

Overview

Note: This feature is only available when using AccuLoad III-X Revision 10.04 firmware or better.

The AccuLoad III has the capability of obtaining temperature, density, and status information from Smith Meter™ S-Mass meters or Apollo mass meters via serial communications (EIA-232 / 485) ports. A direct pulse input is required for volume or mass accumulation and flow control purposes.

The AccuLoad III-X offers a new communications port function type selection. Once the user configures a port for the mass meter function and connects the meter, the AccuLoad performs the following functions:

- Polls up to six mass meters for temperature, density, and status
- Monitors and reports mass meter alarm conditions
- Provides the automation system with pass-through access to the mass meter command set via Smith protocol
- Provides a programming interface to the S-Mass meter via program mode
- Collects temperature and density data from the mass meter and makes it available for other load arms to share.

The AccuLoad can communicate with a maximum of six mass meters (Apollo, S-Mass, or a combination of the two) via RS-232 or RS-485 communications. The actual number of mass meters that can be physically connected varies according to the mass meter and the type of port used for the connection.

RS-232 Connection: The S-Mass can be daisy-chained on RS-232 with a maximum of three meters in the chain. The Apollo must be the only meter on an RS-232 connection.

RS-485 Connection: When using RS-485, the AccuLoad will support a maximum of six Apollo meters. The S-Mass does not support RS-485. Thus, a converter would be required.

For information about the protocol used to communicate with the Smith S-Mass meter, refer to S-Mass Installation / Operation / Maintenance Manual MNOM008.

For information about the protocol used to communicate with the Apollo meter, refer to Apollo Series Mass Flow and Density Meters Instruction Manual, MNOM012.

Polling

The AccuLoad III periodically polls all mass meters that successfully complete the power-up sequence. Polling values include temperature, density, and status, except while the AccuLoad is in program mode. The polling is done at a rate of one meter per 0.25 seconds. The density request command (DR) and temperature request command (TR) are used to collect polled data from the mass meter.

If the DR or TR status response indicates the presence of a mass meter alarm condition, an alarm will be set on the AccuLoad. If the alarm condition is due to a tube imbalance, the alarm will be an MT alarm. If the alarm condition is due to an overdrive condition, the alarm will be an MO alarm.

If a mass meter fails to respond by the end of 0.25 seconds, it will be retried in the next 0.25-second interval. If there is still no response, an MF alarm will be set for that meter and the next meter will be polled. The meter in alarm will be skipped in the polling loop until the alarm is cleared.

For more information on communications commands, refer to AccuLoad III-X Communications Manual, MN06130L.

Density

The density retrieved from the mass meter via communