494	01EE	495	30495	2	ULONG	
Reserved 4	496	01F0	497	30497	2	ULONG	
COM 1 Comms Error Counts	498	01F2	499	30499	2	ULONG	
COM 2 Comms Error Counts	500	01F4	501	30501	2	ULONG	
COM 3 Comms Error Counts	502	01F6	503	30503	2	ULONG	
CPU Card (Card D) Health	504	01F8	505	30505	1	UINT	
Input Card (Card C) Health	505	01F9	506	30506	1	UINT	
Output Card (Card B) Health	506	01FA	507	30507	1	UINT	
Power Card (Card A) Health	507	01FB	508	30508	1	UINT	
Reserved	508	01FC	509	30509	1	UINT	
Reserved	509	01FD	510	30510	1	UINT	
Reserved	510	01FE	511	30511	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Reserved	511	01FE	512	30512	1	UINT	
Meter 1 W&M Configuration Parameters							
Meter 1 Minimum Linear Flow-rate	512	0200	513	30513	1	UINT	
Meter 1 Signal type	513	0201	514	30514	1	UINT	
Meter 1 Flow Meter Input Resister	514	0202	515	30515	1	UINT	
Meter 1 Flow Meter Input Filter	515	0203	516	30516	1	UINT	
Meter 1 Unauthorised flow threshold	516	0204	517	30517	1	UINT	
Meter 1 Minimum Preset Quna-tity	517	0205	518	30518	1	UINT	
Meter 1 Calibration Number	518	0206	519	30519	1	UINT	
Meter 1 Calibration Date - Day	519	0207	520	30520	1	UINT	
Meter 1 Calibration Date - Month	520	0208	521	30521	1	UINT	
Meter 1 Calibration Date - Year	521	0209	522	30522	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 1 Calibration Date - Hours	522	020A	523	30523	1	UINT	
Meter 1 Calibration Date - Min-utes	523	020B	524	30524	1	UINT	
Meter 1 Calibration Date - Sec-onds	524	020C	525	30525	1	UINT	
Meter 1 K-Factor Type	525	020D	526	30526	1	UINT	
Meter 1 Number of Non-Linear K- Factor	526	020E	527	30527	1	UINT	
Meter 1 Non- Linear Frequency 1	527	020F	528	30528	1	UINT	
Meter 1 Non- Linear Frequency 2	528	0210	529	30529	1	UINT	
Meter 1 Non- Linear Frequency 3	529	0211	530	30530	1	UINT	
Meter 1 Non- Linear Frequency 4	530	0212	531	30531	1	UINT	
Meter 1 Non- Linear Frequency 5	531	0213	532	30532	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 1 Non-Linear Frequency 6	532	0214	533	30533	1	UINT	
Meter 1 Non-Linear Frequency 7	533	0215	534	30534	1	UINT	
Meter 1 Non-Linear Frequency 8	534	0216	535	30535	1	UINT	
Meter 1 Non-Linear Frequency 9	535	0217	536	30536	1	UINT	
Meter 1 Non-Linear Frequency 10	536	0218	537	30537	1	UINT	
Meter 1 Meter Factor	537	0219	538	30538	2	FLOAT	
Meter 1 Linear K-Factor	539	021B	540	30540	2	FLOAT	
Meter 1 Non-Linear K-Factor 1	541	021D	542	30542	2	FLOAT	
Meter 1 Non-Linear K-Factor 2	543	021F	544	30544	2	FLOAT	
Meter 1 Non-Linear K-Factor 3	545	0221	546	30546	2	FLOAT	
Meter 1 Non-Linear K-Factor 4	547	0223	548	30548	2	FLOAT	
Meter 1 Non-Linear K-Factor 5	549	0225	550	30550	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 1 Non-Linear K-Factor 6	551	0227	552	30552	2	FLOAT	
Meter 1 Non-Linear K-Factor 7	553	0229	554	30554	2	FLOAT	
Meter 1 Non-Linear K-Factor 8	555	022B	556	30556	2	FLOAT	
Meter 1 Non-Linear K-Factor 9	557	022D	558	30558	2	FLOAT	
Meter 1 Non-Linear K-Factor 10	559	022F	560	30560	2	FLOAT	
Meter 1 Cut-off Frequency	561	0231	562	30562	2	FLOAT	
Meter 1 Overrun quantity	563	0233	564	30564	2	FLOAT	
Meter 1 Reserved 1	565	0235	566	30566	1	UINT	
Meter 1 Reserved 2	566	0236	567	30567	1	UINT	
Meter 1 Reserved 3	567	0237	568	30568	1	UINT	
Meter 1 Reserved 4	568	0238	569	30569	1	UINT	
Meter 1 Reserved 5	569	0239	570	30570	1	UINT	
Meter 1 Reserved 6	570	023A	571	30571	1	UINT	
Meter 1 Reserved 7	571	023B	572	30572	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 1 Reserved 8	572	023C	573	30573	1	UINT	
Meter 1 Reserved 9	573	023D	574	30574	1	UINT	
Meter 1 Reserved 10	574	023E	575	30575	1	UINT	
Meter 2 W&M Configuration Parameters							
Meter 2 Minimum Linear Flow-rate	575	023F	576	30576	1	UINT	
Meter 2 Signal type	576	0240	577	30577	1	UINT	
Meter 2 Flow Meter Input Resister	577	0241	578	30578	1	UINT	
Meter 2 Flow Meter Input Filter	578	0242	579	30579	1	UINT	
Meter 2 Unauthorised flow threshold	579	0243	580	30580	1	UINT	
Meter 2 Minimum Preset Quna-ity	580	0244	581	30581	1	UINT	
Meter 2 Calibration Number	581	0245	582	30582	1	UINT	
Meter 2 Calibration Date - Day	582	0246	583	30583	1	UINT	
Meter 2 Calibration Date - Month	583	0247	584	30584	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 2 Calibration Date - Year	584	0248	585	30585	1	UINT	
Meter 2 Calibration Date - Hours	585	0249	586	30586	1	UINT	
Meter 2 Calibration Date - Minutes	586	024A	587	30587	1	UINT	
Meter 2 Calibration Date - Seconds	587	024B	588	30588	1	UINT	
Meter 2 K-Factor Type	588	024C	589	30589	1	UINT	
Meter 2 Number of Non-Linear K- Factor	589	024D	590	30590	1	UINT	
Meter 2 Non- Linear Frequency 1	590	024E	591	30591	1	UINT	
Meter 2 Non- Linear Frequency 2	591	024F	592	30592	1	UINT	
Meter 2 Non- Linear Frequency 3	592	0250	593	30593	1	UINT	
Meter 2 Non- Linear Frequency 4	593	0251	594	30594	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 2 Non-Linear Frequency 5	594	0252	595	30595	1	UINT	
Meter 2 Non-Linear Frequency 6	595	0253	596	30596	1	UINT	
Meter 2 Non-Linear Frequency 7	596	0254	597	30597	1	UINT	
Meter 2 Non-Linear Frequency 8	597	0255	598	30598	1	UINT	
Meter 2 Non-Linear Frequency 9	598	0256	599	30599	1	UINT	
Meter 2 Non-Linear Frequency 10	599	0257	600	30600	1	UINT	
Meter 2 Meter Factor	600	0258	601	30601	2	FLOAT	
Meter 2 Linear K-Factor	602	025A	603	30603	2	FLOAT	
Meter 2 Non-Linear K-Factor 1	604	025C	605	30605	2	FLOAT	
Meter 2 Non-Linear K-Factor 2	606	025E	607	30607	2	FLOAT	
Meter 2 Non-Linear K-Factor 3	608	0260	609	30609	2	FLOAT	
Meter 2 Non-Linear K-Factor 4	610	0262	611	30611	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 2 Non-Linear K-Factor 5	612	0264	613	30613	2	FLOAT	
Meter 2 Non-Linear K-Factor 6	614	0266	615	30615	2	FLOAT	
Meter 2 Non-Linear K-Factor 7	616	0268	617	30617	2	FLOAT	
Meter 2 Non-Linear K-Factor 8	618	026A	619	30619	2	FLOAT	
Meter 2 Non-Linear K-Factor 9	620	026C	621	30621	2	FLOAT	
Meter 2 Non-Linear K-Factor 10	622	026E	623	30623	2	FLOAT	
Meter 2 Cut-off Frequency	624	0270	625	30625	2	FLOAT	
Meter 2 Overrun quantity	626	0272	627	30627	2	FLOAT	
Meter 2 Reserved 1	628	0274	629	30629	1	UINT	
Meter 2 Reserved 2	629	0275	630	30630	1	UINT	
Meter 2 Reserved 3	630	0276	631	30631	1	UINT	
Meter 2 Reserved 4	631	0277	632	30632	1	UINT	
Meter 2 Reserved 5	632	0278	633	30633	1	UINT	
Meter 2 Reserved 6	633	0279	634	30634	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 2 Reserved 7	634	027A	635	30635	1	UINT	
Meter 2 Reserved 8	635	027B	636	30636	1	UINT	
Meter 2 Reserved 9	636	027C	637	30637	1	UINT	
Meter 2 Reserved 10	637	027D	638	30638	1	UINT	
Meter 3 W&M Configuration Parameters							
Meter 3 Minimum Linear Flow-rate	638	027E	639	30639	1	UINT	
Meter 3 Signal type	639	027F	640	30640	1	UINT	
Meter 3 Flow Meter Input Resister	640	0280	641	30641	1	UINT	
Meter 3 Flow Meter Input Filter	641	0281	642	30642	1	UINT	
Meter 3 Unauthorised flow threshold	642	0282	643	30643	1	UINT	
Meter 3 Minimum Preset Quna-tity	643	0283	644	30644	1	UINT	
Meter 3 Calibration Number	644	0284	645	30645	1	UINT	
Meter 3 Calibration Date - Day	645	0285	646	30646	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 3 Calibration Date - Month	646	0286	647	30647	1	UINT	
Meter 3 Calibration Date - Year	647	0287	648	30648	1	UINT	
Meter 3 Calibration Date - Hours	648	0288	649	30649	1	UINT	
Meter 3 Calibration Date - Min-utes	649	0289	650	30650	1	UINT	
Meter 3 Calibration Date - Sec-onds	650	028A	651	30651	1	UINT	
Meter 3 K-Factor Type	651	028B	652	30652	1	UINT	
Meter 1 Number of Non-Linear K- Factor	652	028C	653	30653	1	UINT	
Meter 3 Non- Linear Frequency 1	653	028D	654	30654	1	UINT	
Meter 3 Non- Linear Frequency 2	654	028E	655	30655	1	UINT	
Meter 3 Non- Linear Frequency 3	655	028F	656	30656	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 3 Non-Linear Frequency 4	656	0290	657	30657	1	UINT	
Meter 3 Non-Linear Frequency 5	657	0291	658	30658	1	UINT	
Meter 3 Non-Linear Frequency 6	658	0292	659	30659	1	UINT	
Meter 3 Non-Linear Frequency 7	659	0293	660	30660	1	UINT	
Meter 3 Non-Linear Frequency 8	660	0294	661	30661	1	UINT	
Meter 3 Non-Linear Frequency 9	661	0295	662	30662	1	UINT	
Meter 3 Non-Linear Frequency 10	662	0296	663	30663	1	UINT	
Meter 3 Meter Factor	663	0297	664	30664	2	FLOAT	
Meter 3 Linear K-Factor	665	0299	666	30666	2	FLOAT	
Meter 3 Non-Linear K-Factor 1	667	029B	668	30668	2	FLOAT	
Meter 3 Non-Linear K-Factor 2	669	029D	670	30670	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 3 Non-Linear K-Factor 3	671	029F	672	30672	2	FLOAT	
Meter 3 Non-Linear K-Factor 4	673	00A1	674	30674	2	FLOAT	
Meter 3 Non-Linear K-Factor 5	675	00A3	676	30676	2	FLOAT	
Meter 3 Non-Linear K-Factor 6	677	00A5	678	30678	2	FLOAT	
Meter 3 Non-Linear K-Factor 7	679	00A7	680	30680	2	FLOAT	
Meter 3 Non-Linear K-Factor 8	681	00A9	682	30682	2	FLOAT	
Meter 3 Non-Linear K-Factor 9	683	00AB	684	30684	2	FLOAT	
Meter 3 Non-Linear K-Factor 10	685	00AD	686	30686	2	FLOAT	
Meter 3 Cut-off Frequency	687	00AF	688	30688	2	FLOAT	
Meter 3 Overrun quantity	689	00B1	690	30690	2	FLOAT	
Meter 3 Reserved 1	691	00B3	692	30692	1	UINT	
Meter 3 Reserved 2	692	00B4	693	30693	1	UINT	
Meter 3 Reserved 3	693	00B5	694	30694	1	UINT	
Meter 3 Reserved 4	694	00B6	695	30695	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 3 Reserved 5	695	00B7	696	30696	1	UINT	
Meter 3 Reserved 6	696	00B8	697	30697	1	UINT	
Meter 3 Reserved 7	697	00B9	698	30698	1	UINT	
Meter 3 Reserved 8	698	00BA	699	30699	1	UINT	
Meter 3 Reserved 9	699	00BB	700	30700	1	UINT	
Meter 3 Reserved 10	700	00BC	701	30701	1	UINT	
Meter 4 W&M Configuration Parameters							
Meter 4 Minimum Linear Flow-rate	701	00BD	702	30702	1	UINT	
Meter 4 Signal type	702	00BE	703	30703	1	UINT	
Meter 4 Flow Meter Input Resister	703	00BF	704	30704	1	UINT	
Meter 4 Flow Meter Input Filter	704	02C0	705	30705	1	UINT	
Meter 4 Unauthorised flow threshold	705	02C1	706	30706	1	UINT	
Meter 4 Minimum Preset Quantity	706	02C2	707	30707	1	UINT	
Meter 4 Calibration Number	707	02C3	708	30708	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 4 Calibration Date - Day	708	02C4	709	30709	1	UINT	
Meter 4 Calibration Date - Month	709	02C5	710	30710	1	UINT	
Meter 4 Calibration Date - Year	710	02C6	711	30711	1	UINT	
Meter 4 Calibration Date - Hours	711	02C7	712	30712	1	UINT	
Meter 4 Calibration Date - Min-utes	712	02C8	713	30713	1	UINT	
Meter 4 Calibration Date - Sec-onds	713	02C9	714	30714	1	UINT	
Meter 4 K-Factor Type	714	02CA	715	30715	1	UINT	
Meter 4 Number of Non-Linear K- Factor	715	02CB	716	30716	1	UINT	
Meter 4 Non- Linear Frequency 1	716	02CC	717	30717	1	UINT	
Meter 4 Non- Linear Frequency 2	717	02CD	718	30718	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 4 Non- Linear Frequency 3	718	02CE	719	30719	1	UINT	
Meter 4 Non- Linear Frequency 4	719	02CF	720	30720	1	UINT	
Meter 4 Non- Linear Frequency 5	720	02D0	721	30721	1	UINT	
Meter 4 Non- Linear Frequency 6	721	02D1	722	30722	1	UINT	
Meter 4 Non- Linear Frequency 7	722	02D2	723	30723	1	UINT	
Meter 4 Non- Linear Frequency 8	723	02D3	724	30724	1	UINT	
Meter 4 Non- Linear Frequency 9	724	02D4	725	30725	1	UINT	
Meter 4 Non- Linear Frequency 10	725	02D5	726	30726	1	UINT	
Meter 4 Meter Factor	726	02D6	727	30727	2	FLOAT	
Meter 4 Linear K- Factor	728	02D8	729	30729	2	FLOAT	
Meter 4 Non- Linear K-Factor 1	730	02DA	731	30731	2	FLOAT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 4 Non-Linear K-Factor 2	732	02DC	733	30733	2	FLOAT	
Meter 4 Non-Linear K-Factor 3	734	02DE	735	30735	2	FLOAT	
Meter 4 Non-Linear K-Factor 4	736	02E0	737	30737	2	FLOAT	
Meter 4 Non-Linear K-Factor 5	738	02E2	739	30739	2	FLOAT	
Meter 4 Non-Linear K-Factor 6	740	02E4	741	30741	2	FLOAT	
Meter 4 Non-Linear K-Factor 7	742	02E6	743	30743	2	FLOAT	
Meter 4 Non-Linear K-Factor 8	744	02E8	745	30745	2	FLOAT	
Meter 4 Non-Linear K-Factor 9	746	02EA	747	30747	2	FLOAT	
Meter 4 Non-Linear K-Factor 10	748	02EC	749	30749	2	FLOAT	
Meter 4 Cut-off Frequency	750	02EE	751	30751	2	FLOAT	
Meter 4 Overrun quantity	752	02F0	753	30753	2	FLOAT	
Meter 4 Reserved 1	754	02F2	755	30755	1	UINT	
Meter 4 Reserved 2	755	02F3	756	30756	1	UINT	
Meter 4 Reserved 3	756	02F4	757	30757	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 4 Reserved 4	757	02F5	758	30758	1	UINT	
Meter 4 Reserved 5	758	02F6	759	30759	1	UINT	
Meter 4 Reserved 6	759	02F7	760	30760	1	UINT	
Meter 4 Reserved 7	760	02F8	761	30761	1	UINT	
Meter 4 Reserved 8	761	02F9	762	30762	1	UINT	
Meter 4 Reserved 9	762	02FA	763	30763	1	UINT	
Meter 4 Reserved 10	763	02FB	764	30764	1	UINT	
Meter 4 Reserved 11	764	02FC	765	30765	1	UINT	
Meter 4 Reserved 12	765	02FD	766	30766	1	UINT	
Meter 4 Reserved 13	766	02FE	767	30767	1	UINT	
Meter 4 Reserved 14	767	02FF	768	30768	1	UINT	
Meter 4 Reserved 15	768	0300	769	30769	1	UINT	
Meter 4 Reserved 16	769	0301	770	30770	1	UINT	
Meter 4 Reserved 17	770	0302	771	30771	1	UINT	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Meter 4 Reserved 18	771	0303	772	30772	1	UINT	
Meter 4 Reserved 19	772	0304	773	30773	1	UINT	
Meter 4 Reserved 20	773	0305	774	30774	1	UINT	
Meter 4 Reserved 21	774	0306	775	30775	1	UINT	
Meter 4 Reserved 22	775	0307	776	30776	1	UINT	
Meter 4 Reserved 23	776	0308	777	30777	1	UINT	
Meter 4 Reserved 24	777	0309	778	30778	1	UINT	
Meter 4 Reserved 25	778	030A	779	30779	1	UINT	
Meter 4 Reserved 26	779	030B	780	30780	1	UINT	
Batch Additive 1 Accum Total Before	780	030C	781	30781	2	ULONG	
Batch Additive 1 Accum Total After	782	030E	783	30783	2	ULONG	
Batch Additive 2 Accum Total Before	784	0310	785	30785	2	ULONG	
Batch Additive 2 Accum Total After	786	0312	787	30787	2	ULONG	

Parameter Name	Starting Input Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Batch Additive 3 Accum Total Before	788	0314	789	30789	2	ULONG	
Batch Additive 3 Accum Total After	790	0316	791	30791	2	ULONG	
Batch Additive 4 Accum Total Before	792	0318	793	30793	2	ULONG	
Batch Additive 4 Accum Total After	794	031A	795	30795	2	ULONG	
Saved Parameter Checksum	796	031C	797	30797	1	UINT	

7.2.4 Holding Registers

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)	Number (Standard / Modicon)		Registers	Type		
Real Time Clock							
RTC Date - Day	000	0000	001	40001	1	UINT	
RTC Date - Month	001	0001	002	40002	1	UINT	
RTC Date - Year	002	0002	003	40003	1	UINT	
RTC Time - Hours	003	0003	004	40004	1	UINT	
RTC Time - Minutes	004	0004	005	40005	1	UINT	
RTC Time - Seconds	005	0005	006	40006	1	UINT	
Operational Parameter							

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Transaction Number	006	0006	007	40007	1	UINT	
Batch Number	007	0007	008	40008	1	UINT	
Audit Log Number	008	0008	009	40009	1	UINT	
Show Officer Card	009	0009	010	40010	1	UINT	
Control Room Stop	010	000A	011	40011	1	BITS	Section A.2.2: Alarm Source 1
Reserved	011	000B	012	40012	1	UINT	
Change Communication Mode	012	000C	013	40013	1	UINT	Section A.1.12: Communication Mode
Operation Command	013	000D	014	40014	1	ENUM	Section A.1.6: Operation Command
Rest Push Button	014	000E	015	40015	1	UINT	
Display Timeout	015	000F	016	40016	1	UINT	
Display Command	016	0010	017	40017	1	ENUM	Section A.1.7: Display Commands
NexWatch Command	017	0011	018	40018	1	ENUM	Section A.1.10: NexWatch Command
Reset Comms Error Counts	018	0012	019	40019	1	ENUM	
Reset alarms	019	0013	020	40020	1	ENUM	Section A.1.9: Reset alarms
Transaction Settled	020	0014	021	40021	2	UINT	
Dummy test data 1	022	0016	023	40023	1	UINT	
Dummy test data 2	023	0017	024	40024	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Reserved	024	0018	025	40025	1	UINT	
Cooling state	025	0019	026	40026	1	UINT	
Number Of. Compartment to Load	026	001A	027	40027	1	UINT	
Loading Type (Top/Bottom)	027	001B	028	40028	1	UINT	Section A.1.11: Top Bottom Loading
Load Compartment 1 - Arm Number	028	001C	029	40029	1	UINT	
Load Compartment 1 - Recipe Number	029	001D	030	40030	1	UINT	
Load Compartment 1 - Compartment Number	030	001E	031	40031	1	UINT	
Load Compartment 2 - Arm Number	031	001F	032	40032	1	UINT	
Load Compartment 2 - Recipe Number	032	0020	033	40033	1	UINT	
Load Compartment 2 - Compartment Number	033	0021	034	40034	1	UINT	
Load Compartment 3 - Arm Number	034	0022	035	40035	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Load Compartment 3 - Recipe Number	035	0023	036	40036	1	UINT	
Load Compartment 3 - Compartment Number	036	0024	037	40037	1	UINT	
Load Compartment 4 - Arm Number	037	0025	038	40038	1	UINT	
Load Compartment 4 - Recipe Number	038	0026	039	40039	1	UINT	
Load Compartment 4 - Compartment Number	039	0027	040	40040	1	UINT	
Load Compartment 5 - Arm Number	040	0028	041	40041	1	UINT	
Load Compartment 5 - Recipe Number	041	0029	042	40042	1	UINT	
Load Compartment 5 - Compartment Number	042	002A	043	40043	1	UINT	
Load Compartment 6 - Arm Number	043	002B	044	40044	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Load Compartment 6 - Recipe Number	044	002C	045	40045	1	UINT	
Load Compartment 6 - Compartment Number	045	002D	046	40046	1	UINT	
Load Compartment 7 - Arm Number	046	002E	047	40047	1	UINT	
Load Compartment 7 - Recipe Number	047	002F	048	40048	1	UINT	
Load Compartment 7 - Compartment Number	048	0030	049	40049	1	UINT	
Load Compartment 8 - Arm Number	049	0031	050	40050	1	UINT	
Load Compartment 8 - Recipe Number	050	0032	051	40051	1	UINT	
Load Compartment 8 - Compartment Number	051	0033	052	40052	1	UINT	
Load Compartment 1 - Preset Quantity	052	0034	053	40053	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Load Compartment 2 - Preset Quantity	054	0036	055	40055	2	FLOAT	
Load Compartment 3 - Preset Quantity	056	0038	057	40057	2	FLOAT	
Load Compartment 4 - Preset Quantity	058	003A	059	40059	2	FLOAT	
Load Compartment 5 - Preset Quantity	060	003C	061	40061	2	FLOAT	
Load Compartment 6 - Preset Quantity	062	003E	063	40063	2	FLOAT	
Load Compartment 7 - Preset Quantity	064	0040	065	40065	2	FLOAT	
Load Compartment 8 - Preset Quantity	066	0042	067	40067	2	FLOAT	
Truck number	068	0044	069	40069	7	char [14]	
Random Number Key	075	004B	076	40076	5	char [10]	
Line 1 Justify Character & Message (top line)	080	0050	081	40081	15	char [30]	
Line 2 Justify Character & Message	095	005F	096	40096	15	char [30]	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Line 3 Justify Character & Message	110	006E	111	40111	15	char [30]	
Line 4 Justify Character & Message	125	007D	126	40126	15	char [30]	
Line 5 Justify Character & Message	140	008C	141	40141	15	char [30]	
Line 6 Justify Character & Message	155	009B	156	40156	15	char [30]	
Line 7 Justify Character & Message	170	00AA	171	40171	15	char [30]	
Line 8 Justify Character & Message (bottom line)	185	00B9	186	40186	15	char [30]	
Configuration Parameter							
Recipe 1 - Recipe Name	200	00C8	201	40201	6	char [12]	
Recipe 2 - Recipe Name	206	00CE	207	40207	6	char [12]	
Recipe 3 - Recipe Name	212	00D4	213	40213	6	char [12]	
Recipe 4 - Recipe Name	218	00DA	219	40219	6	char [12]	
Recipe 5 - Recipe Name	224	00E0	225	40225	6	char [12]	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 6 - Recipe Name	230	00E6	231	40231	6	char [12]	
Recipe 7 - Recipe Name	236	00EC	237	40237	6	char [12]	
Recipe 8 - Recipe Name	242	00F2	243	40243	6	char [12]	
Recipe 9 - Recipe Name	248	00F8	249	40249	6	char [12]	
Recipe 10 - Recipe Name	254	00FE	255	40255	6	char [12]	
Recipe 11 - Recipe Name	260	0104	261	40261	6	char [12]	
Recipe 12 - Recipe Name	266	010A	267	40267	6	char [12]	
Recipe 13 - Recipe Name	272	0110	273	40273	6	char [12]	
Recipe 14 - Recipe Name	278	0116	279	40279	6	char [12]	
Recipe 15 - Recipe Name	284	011C	285	40285	6	char [12]	
Recipe 16 - Recipe Name	290	0112	291	40291	6	char [12]	
Recipe 1 - Enable/Disable	296	0128	297	40297	1	UINT	
Recipe 1 - Arm Number	297	0129	298	40298	1	UINT	
Recipe 1 - Clean Line Volume	298	012A	299	40299	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 1 - Additive Flush Volume	299	012B	300	40300	1	UINT	
Recipe 2 - Enable/Disable	300	012C	301	40301	1	UINT	
Recipe 2 - Arm Number	301	012D	302	40302	1	UINT	
Recipe 2 - Clean Line Volume	302	012E	303	40303	1	UINT	
Recipe 2 - Additive Flush Volume	303	012F	304	40304	1	UINT	
Recipe 3 - Enable/Disable	304	0130	305	40305	1	UINT	
Recipe 3 - Arm Number	305	0131	306	40306	1	UINT	
Recipe 3 - Clean Line Volume	306	0132	307	40307	1	UINT	
Recipe 3 - Additive Flush Volume	307	0133	308	40308	1	UINT	
Recipe 4 - Enable/Disable	308	0134	309	40309	1	UINT	
Recipe 4 - Arm Number	309	0135	310	40310	1	UINT	
Recipe 4 - Clean Line Volume	310	0136	311	40311	1	UINT	
Recipe 4 - Additive Flush Volume	311	0137	312	40312	1	UINT	
Recipe 5 - Enable/Disable	312	0138	313	40313	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 5 - Arm Number	313	0139	314	40314	1	UINT	
Recipe 5 - Clean Line Volume	314	013A	315	40315	1	UINT	
Recipe 5 - Additive Flush Volume	315	013B	316	40316	1	UINT	
Recipe 6 - Enable/Disable	316	013C	317	40317	1	UINT	
Recipe 6 - Arm Number	317	013D	318	40318	1	UINT	
Recipe 6 - Clean Line Volume	318	013E	319	40319	1	UINT	
Recipe 6 - Additive Flush Volume	319	013F	320	40320	1	UINT	
Recipe 7 - Enable/Disable	320	0140	321	40321	1	UINT	
Recipe 7 - Arm Number	321	0141	322	40322	1	UINT	
Recipe 7 - Clean Line Volume	322	0142	323	40323	1	UINT	
Recipe 7 - Additive Flush Volume	323	0143	324	40324	1	UINT	
Recipe 8 - Enable/Disable	324	0144	325	40325	1	UINT	
Recipe 8 - Arm Number	325	0145	326	40326	1	UINT	
Recipe 8 - Clean Line Volume	326	0146	327	40327		UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 8 - Additive Flush Volume	327	0147	328	40328	1	UINT	
Recipe 9 - Enable/Disable	328	0148	329	40329	1	UINT	
Recipe 9 - Arm Number	329	0149	330	40330	1	UINT	
Recipe 9 - Clean Line Volume	330	014A	331	40331	1	UINT	
Recipe 9 - Additive Flush Volume	331	014B	332	40332	1	UINT	
Recipe 10 - Enable/Disable	332	014C	333	40333	1	UINT	
Recipe 10 - Arm Number	333	014D	334	40334	1	UINT	
Recipe 10 - Clean Line Volume	334	014E	335	40335	1	UINT	
Recipe 10 - Additive Flush Volume	335	014F	336	40336	1	UINT	
Recipe 11 - Enable/Disable	336	0150	337	40337	1	UINT	
Recipe 11 - Arm Number	337	0151	338	40338	1	UINT	
Recipe 11 - Clean Line Volume	338	0152	339	40339	1	UINT	
Recipe 11 - Additive Flush Volume	339	0153	340	40340	1	UINT	
Recipe 12 - Enable/Disable	340	0154	341	40341	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 12 - Arm Number	341	0155	342	40342	1	UINT	
Recipe 12 - Clean Line Volume	342	0156	343	40343	1	UINT	
Recipe 12 - Additive Flush Volume	343	0157	344	40344	1	UINT	
Recipe 13 - Enable/Disable	344	0158	345	40345	1	UINT	
Recipe 13 - Arm Number	345	0159	346	40346	1	UINT	
Recipe 13 - Clean Line Volume	346	015A	347	40347	1	UINT	
Recipe 13 - Additive Flush Volume	347	015B	348	40348	1	UINT	
Recipe 14 - Enable/Disable	348	015C	349	40349	1	UINT	
Recipe 14 - Arm Number	349	015D	350	40350	1	UINT	
Recipe 14 - Clean Line Volume	350	015E	351	40351	1	UINT	
Recipe 14 - Additive Flush Volume	351	015F	352	40352	1	UINT	
Recipe 15 - Enable/Disable	352	0160	353	40353	1	UINT	
Recipe 15 - Arm Number	353	0161	354	40354	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 15 - Clean Line Volume	354	0162	355	40355	1	UINT	
Recipe 15 - Additive Flush Volume	355	0163	356	40356	1	UINT	
Recipe 16 - Enable/Disable	356	0164	357	40357	1	UINT	
Recipe 16 - Arm Number	357	0165	358	40358	1	UINT	
Recipe 16 - Clean Line Volume	358	0166	359	40359	1	UINT	
Recipe 16 - Additive Flush Volume	359	0167	360	40360	1	UINT	
Recipe 1 - Blend Percentage	360	0168	361	40361	2	FLOAT	
Recipe 1 - Line 1 Additive Amount	362	016A	363	40363	2	FLOAT	
Recipe 1 - Line 2 Additive Amount	364	016C	365	40365	2	FLOAT	
Recipe 1 - Line 3 Additive Amount	366	016E	367	40367	2	FLOAT	
Recipe 1 - Line 4 Additive Amount	368	0170	369	40369	2	FLOAT	
Recipe 2 - Blend Percentage	370	0172	371	40371	2	FLOAT	
Recipe 2 - Line 1 Additive Amount	372	0174	373	40373	2	FLOAT	
Recipe 2 - Line 2 Additive Amount	374	0176	375	40375	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 2 - Line 3 Additive Amount	376	0178	377	40377	2	FLOAT	
Recipe 2 - Line 4 Additive Amount	378	017A	379	40379	2	FLOAT	
Recipe 3 - Blend Percentage	380	017C	381	40381	2	FLOAT	
Recipe 3 - Line 1 Additive Amount	382	017E	383	40383	2	FLOAT	
Recipe 3 - Line 2 Additive Amount	384	0180	385	40385	2	FLOAT	
Recipe 3 - Line 3 Additive Amount	386	0182	387	40387	2	FLOAT	
Recipe 3 - Line 4 Additive Amount	388	0184	389	40389	2	FLOAT	
Recipe 4 - Blend Percentage	390	0186	391	40391	2	FLOAT	
Recipe 4 - Line 1 Additive Amount	392	0188	393	40393	2	FLOAT	
Recipe 4 - Line 2 Additive Amount	394	018A	395	40395	2	FLOAT	
Recipe 4 - Line 3 Additive Amount	396	018C	397	40397	2	FLOAT	
Recipe 4 - Line 4 Additive Amount	398	018E	399	40399	2	FLOAT	
Recipe 5 - Blend Percentage	400	0190	401	40401	2	FLOAT	
Recipe 5 - Line 1 Additive Amount	402	0192	403	40403	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 5 - Line 2 Additive Amount	404	0194	405	40405	2	FLOAT	
Recipe 5 - Line 3 Additive Amount	406	0196	407	40407	2	FLOAT	
Recipe 5 - Line 4 Additive Amount	408	0198	409	40409	2	FLOAT	
Recipe 6 - Blend Percentage	410	019A	411	40411	2	FLOAT	
Recipe 6 - Line 1 Additive Amount	412	019C	413	40413	2	FLOAT	
Recipe 6 - Line 2 Additive Amount	414	019E	415	40415	2	FLOAT	
Recipe 6 - Line 3 Additive Amount	416	01A0	417	40417	2	FLOAT	
Recipe 6 - Line 4 Additive Amount	418	01A2	419	40419	2	FLOAT	
Recipe 7 - Blend Percentage	420	01A4	421	40421	2	FLOAT	
Recipe 7 - Line 1 Additive Amount	422	01A6	423	40423	2	FLOAT	
Recipe 7 - Line 2 Additive Amount	424	01A8	425	40425	2	FLOAT	
Recipe 7 - Line 3 Additive Amount	426	01AA	427	40427	2	FLOAT	
Recipe 7 - Line 4 Additive Amount	428	01AC	429	40429	2	FLOAT	
Recipe 8 - Blend Percentage	430	01AE	431	40431	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 8 - Line 1 Additive Amount	432	01B0	433	40433	2	FLOAT	
Recipe 8 - Line 2 Additive Amount	434	01B2	435	40435	2	FLOAT	
Recipe 8 - Line 3 Additive Amount	436	01B4	437	40437	2	FLOAT	
Recipe 8 - Line 4 Additive Amount	438	01B6	439	40439	2	FLOAT	
Recipe 9 - Blend Percentage	440	01B8	441	40441	2	FLOAT	
Recipe 9 - Line 1 Additive Amount	442	01BA	443	40443	2	FLOAT	
Recipe 9 - Line 2 Additive Amount	444	01BC	445	40445	2	FLOAT	
Recipe 9 - Line 3 Additive Amount	446	01BE	447	40447	2	FLOAT	
Recipe 9 - Line 4 Additive Amount	448	01C0	449	40449	2	FLOAT	
Recipe 10 - Blend Percentage	450	01C2	451	40451	2	FLOAT	
Recipe 10 - Line 1 Additive Amount	452	01C4	453	40453	2	FLOAT	
Recipe 10 - Line 2 Additive Amount	454	01C6	455	45540	2	FLOAT	
Recipe 10 - Line 3 Additive Amount	456	01C8	457	40457	2	FLOAT	
Recipe 10 - Line 4 Additive Amount	458	01CA	459	40459	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 11 - Blend Percentage	460	01CC	461	40461	2	FLOAT	
Recipe 11 - Line 1 Additive Amount	462	01CE	463	40463	2	FLOAT	
Recipe 11 - Line 2 Additive Amount	464	01D0	465	40465	2	FLOAT	
Recipe 11 - Line 3 Additive Amount	466	01D2	467	40467	2	FLOAT	
Recipe 11 - Line 4 Additive Amount	468	01D4	469	40469	2	FLOAT	
Recipe 12 - Blend Percentage	470	01D6	471	40471	2	FLOAT	
Recipe 12 - Line 1 Additive Amount	472	01D8	473	40473	2	FLOAT	
Recipe 12 - Line 2 Additive Amount	474	01DA	475	40475	2	FLOAT	
Recipe 12 - Line 3 Additive Amount	476	01DC	477	40477	2	FLOAT	
Recipe 12 - Line 4 Additive Amount	478	01DE	479	40479	2	FLOAT	
Recipe 13 - Blend Percentage	480	01E0	481	40481	2	FLOAT	
Recipe 13 - Line 1 Additive Amount	482	01E2	483	40483	2	FLOAT	
Recipe 13 - Line 2 Additive Amount	484	01E4	485	40485	2	FLOAT	
Recipe 13 - Line 3 Additive Amount	486	01E6	487	40487	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 13 - Line 4 Additive Amount	488	01E8	489	40489	2	FLOAT	
Recipe 14 - Blend Percentage	490	01EA	491	40491	2	FLOAT	
Recipe 14 - Line 1 Additive Amount	492	01EC	493	40493	2	FLOAT	
Recipe 14 - Line 2 Additive Amount	494	01EE	495	40495	2	FLOAT	
Recipe 14 - Line 3 Additive Amount	496	01F0	497	40497	2	FLOAT	
Recipe 14 - Line 4 Additive Amount	498	01F2	499	40499	2	FLOAT	
Recipe 15 - Blend Percentage	500	01F4	501	40501	2	FLOAT	
Recipe 15 - Line 1 Additive Amount	502	01F6	503	40503	2	FLOAT	
Recipe 15 - Line 2 Additive Amount	504	01F8	505	40505	2	FLOAT	
Recipe 15 - Line 3 Additive Amount	506	01FA	507	40507	2	FLOAT	
Recipe 15 - Line 4 Additive Amount	508	01FC	509	40509	2	FLOAT	
Recipe 16 - Blend Percentage	510	01FE	511	40511	2	FLOAT	
Recipe 16 - Line 1 Additive Amount	512	0200	513	40513	2	FLOAT	
Recipe 16 - Line 2 Additive Amount	514	0202	515	40515	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 16 - Line 3 Additive Amount	516	0204	517	40517	2	FLOAT	
Recipe 16 - Line 4 Additive Amount	518	0206	519	40519	2	FLOAT	
METER 1 Density	520	0208	521	40521	2	FLOAT	
METER 2 Density	522	020A	523	40523	2	FLOAT	
METER 3 Density	524	020C	525	40525	2	FLOAT	
METER 4 Density	526	020E	527	40527	2	FLOAT	
Reserved	528	0210	529	40529	2	FLOAT	
Reserved	530	0212	531	40531	2	FLOAT	
Reserved	532	0214	533	40533	2	FLOAT	
Reserved	534	0216	535	40535	2	FLOAT	
ARM 1 NAME	536	0218	537	40537	4	char [8]	
ARM 2 NAME	540	021C	541	40541	4	char [8]	
METER 1 NAME	544	0220	545	40545	4	char [8]	
METER 2 NAME	548	0224	549	40549	4	char [8]	
METER 3 NAME	552	0228	553	40553	4	char [8]	
METER 4 NAME	556	022C	557	40557	4	char [8]	
Reserved	560	0230	561	40561	4	char [8]	
Reserved	564	0234	565	40565	4	char [8]	
Display Contrast	568	0238	569	40569	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Language Options	569	0239	570	40570	1	ENUM	
First Arm Number	570	023A	571	40571	1	UINT	
RIT Lamp State Boot	571	023B	572	40572	1	ENUM	
RIT Lamp State Idle	572	023C	573	40573	1	ENUM	
RIT Lamp State Authorisation	573	023D	574	40574	1	ENUM	
RIT Lamp State Wait Ack	574	023E	575	40575	1	ENUM	
RIT Lamp State Wait Start	575	023F	576	40576	1	ENUM	
RIT Lamp State Loading	576	0240	577	40577	1	ENUM	
RIT Lamp State Error	577	0241	578	40578	1	ENUM	
RIT Lamp State Batch Over	578	0242	579	40579	1	ENUM	
Overrun Authorisation	579	0243	580	40580	1	UINT	
Local Overrun Authorisation	580	0244	581	40581	1	UINT	
ARM 1 Enable/Disable	581	0245	582	40582	1	UINT	
ARM 2 Enable/Disable	582	0246	583	40583	1	UINT	
Recipe 1 - Pre- blend Percentage	583	0247	584	40584	1	UINT	
Recipe 2 - Pre- blend Percentage	584	0248	585	40585	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Recipe 3 - Pre-blend Percentage	585	0249	586	40586	1	UINT	
Recipe 4 - Pre-blend Percentage	586	024A	587	40587	1	UINT	
Recipe 5 - Pre-blend Percentage	587	024B	588	40588	1	UINT	
Recipe 6 - Pre-blend Percentage	588	024C	589	40589	1	UINT	
Recipe 7 - Pre-blend Percentage	589	024D	590	40590	1	UINT	
Recipe 8 - Pre-blend Percentage	590	024E	591	40591	1	UINT	
Recipe 9 - Pre-blend Percentage	591	024F	592	40592	1	UINT	
Recipe 10 - Pre-blend Percentage	592	0250	593	40593	1	UINT	
Recipe 11 - Pre-blend Percentage	593	0251	594	40594	1	UINT	
Recipe 12 - Pre-blend Percentage	594	0252	595	40595	1	UINT	
Recipe 13 - Pre-blend Percentage	595	0253	596	40596	1	UINT	
Recipe 14 - Pre-blend Percentage	596	0254	597	40597	1	UINT	
Recipe 15 - Pre-blend Percentage	597	0255	598	40598	1	UINT	
Recipe 16 - Pre-blend Percentage	598	0256	599	40599	1	UINT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Loadspot 1 Wagon Number	600	0258	601	40601	6	CHAR [14]	R/W
Loadspot 2 Wagon Number	606	025F	607	40607	6	CHAR [14]	R/W
Loadspot 3 Wagon Number	612	0266	613	40613	6	CHAR [14]	R/W
Dual Error Alarm	618	026A	619	40619	1	UINT	Section A.1.14: Loading Alarm Effect
No Flow Timeout	619	026B	620	40620	1	UINT	Section A.1.14: Loading Alarm Effect
Temperature Error	620	026C	621	40621	1	UINT	Section A.1.14: Loading Alarm Effect
Leaking Additive	621	026D	622	40622	1	UINT	Section A.1.14: Loading Alarm Effect
Additive Volume Error	622	026E	623	40623	1	UINT	Section A.1.14: Loading Alarm Effect
Additive No Activity	623	026F	624	40624	1	UINT	Section A.1.14: Loading Alarm Effect
No Additive Flow	624	0270	625	40625	1	UINT	Section A.1.14: Loading Alarm Effect
Stopped Remotely	625	0271	626	40626	1	UINT	Section A.1.14: Loading Alarm Effect

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Phase Error Meter	626	0272	627	40627	1	UINT	Section A.1.14: Loading Alarm Effect
Pressure Error ARM	627	0273	628	40628	1	UINT	Section A.1.14: Loading Alarm Effect
Additive Firmware Failure	628	0274	629	40629	1	UINT	Section A.1.14: Loading Alarm Effect
Additive Error Failure	629	0275	630	40630	1	UINT	Section A.1.14: Loading Alarm Effect
Additive Comms Failure	630	0276	631	40631	1	UINT	Section A.1.14: Loading Alarm Effect
No Additive Response	631	0277	632	40632	1	UINT	Section A.1.14: Loading Alarm Effect
Slow Flow Error	632	0278	633	40633	1	UINT	Section A.1.14: Loading Alarm Effect
High Flow High	633	0279	634	40634	1	UINT	Section A.1.14: Loading Alarm Effect
High flow Low	634	027A	635	40635	1	UINT	Section A.1.14: Loading Alarm Effect
Low Flow High	635	027B	636	40636	1	UINT	Section A.1.14: Loading Alarm Effect

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Low Flow Low	636	027C	637	40637	1	UINT	Section A.1.14: Loading Alarm Effect
Overflow Error	637	027D	638	40638	1	UINT	Section A.1.14: Loading Alarm Effect
Tas Communication Failure	638	027E	639	40639	1	UINT	Section A.1.14: Loading Alarm Effect
Density Error	639	027F	640	40640	1	UINT	Section A.1.14: Loading Alarm Effect
Blend Tolerance	640	0280	641	40641	1	UINT	Section A.1.14: Loading Alarm Effect
Set RIT lamp 1	641	0281	642	40642	1	UNIT	Section A.1.15: Set RIT Lamp
Set RIT lamp 2	642	0282	643	40643	1	UNIT	Section A.1.15: Set RIT Lamp
Product Stream 1- No Flow Timeout	643	0283	644	40644	1	UNIT	
Product Stream 1- Valve Type	644	0284	645	40645	1	UNIT	0= Digital, 1=ON/OFF, 2=stage
Product Stream 1- DeadBand	645	0285	646	40646	1	UNIT	
Product Stream 1- Valve Slow Flow	646	0286	647	40647	1	UNIT	
Product Stream 1- Valve Low Flow	647	0287	648	40648	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Product Stream 1- Valve Response	648	0288	649	40649	2	FLOAT	
Product Stream 1- Prestop Quantity	650	028A	651	40651	1	UNIT	
Product Stream 1- Auto High Flow	651	028B	652	40652	1	UNIT	0 = Disable, 1 = Enable
Product Stream 1- Valve Full Flow	652	028C	653	40653	1	UNIT	
Product Stream 1- High Flow Timeout	653	028D	654	40654	1	UNIT	Only applicable if Auto high flow Enabled
Product Stream 1- Pump Off Delay	654	028E	655	40655	1	UNIT	
Product Stream 2- No Flow Timeout	655	028F	656	40656	1	UNIT	
Product Stream 2- Valve Type	656	0290	657	40657	1	UNIT	0= Digital, 1=ON/OFF, 2=stage
Product Stream 2- DeadBand	657	0291	658	40658	1	UNIT	
Product Stream 2- Valve Slow Flow	658	0292	659	40659	1	UNIT	
Product Stream 2- Valve Low Flow	659	0293	660	40660	1	UNIT	
Product Stream 2- Valve Response	660	0294	661	40661	2	FLOAT	
Product Stream 2- Prestop Quantity	662	0296	663	40663	1	UNIT	
Product Stream 2- Auto High Flow	663	0297	664	40664	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Product Stream 2- Valve Full Flow	664	0298	665	40665	1	UNIT	
Product Stream 2- High Flow Tim-eout	665	0299	666	40666	1	UNIT	
Product Stream 2- Pump Off Delay	666	029A	667	40667	1	UNIT	
Product Stream 3- No Flow Time-out	667	029B	668	40668	1	UNIT	
Product Stream 3- Valve Type	668	029C	669	40669	1	UNIT	0= Digital, 1=ON/OFF, 2=stage
Product Stream 3- DeadBand	669	029D	670	40670	1	UNIT	
Product Stream 3- Valve Slow Flow	670	029E	671	40671	1	UNIT	
Product Stream 3- Valve Low Flow	671	029F	672	40672	1	UNIT	
Product Stream 3- Valve Response	672	02A0	673	40673	2	FLOAT	
Product Stream 3- Prestop Quantity	674	02A2	675	40675	1	UNIT	
Product Stream 3- Auto High Flow	675	02A3	676	40676	1	UNIT	0 = Disable, 1 = Enable
Product Stream 3- Valve Full Flow	676	02A4	677	40677	1	UNIT	
Product Stream 3- High Flow Timeout	677	02A5	678	40678	1	UNIT	Only applicable if Auto high flow Enabled
Product Stream 3- Pump Off Delay	678	02A6	679	40679	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Product Stream 4- No Flow Timeout	679	02A7	680	40680	1	UNIT	
Product Stream 4- Valve Type	680	02A8	681	40681	1	UNIT	0= Digital, 1=ON/OFF, 2=stage
Product Stream 4- DeadBand	681	02A9	682	40682	1	UNIT	
Product Stream 4- Valve Slow Flow	682	02AA	683	40683	1	UNIT	
Product Stream 4- Valve Low Flow	683	02AB	684	40684	1		
Product Stream 4- Valve Response	684	02AC	685	40685	2	FLOAT	
Product Stream 4- Prestop Quantity	686	02AE	687	40687	1	UNIT	
Product Stream 4- Auto High Flow	687	02AF	688	40688	1	UNIT	0 = Disable, 1 = Enable
Product Stream 4- Valve Full Flow	688	02B0	689	40689	1	UNIT	
Product Stream 4- High Flow Timeout	689	02B1	690	40690	1	UNIT	Only applicable if Auto high flow Enabled
Product Stream 4- Pump Off Delay	690	02B2	691	40691	1	UNIT	
Arm Setting ARM 1 - Arm Type	691	02B3	692	40692	1	UNIT	Section A.1.16: ARM Type
Arm Setting ARM 1 - Arm Name	692	02B4	693	40693	4	CHAR [8]	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Arm Setting ARM 1 - Arm Status	696	02B8	697	40697	1	UNIT	0 = Disable, 1 = Enable, 2= Faulty
Arm Setting ARM 1 - Load Unit	697	02B9	698	40698	1	UNIT	(0 = litres/liters, 1 = meters3, 2 = kg, 3 = tonnes, 4 =grams, 5 = gallons, 6 = pounds
Arm Setting ARM 1 - Maximum Preset	698	02BA	699	40699	2	FLOAT	
Arm Setting ARM 1 - Slow Flow	700	02BC	701	40701	1	UNIT	
Arm Setting ARM 1 - Slow Start Quantity	701	02BD	702	40702	1	UNIT	
Arm Setting ARM 1 - Top Loading Full Flow	702	02BE	703	40703	1	UNIT	
Arm Setting ARM 1 - Bottom Loading Full Flow	703	02BF	704	40704	1	UNIT	
Arm Setting ARM 1 - Meter 1 Number	704	02C0	705	40705	1	UNIT	
Arm Setting ARM 1 - Meter 2 Number	705	02C1	706	40706	1	UNIT	Blend meter, 0 if not applicable
Arm Setting ARM 1 - Blend Tolarance	706	02C2	707	40707	1	UNIT	0= Disable, 1= Enable
Arm Setting ARM 1 - Low Percentage	707	02C3	708	40708	2	FLOAT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Arm Setting ARM 1 - High Percentage	709	02C5	710	40710	2	FLOAT	
Arm Setting ARM 1 - MIN Blend Volume	711	02C7	712	40712	1	UNIT	
Arm Setting ARM 1 - Slow Flow Alarm	712	02C8	713	40713	1	UNIT	
Arm Setting ARM 1 - Slow Flow Low Percentage	713	02C9	714	40714	2	FLOAT	
Arm Setting ARM 1 - Slow Flow High Percentage	715	02CB	716	40716	2	FLOAT	
Arm Setting ARM 1 - Slow Flow alarm Delay	717	02CD	718	40718	1	UNIT	
Arm Setting ARM 1 - High Flow Alarm	718	02CE	719	40719	1	UNIT	0= Disable, 1= Enable
Arm Setting ARM 1 - High Flow Low Percentage	719	02CF	720	40720	2	FLOAT	
Arm Setting ARM 1 - High Flow High Percentage	721	02D1	722	40722	2	FLOAT	
Arm Setting ARM 1 - High Flow alarm Delay	723	02D3	724	40724	1	UNIT	
Arm Setting ARM 1 - Low Flow Alarm	724	02D4	725	40725	1	UNIT	0= Disable, 1= Enable

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Arm Setting ARM 1 - Low Flow Low Percentage	725	02D5	726	40726	2	FLOAT	
Arm Setting ARM 1 - Low Flow High Percentage	727	02D7	728	40728	2	FLOAT	
Arm Setting ARM 1 - Low Flow alarm Delay	729	02D9	730	40730	1	UNIT	
Arm Setting ARM 2 - Arm Type	730	02DA	731	40731	1	UNIT	Section A.1.16: ARM Type
Arm Setting ARM 2 - Arm Name	731	02DB	732	40732	4	CHAR [8]	
Arm Setting ARM 2 - Arm Status	735	02DF	736	40736	1	UNIT	0 = Disable, 1 = Enable, = Faulty
Arm Setting ARM 2 - Load Unit	736	02E0	737	40737	1	UNIT	(0 = litres/liters, 1 = meters3, 2 = kg, 3 = tonnes, 4 = grams, 5 = gallons, 6 = pounds
Arm Setting ARM 2 - Maximum Preset	737	02E1	738	40738	2	FLOAT	
Arm Setting ARM 2 - Slow Flow	739	02E3	740	40740	1	UNIT	
Arm Setting ARM 2 - Slow Start Quantity	740	02E4	741	40741	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Arm Setting ARM 2 - Top Loading Full Flow	741	02E5	742	40742	1	UNIT	
Arm Setting ARM 2 - Bottom Loading Full Flow	742	02E6	743	40743	1	UNIT	
Arm Setting ARM 2 - Meter 3 Number	743	02E7	744	40744	1	UNIT	
Arm Setting ARM 2 - Meter 4 Number	744	02E8	745	40745	1	UNIT	Blend meter, 0 if not applicable
Arm Setting ARM 2 - Blend Tolarance	745	02E9	746	40746	1	UNIT	0 = Disable, 1 = Enable
Arm Setting ARM 2 - Low Percent-ge	746	02EA	747	40747	2	FLOAT	
Arm Setting ARM 2 - High Percentage	748	02EC	749	40749	2	FLOAT	
Arm Setting ARM 2 - MIN Blend Volume	750	02EE	751	40751	1	UNIT	
Arm Setting ARM 2 - Slow Flow Alarm	751	02EF	752	40752	1	UNIT	0 = Disable, 1 = Enable
Arm Setting ARM 2 - Slow Flow Low Percentage	752	02F0	753	40753	2	FLOAT	
Arm Setting ARM 2 - Slow Flow High Percentage	754	02F2	755	40755	2	FLOAT	
Arm Setting ARM 2 - Slow Flow alarm Delay	756	02F4	757	40757	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Arm Setting ARM 2 - High Flow Alarm	757	02F5	758	40758	1	UNIT	0 = Disable, 1 = Enable
Arm Setting ARM 2 - High Flow Low Percentage	758	02F6	759	40759	2	FLOAT	
Arm Setting ARM 2 - High Flow High Percentage	760	02F8	761	40761	2	FLOAT	
Arm Setting ARM 2 - High Flow alarm Delay	762	02FA	763	40763	1	UNIT	
Arm Setting ARM 2 - Low Flow Alarm	763	02FB	764	40764	1	UNIT	0 = Disable, 1 = Enable
Arm Setting ARM 2 - Low Flow Low Percentage	764	02FC	765	40765	2	FLOAT	
Arm Setting ARM 2 - Low Flow High Percentage	766	02FE	767	49767	2	FLOAT	
Arm Setting ARM 2 - Low Flow alarm Delay	768	0300	769	40769	1	UNIT	
External No of Injector Used	769	0301	770	40770	1	UNIT	If type = EFT Minipak
External Injector Type	770	0302	771	40771	1	UNIT	0 = None, 1 = EFT Minipak, 2 = Pulse Output
External additive 1- Arm No	771	0303	772	40772	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
External additive 1- Address	772	0304	773	40773	1	UNIT	
External additive 1- Code	773	0305	774	40774	5	CHAR [10]	
External additive 2- Arm No	778	030A	779	40779	1	UNIT	
External additive 2- Address	779	030B	780	40780	1	UNIT	
External additive 2- Code	780	030C	781	40781	5	CHAR [10]	
External additive 3- Arm No	785	0311	786	40786	1	UNIT	
External additive 3- Address	786	0312	787	40787	1	UNIT	
External additive 3- Code	787	0313	788	40788	5	CHAR [10]	
External additive 4- Arm No	792	0318	793	40793	1	UNIT	
External additive 4- Address	793	0319	794	40794	1	UNIT	
External additive 4- Code	794	031A	795	40795	5	CHAR [10]	
Internal Additive 1- Status	799	031F	800	40800	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 1- ARM No	800	0320	801	40801	1	UNIT	
Internal Additive 1- Solenoid Alarm	801	0321	802	40802	1	UNIT	0 = Disable, 1 = Enable

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Internal Additive 1- Leaking Solenoid Time	802	0322	803	40803	1	UNIT	
Internal Additive 1- Leaking Solenoid Vol Limit	803	0323	804	40804	1	UNIT	
Internal Additive 1- No Flow Alarm	804	0324	805	40805	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 1- No Flow Time-Out	805	0325	806	40806	1	UNIT	
Internal Additive 1- No Of Solenoid Retries	806	0326	807	40807	1	UNIT	
Internal Additive 1- Deviation Alarm	807	0327	808	40808	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 1- Deviation Basis	808	0328	809	40809	1	UNIT	
Internal Additive 1- Volume Deviation	809	0329	810	40810	1	UNIT	
Internal Additive 1- Pacing Volume	810	032A	811	40811	1	UNIT	
Internal Additive 1- Pump Off Delay	811	032B	812	40812	1	UNIT	
Internal Additive 1- K Factor	812	032C	813	40813	2	FLOAT	
Internal Additive 1- Meter Factor	814	032E	815	40815	2	FLOAT	
Internal Additive 1- Code	816	0330	817	40817	5	CHAR [10]	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Internal Additive 2- Status	821	0335	822	40822	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 2- ARM No	822	0336	823	40823	1	UNIT	
Internal Additive 2- Solenoid Alarm	823	0337	824	40824	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 2- Leaking Solenoid Time	824	0338	825	40825	1	UNIT	
Internal Additive 2- Leaking Solenoid Vol Limit	825	0339	826	40826	1	UNIT	
Internal Additive 2- No Flow Alarm	826	033A	827	40827	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 2- No Flow Time-Out	827	033B	828	40828	1	UNIT	
Internal Additive 2- No Of Solenoid Retries	828	033C	829	40829	1	UNIT	
Internal Additive 2- Deviation Alarm	829	033D	830	40830	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 2- Deviation Basis	830	033E	831	40831	1	UNIT	
Internal Additive 2- Volume Deviation	831	033F	832	40832	1	UNIT	
Internal Additive 2- Pacing Volume	832	0340	833	40833	1	UNIT	
Internal Additive 2- Pump Off Delay	833	0341	834	40834	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Internal Additive 2-K Factor	834	0342	835	40835	2	FLOAT	
Internal Additive 2-Meter Factor	836	0344	837	40837	2	FLOAT	
Internal Additive 2-Code	838	0346	839	40839	5	CHAR [10]	
Internal Additive 3-Status	843	034B	844	40844	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 3-ARM No	844	034C	845	40845	1	UNIT	
Internal Additive 3-Solenoid Alarm	845	034D	846	40846	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 3-Leaking Solenoid Time	846	034E	847	40847	1	UNIT	
Internal Additive 3-Leaking Solenoid Vol Limit	847	034F	848	40848	1	UNIT	
Internal Additive 3-No Flow Alarm	848	0350	849	40849	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 3-No Flow Time-Out	849	0351	850	40850	1	UNIT	
Internal Additive 3-No Of Solenoid Retries	850	0352	851	40851	1	UNIT	
Internal Additive 3-Deviation Alarm	851	0353	852	40852	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 3-Deviation Basis	852	0354	853	40853	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Internal Additive 3- Volume Deviation	853	0355	854	40854	1	UNIT	
Internal Additive 3- Pacing Volume	854	0356	855	40855	1	UNIT	
Internal Additive 3- Pump Off Delay	855	0357	856	40856	1	UNIT	
Internal Additive 3- K Factor	856	0358	857	40857	2	FLOAT	
Internal Additive 3- Meter Factor	858	035A	859	40859	2	FLOAT	
Internal Additive 3- Code	860	035C	861	40861	5	CHAR [10]	
Internal Additive 4- Status	865	0361	866	40866	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 4- ARM No	866	0362	867	40867	1	UNIT	
Internal Additive 4- Solenoid Alarm	867	0363	868	40868	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 4- Leaking Solenoid Time	868	0364	869	40869	1	UNIT	
Internal Additive 4- Leaking Solenoid Vol Limit	869	0365	870	40870	1	UNIT	
Internal Additive 4- No Flow Alarm	870	0366	871	40871	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 4- No Flow Time-Out	871	0367	872	40872	1	UNIT	

Parameter Name	Starting Holding Register				Data Size/Type		Description/ Reference
	Address (Decimal / Hex)		Number (Standard / Modicon)		Registers	Type	
Internal Additive 4- No Of Solenoid Retries	872	0368	873	40873	1	UNIT	
Internal Additive 4- Deviation Alarm	873	0369	874	40874	1	UNIT	0 = Disable, 1 = Enable
Internal Additive 4- Deviation Basis	874	036A	875	40875	1	UNIT	
Internal Additive 4- Volume Deviation	875	036B	876	40876	1	UNIT	
Internal Additive 4- Pacing Volume	876	036C	877	40877	1	UNIT	
Internal Additive 4- Pump Off Delay	877	036D	878	40878	1	UNIT	
Internal Additive 4- K Factor	878	036E	879	40879	2	FLOAT	
Internal Additive 4- Meter Factor	880	0370	881	40881	2	FLOAT	
Internal Additive 4- Code	882	0372	883	40883	5	CHAR [10]	
Latched Switch status	887	0377	888	40888	1	UNIT	Value = 0 (Clear status)

7.3 Remote Workflow Sequence

The examples in this section are based on two loading arms and each one configured with at least once recipes.

Ensure instrument's Terminal Automation System Mode is set to "Load Scheduling" and one of the communication port is set to Modbus RTU or Modbus TCP/IP. Refer to the [Programming Manual](#) for communication parameter setting.

NOTE: Modbus Poll screen shot used for examples shown for Modbus registers read/write operation.

7.3.1 Read Screen Mode

Read Screen Mode (Input register address = 002, Quantity = 1) and other instrument status input registers periodically.

If Screen Mode is 'Load Number Response', send compartment details to instrument. If not, continue to poll this value until receives the 'Load Number Response' as Screen Mode.

Screen Mode input register value is 21 which is for 'Load Number Response'.

Tx = 22: Err = 00: ID = 100: F

	Alias	00000
0		
1		
2	SCREEN MODE	21
3		
4		
5		
6		
7		
8		

7.3.2 Write Truck Number

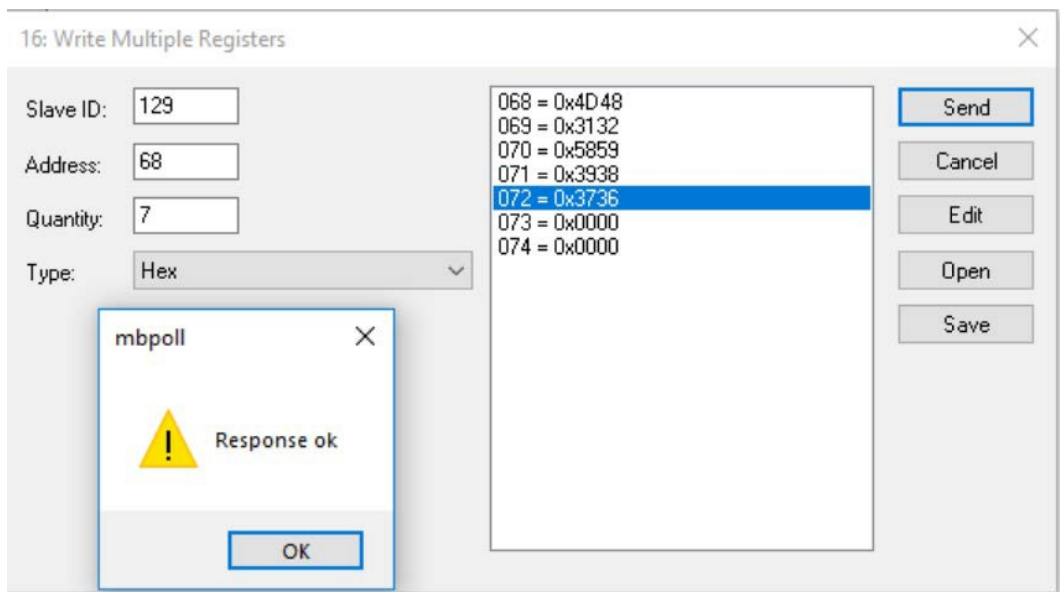
Once Screen Mode (Refer [Section A.1.2: Screen Mode](#)) become 'Load Number Response', send truck number to BCU.

7.3.2.1 Modbus Registers:

- Truck Number (Holding Register Address = 068, Quantity = 7)

7.3.2.2 Example:

Write Truck Number "MH12XY9876" Hex value: 4D48 3132 5859 3938 3736



7.3.3 Load Compartment Details

Maximum eight compartment details accepted by instrument. Number of compartments to loads depends on "Number of Compartment to Load (Holding Register Address = 026, Quantity = 1).

7.3.3.1 Example:

- 2 compartments loading

Tx = 202: Err = 0: ID = 129: F = 03: SR = 1000ms

	Alias	00020	Alias	00030	Alias	00040	Alias	00050	Alias	00060	Alias	00070
0			Compartment 1 comp no	0x0001	Compartment 5 Arm No	0x0001	Compartment 8 Recipe No	0x0001	Compartment 5 preset	0x0000		0x5859
1			Compartment 2 Arm No	0x0001	Compartment 5 Recipe No	0x0001	Compartment 8 comp no	0x0000		0x0000		0x3938
2			Compartment 2 Recipe No	0x0001	Compartment 5 comp no	0x0000	Compartment 1 preset	0x447A	Compartment 6 preset	0x0000		0x3736
3			Compartment 2 comp no	0x0002	Compartment 6 Arm No	0x0001		0x0000		0x0000		0x0001
4			Compartment 3 Arm No	0x0001	Compartment 6 Recipe No	0x0001	Compartment 2 preset	0x447A	Compartment 7 preset	0x0000		0x0001
5			Compartment 3 Recipe No	0x0001	Compartment 6 comp no	0x0000		0x0000		0x0000		
6	No of Compart to load	0x0002	Compartment 3 comp no	0x0000	Compartment 7 Arm No	0x0001	Compartment 3 preset	0x0000	Compartment 8 preset	0x0000		
7	Loading Type	0x0001	Compartment 4 Arm No	0x0001	Compartment 7 Recipe No	0x0001		0x0000		0x0000		
8	Compartment 1 Arm ...	0x0001	Compartment 4 Recipe No	0x0001	Compartment 7 comp no	0x0000	Compartment 4 preset	0x0000	Truck No	0x4D48		
9	Compartment 1 Reci...	0x0001	Compartment 4 comp no	0x0000	Compartment 8 Arm No	0x0001		0x0000		0x3132		

- 8 compartments loading

Tx = 4486: Err = 4067: ID = 129: F = 03: SR = 1000ms

	Alias	00020	Alias	00030	Alias	00040	Alias	00050	Alias	00060	Alias	00070
0			Load Compartment 1 - Compartment...	1	Load Compartment 5 - Arm Nu...	1	Load Compartment 8 - Recip...	8	Load Compartment 5 - Prese...	1000		22617
1			Load Compartment 2 - Arm Number	2	Load Compartment 5 - Recipe ...	5	Load Compartment 8 - Comp...	8		--		14648
2			Load Compartment 2 - Recipe Number	2	Load Compartment 5 - Compar...	5	Load Compartment 1 - Preset...	1000	Load Compartment 6 - Prese...	1000		14134
3			Load Compartment 2 - Compartment...	2	Load Compartment 5 - Arm Nu...	2		--		--		0
4			Load Compartment 3 - Arm Number	1	Load Compartment 6 - Recipe ...	6	Load Compartment 2 - Preset...	1000	Load Compartment 7 - Prese...	1000		0
5			Load Compartment 3 - Recipe Number	3	Load Compartment 6 - Compar...	6		--		--		
6	Number Of. Compartment to Load	8	Load Compartment 3 - Compartment...	3	Load Compartment 7 - Arm Nu...	1	Load Compartment 3 - Preset...	1000	Load Compartment 8 - Prese...	1000		
7	Loading Type	0	Load Compartment 4 - Arm Number	2	Load Compartment 7 - Recipe ...	7		--		--		
8	Load Compartment 1 - Arm Nu...	1	Load Compartment 4 - Recipe Number	4	Load Compartment 7 - Compar...	7	Load Compartment 4 - Preset...	1000	Truck number	19784		
9	Load Compartment 1 - Recipe N...	1	Load Compartment 4 - Compartment...	4	Load Compartment 8 - Arm Nu...	2		--		12594		

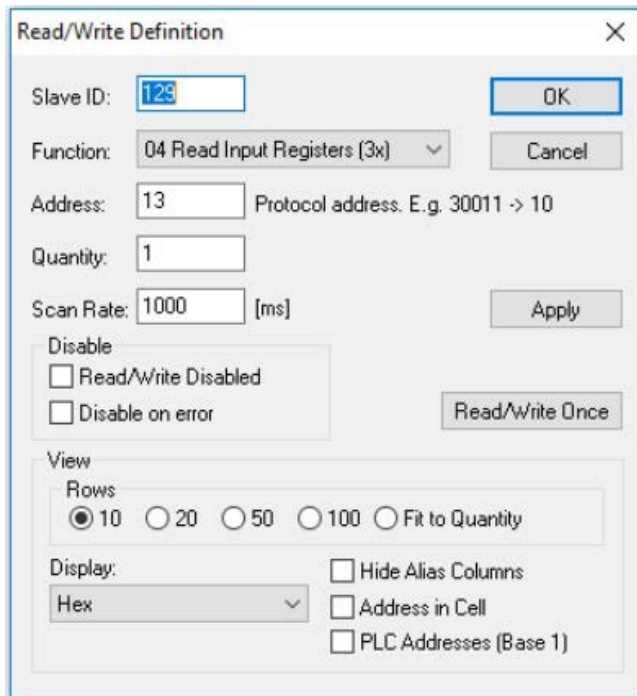
7.3.4 Load Authorization

Authorize the load with Operation Command - Load authorize.

7.3.4.1 Modbus Registers:

- Operational Command (Holding Register Address = 013, Quantity =1)

Write '1' to authorize load.



The image shows a 'Read/Write Definition' dialog box. It contains the following fields and options:

- Slave ID: 129
- Function: 04 Read Input Registers (3x)
- Address: 13 (Protocol address. E.g. 30011 -> 10)
- Quantity: 1
- Scan Rate: 1000 [ms]
- Disable:
 - ☐ Read/Write Disabled
 - ☐ Disable on error
- Buttons: OK, Cancel, Apply, Read/Write Once
- View:
 - Rows: ☒ 10, ☐ 20, ☐ 50, ☐ 100, ☐ Fit to Quantity
 - Display: Hex (dropdown menu)
 - ☐ Hide Alias Columns
 - ☐ Address in Cell
 - ☐ PLC Addresses (Base 1)

Then sequence follow as:

- Once load authorized by TAS remotely, BCU will display ACK Prompt where compartment detail information show on the screen.
- Press ACK button through RIT if RIT is enabled or Press ENTER button on BCU.
- BCU display PRESS START prompt. Press START to start the loading.
- Once loading started, ARM status at Input Register 005 will show ARM 1 loading status.

7.3.5 Read Instantaneous Values

- Read instantaneous values from Input Register Address start from 056 to 229.

7.3.6 Remote Stop/Pause Loading Arm.

Write '1' Control Room Stop to Holding Register 010 stop the arm remotely. This write work only when BCU is in loading state.

7.3.7 End Transaction

Read Screen Mode (Input Register Address = 002, Quantity = 1) periodically. Once BCU complete the loading, the Screen Mode become 'Post Loading' state.

Send Transaction complete command to BCU to complete load.

7.3.7.1 Modbus Registers:

- Operational Command (Holding Register Address = 013, Quantity = 1)
- Data = 2

After successful transaction complete, BCU show Loading Complete Message and ask to Disconnect the Permissive. Disconnect permissive to complete the loading cycle.

7.4 Read Transaction and Batch Record

After completion of every transaction and batch, instrument saved transaction and batch details. Maximum 1000 transactions storage space available in the instrument. Each transaction can have maximum up to 10 batch records.

7.4.1 Read Transaction Record

When instrument is in idle state, last or any previous stored transaction can be read from the instrument.

7.4.1.1 Modbus Registers:

- Last Transaction Number (Input Register Address = 000, Quantity = 2)

	Alias	00000
0		0x0000
1	Last transaction No	0x0003
2		
3		
4		
5		
6		
7		
8		
9		

7.4.1.2 Example: Requested to Read Transaction Number 22

- Write requested transaction number to Holding Register Address 006

Last Transaction Record.mbp

Tx = 101: Err = 18: ID = 129: F = 04: SR = 1000ms

	Alias	00240	Alias	00250	Alias	00260	Alias	00270
0	Transaction Number	22	Start Date - Month	8	Bay Number	1		(??) 0x0000
1		--	Start Date - Year	2020	First Arm Number	1		(??) 0x0000
2	Unique Number	0	Start Time - Hours	15	Number of Arms	2		(??) 0x0000
3		--	Start Time - Minutes	21	Calibration Number	2		
4	Power Cycle Counts	11	Start Time - Seconds	16	Personnel Index	0		
5		--	Stop Time - Hours	15	Vehicle Index	0		
6	Unit Address	1	Stop Time - Minutes	24	Master Index	0		
7	Batch Start	40	Stop Time - Seconds	50	Checksum	0		
8	Batch Stop	41	Communication Mode	1	Load Number	(9?) 0x3900		
9	Start Date - Day	24	Loading type	0		(??) 0x0000		

Read Input Register Address start from 240 to read transaction record.

7.4.2 Read Batch Record

When instrument is in idle state, last or any previous stored batch record can be read from the instrument.

7.4.2.1 Example: Requested to Read Batch Number 2

- Write requested batch number '2' to Holding Register Address 007
- Read Input Register Address start from 300 to read batch record.

Tx = 31: Err = 0: ID = 129: F = 04: SR = 1000ms

	Alias	00300	Alias	00310	Alias	00320	Alias	00330
0	Arm Number	1	Stop Time - Seconds	32	Transaction Number	2	Blend Meter 1 - Accumulated Total Before	0
1	Batch Number	2	Blend Accuracy	0	--	--	--	--
2	Recipe Number	1	Arm Error	0	Base Meter - Accumulated Total Before	0	Blend Meter 1 - Accumulated Total After	0
3	Compartment Number	1	Unit Setting	0	--	--	--	--
4	Blend Type	5	Base Meter - Compensation Setting	0	Base Meter - Accumulated Total After	200	Blend Meter 1 - Net Accumulated Total Before	0
5	Start Time - Hours	14	Blend Meter 1 - Compensation Setting	0	--	--	--	--
6	Start Time - Minutes	56	Blend Meter 2 - Compensation Setting	0	Base Meter - Net Accumulated Total Before	0	Blend Meter 1 - Net Accumulated Total After	0
7	Start Time - Seconds	0	Base Meter - Error Status	0	--	--	--	--
8	Stop Time - Hours	14	Blend Meter 1 - Error Status	0	Base Meter - Net Accumulated Total After	200	Blend Meter 2 - Accumulated Total Before	0
9	Stop Time - Minutes	57	Blend Meter 2 - Error Status	0	--	--	--	--

Tx = 39: Err = 0: ID = 129: F = 04: SR = 1000ms

	Alias	00340	Alias	00350	Alias	00360	Alias	00370
0	Blend Meter 2 - Accumulated Total After	0	Base Meter - Gross Total	200.783	Base Meter - Average Temperature	-100	Blend Meter 1 - Net Total	0
1	--	--	--	--	--	--	--	--
2	Blend Meter 2 - Net Accumulated Total Before	0	Base Meter - Net Total	200.783	Base Meter - Average Pressure	-100	Blend Meter 1 - Density	0
3	--	--	--	--	--	--	--	--
4	Blend Meter 2 - Net Accumulated Total After	0	Base Meter - Preset Quantity	200	Base Meter - Average Density	-100	Blend Meter 1 - Expansion factor	0
5	--	--	--	--	--	--	--	--
6	Arm Preset Quantity	200	Base Meter - Density	0	Blend Meter 1 - Preset Quantity	0	Blend Meter 1 - Average Temperature	-100
7	--	--	--	--	--	--	--	--
8	Arm Returned Quantity	0	Base Meter - Expansion factor	0	Blend Meter 1 - Gross Total	0	Blend Meter 1 - Average Pressure	-100
9	--	--	--	--	--	--	--	--

	Alias	00380	Alias	00390	Alias	00400	Alias	00410
0	Blend Meter 1 - Average Density	-100	Blend Meter 2 - Expansion factor	0	Additive 1 - Gross Total	0	Additive 4 - Preset Quant...	0
1	--	--	--	--	--	--	--	--
2	Blend Meter 2 - Preset Quantity	0	Blend Meter 2 - Average Temperature	0	Additive 2 - Preset Quantity	0	Additive 4 - Gross Total	0
3	--	--	--	--	--	--	--	--
4	Blend Meter 2 - Gross Total	0	Blend Meter 2 - Average Pressure	0	Additive 2 - Gross Total	0	--	--
5	--	--	--	--	--	--	--	--
6	Blend Meter 2 - Net Total	0	Blend Meter 2 - Average Density	0	Additive 3 - Preset Quantity	0	--	--
7	--	--	--	--	--	--	--	--
8	Blend Meter 2 - Density	0	Additive 1 - Preset Quantity	0	Additive 3 - Gross Total	0	--	--
9	--	--	--	--	--	--	--	--

7.5 Display Message

7.5.1 Update Messages

Write bottom 2 lines messages to Holding Registers 170 to 199. Prepare the message according to Justify character options and Message Options.

Justify Character Options	
Value	Description
0x7C (' ')	centre justified
0x5F ('_')	left justified
0x2B ('+')	right justified

Message Option	
Data	Description
0x2D31 ("-1")	leave line as is (if previous message still being displayed)
0x2D32 ("-2")	clear line (if previous message still being displayed)
Message	up to 30 characters of text (in addition to the justify character)

Example: Write "IDLE" on Line 7 and Write "ABCDEFGF" on Line 8

7.5.2 Write Display Command

Write to Display Command (Refer [Section A.1.6: Operation Command](#)) Holding Register Address = 016 and Quantity = 1.

Value = 1 (DM command)

After successful write, 1010 screen shows "IDLE" and "ABCDEFGF".

7.5.3 Verify Screen Mode

Read Screen Mode Input Register Address = 002, Quantity = 1 to verify screen state

7.5.4 Clear Screen

Write Display command (Refer [Section A.1.7: Display Commands](#)) Holding Register Address = 016 and Quantity = 1

Value = 0 (CM command)

7.6 Audit Log Record

When W&M parameters changed, the instrument recorded information about the changes, previous and new data, date and time of changes.

Maximum 2000 audit logs storage space available. Sequence of steps to read audit logs are:

1. Read audit log counts from Input Register 023
2. Write requested audit log to the Holding Register 008.
3. Read Modbus Input Registers 431 to 473 to get detail audit log information.

Audit Logs Contains:

- Audit Log Number
- Audit Log Data and Time
- User Name
- Old Value
- New Value

	Alias	00430	Alias	00440	Alias	00450	Alias	00460	Alias	00470
0				20577		12832		0		0
1	Audit Log Number	2		29555		19245		0		0
2	Audit Log Date - Day	25		30575		26209		0		0
3	Audit Log Date - Month	6		29284		25460		0		0
4	Audit Log Date - Day	2020		0		28530		0		
5	Audit Log Date - Hours	15		0		0	New Value	13614		
6	Audit Log Date - Mins	55		0	Old Value	12590		12336		
7	Audit Log Date - Secs	33	Config Item	19813		12336		12288		
8	User Name	22310		29797		12288		0		
9		19744		29229		0		0		

7.7 Alarms Status

All alarms status separately for arms, meters, additive injection, recipes, and system are in Modbus Registers Coils. The alarm status is latched and is retained after a power failure. Write '0' to clear the alarms.

Appendix A: Additional Details

A.1 Enumeration

A.1.1 Digital State

Digital State	
Description	Value
Deactive	0
Active	1

A.1.2 Screen Mode

Digital State		
Description	Value	Remark
Normal	0	Normal
Display Message (DM)	1	The instrument is displaying a message via the DM command.
Get Answer (GA)	2	The instrument is displaying a question to the operator via the GA command.
Get Hidden Answer (GH)	3	The instrument is displaying a question to the operator via the GH command.
Display Prompt (DP)	4	The instrument is displaying a message prompt via the DP command.
Get Touch Key (GK)	5	The instrument is requesting the presentation of a touch key via the GK command.
Get Card (GC)	6	The instrument is requesting the presentation of a card via the GC command.
Message Taken (MT)	7	The message prompt (DP command) has been acknowledged.

Digital State		
Description	Value	Remark
Touck key Available (KA)	8	A touch key has been read in response to a GK command.
Card Available (CA)	9	A card has been read in response to a GC command.
Answer Available (AA)	10	Indicates that a question that was posted to the operator using the GA or GH commands has been answered
Get RF ID (GR)	11	The instrument is requesting the presentation of an RF ID via the GR command.
Get PIN (GP)	12	The instrument is requesting the enter PIN via the GP command.
RF ID Vailable (FA)	13	An RF ID has been read in response to a GR command.
PIN Available (PA)	14	A PIN has been read in response to a GP command.
Get Nexkey (GN)	15	The instrument is requesting the presentation of a NexWatch card via the GN command.
Nexkey Available (NA)	16	A NexWatch card has been read in response to a GN command.
Remote Authorisation (RA)	17	The instrument is waiting for entry authorisation (Remote Authorise is ENABLED)
Compartment Response (RC)	18	The instrument is in the compartment authorisation state (Load Schedule is ENABLED)
Allocate Recipe (AR)	19	The instrument is in the Allocate Recipe state (Load Schedule is ENABLED)
Remote Start (RS)	20	The instrument is in the remote start state (Load Schedule is ENABLED)
Load Number Response (RL)	21	The instrument is in the load authorisation state (Load Schedule is ENABLED)
Request Alarm (LA)	22	The instrument in is the Loading Arm information state (Load Schedule and RIT panel are ENABLED)

Digital State		
Description	Value	Remark
Post Loading (PL)	23	The instrument is in the load authorisation state (Load Schedule is ENABLED)
Push Button (PB)	24	The instrument is in the push button waiting state (Load Schedule is ENABLED)
Standard Enquiry Response (SS)	25	Standard enquiry response, the instrument is not in a special state.

A.1.3 Message Code

Message Code	
Description	Value
Unknown	0
Initial Message	1
Acknowledge Safety Checks (Push Button)	2
Enter master PIN	3
Enter Vehicle PIN	4
Enter Personnel PIN	5
Enter Truck Number	6
Enter Load Number	7
Select Arm	8
Select Compartment	9
Select Recipe	10
Preset Quantity	11
Ack prompt	12
Start Prompt	13
Load Another Compartment	14
Overrun	15
Loading Complete Disconnect Earth	16
Show Office Card	17
Waiting for Valve Close	18

Message Code	
Description	Value
Blank Screen	19

A.1.4 BCU Mode

BCU Mode	
Description	Value
Standalone	0
Load scheduling (remote)	1

A.1.5 Enable Disable

Enable Disable	
Description	Value
Disable	0
Enable	1

A.1.6 Operation Command

Message Code	
Description	Value
Load Allowed	1
Transaction Complete	2
Terminate Transaction	3
Manager Reset	4
Clear Power Cycle	5
Push Button	6

A.1.7 Display Commands

Display Commands	
Description	Value
Clear Message (CC)	0
Display Message (DM)	1
Display Prompt (DP)	2
Get Answer (GA)	3
Get Hidden (GH)	4
Get Touch Key (GK)	5
Get Nexwatch (GN)	6

A.1.8 RIT Lamp States

Display Commands	
Description	Value
All Off	0
Read Steady	1
Red Flashing	2
Amber Steady	3
Amber Flashing	4
Green Steady	5
Green Flashig	6

A.1.9 Reset alarms

Reset alarms Commands	
Description	Value
Clear All Alarms	1
Clear Arm Alarms	2
Clear Meter Alarms	3
Clear System Alarms	4

Reset alarms Commands	
Description	Value
Clear Additive Alarms	5
Clear Recipe Alarms	6

A.1.10 NexWatch Command

NexWatch Command	
Description	Value
Clear NexWatch	0
Read NexWatch	1

A.1.11 Top Bottom Loading

Top Bottom Loading	
Description	Value
Top Loading	0
Bottom Loading	1

A.1.12 Communication Mode

Communication Mode	
Description	Value
Standalone Mode	0
Load Scheduling Mode	1

A.1.13 Blend Accuracy

Blend Accuracy	
Description	Value
No fault	0
High Alarm	1
Low Alarm	2

A.1.14 Loading Alarm Effect

Loading Alarm Effect	
Description	Value
None	0
Pause Loading	1
Timeout Loading	2
Terminate Loading	3
Manager Reset	4

A.1.15 Set RIT Lamp

Bit 7	Bit 6	Bit 5 (32)	Bit 4 (16)	Bit 3 (8)	Bit 2 (4)	Bit 1 (2)	Bit 0 (1)
0	0	Flash Green	Flash Yellow	Flash Red	Steady State Green	Steady State Yellow	Steady state red

Description	Value	
	Lamp1	Lamp2
All Lamps Off	0	0
All Arm 1 lamps on steady Arm2 lamps off	7	0
ARM 2 Yellow lamp on steady	0	2
Arm 2 Flash red lamp	0	8 or 9
Arm 2 Flash red lamp with green lamp on steady	0	12
Arm 2 Flash red & green in time with each other	0	45 or 40
Both Arms Flash red & green alternatively	41 or 44	41 or 44

A.1.16 ARM Type

ARM Type		
ARM Type	Value	Description
STRAIGHT	1	Net Accumulative Total of Arm = Meter (only one meter associated with the arm)
Not used	2	N/A
SIDE STREA	3	Net Accumulative Total of Arm = First/Base Meter
Not used	4	N/A
RATIO	5	Net Accumulative Total of Arm = First Meter + Second/Blend Meter

A.2 Bits

A.2.1 Control Room Stop

Control Room Stop									
Status Body								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	
x	1	x	x	x	x	x	x	64	Arm 2 Terminate Batch
x	x	1	x	x	x	x	x	32	Arm 2 Resume Batch
x	x	x	1	x	x	x	x	16	Arm 2 Pause Batch
x	x	x	x	1	x	x	x	8	Soft Emergency Stop
x	x	x	x	x	1	x	x	4	Arm 1 Terminate Batch
x	x	x	x	x	x	1	x	2	Arm 1 Resume Batch
x	x	x	x	x	x	x	1	1	Arm 1 Pause Batch

A.2.2 Alarm Source 1

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Arm 1
x	1	x	x	x	x	x	x	64	Arm 2
x	x	1	x	x	x	x	x	32	Arm 3
x	x	x	1	x	x	x	x	16	Arm 4
x	x	x	x	1	x	x	x	8	Meter 1
x	x	x	x	x	1	x	x	4	Meter 2
x	x	x	x	x	x	1	x	2	Meter 3
x	x	x	x	x	x	x	1	1	Meter 4

A.2.3 Alarm Source 2

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	NA
x	1	x	x	x	x	x	x	64	NA
x	x	1	x	x	x	x	x	32	NA
x	x	x	1	x	x	x	x	16	System
x	x	x	x	1	x	x	x	8	Recipe 1
x	x	x	x	x	1	x	x	4	Recipe 2
x	x	x	x	x	x	1	x	2	Recipe 3
x	x	x	x	x	x	x	1	1	Recipe 4

A.2.4 Alarm Source 3

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Recipe 5
x	1	x	x	x	x	x	x	64	Recipe 6

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
x	x	1	x	x	x	x	x	32	Recipe 7
x	x	x	1	x	x	x	x	16	Recipe 8
x	x	x	x	1	x	x	x	8	Recipe 9
x	x	x	x	x	1	x	x	4	Recipe 10
x	x	x	x	x	x	1	x	2	Recipe 11
x	x	x	x	x	x	x	1	1	Recipe 12

A.2.5 Alarm Source 4

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Recipe 13
x	1	x	x	x	x	x	x	64	Recipe 14
x	x	1	x	x	x	x	x	32	Recipe 15
x	x	x	1	x	x	x	x	16	Recipe 16
x	x	x	x	1	x	x	x	8	Injection point 1
x	x	x	x	x	1	x	x	4	Injection point 2
x	x	x	x	x	x	1	x	2	Injection point 3
x	x	x	x	x	x	x	1	1	Injection point 4

A.2.6 Alarm Source 5

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Injection point 5
x	1	x	x	x	x	x	x	64	Injection point 6
x	x	1	x	x	x	x	x	32	Injection point 7
x	x	x	1	x	x	x	x	16	Injection point 8
x	x	x	x	1	x	x	x	8	Injection point 9
x	x	x	x	x	1	x	x	4	Injection point 10

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
x	x	x	x	x	x	1	x	2	Injection point 11
x	x	x	x	x	x	x	1	1	Injection point 12

A.2.7 Alarm Source 6

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Injection point 13
x	1	x	x	x	x	x	x	64	Injection point 14
x	x	1	x	x	x	x	x	32	Injection point 15
x	x	x	1	x	x	x	x	16	Injection point 16
x	x	x	x	1	x	x	x	8	Injection point 17
x	x	x	x	x	1	x	x	4	Injection point 18
x	x	x	x	x	x	1	x	2	Injection point 19
x	x	x	x	x	x	x	1	1	Injection point 20

A.2.8 Alarm Source 7

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
1	x	x	x	x	x	x	x	128	Injection point 21
x	1	x	x	x	x	x	x	64	Injection point 22
x	x	1	x	x	x	x	x	32	Injection point 23
x	x	x	1	x	x	x	x	16	Injection point 24
x	x	x	x	1	x	x	x	8	Spare
x	x	x	x	x	1	x	x	4	Spare
x	x	x	x	x	x	1	x	2	Spare
x	x	x	x	x	x	x	1	1	Spare

A.2.9 Acknowledge Waiting Status

							Value	Description
6	5	4	3	2	1	0		
x	x	x	x	x	x	x	128	Arm 1 Ack
1	x	x	x	x	x	x	64	Arm 1 Start
x	1	x	x	x	x	x	32	Arm 2 Ack
x	x	1	x	x	x	x	16	Arm 2 Start
x	x	x	1	x	x	x	8	Officer Card
x	x	x	x	1	x	x	4	Nexwatch comms failure
x	x	x	x	x	1	x	2	
x	x	x	x	x	x	1	1	

A.2.10 Compartment Loading Status

							Value	Description
6	5	4	3	2	1	0		
x	x	x	x	x	x	x		Compartment Loading on Arm 2
1	x	x	x	x	x	x		
x	1	x	x	x	x	x		
x	x	1	x	x	x	x		
x	x	x	1	x	x	x		Compartment Loading on Arm 1
x	x	x	x	1	x	x		
x	x	x	x	x	1	x		
x	x	x	x	x	x	1		

A.2.11 Overrun Status

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
x	x	1	x	x	x	x	x	32	Meter 4 has overrun
x	x	x	1	x	x	x	x	16	Meter 3 has overrun

Parameter Byte								Value	Description
7	6	5	4	3	2	1	0		
x	x	x	x	1	x	x	x	8	Meter 2 has overrun
x	x	x	x	x	1	x	x	4	Meter 1 has overrun error
x	x	x	x	x	x	1	x	2	Overrun is authorised using local database
x	x	x	x	x	x	x	1	1	Authorise overrun enabled

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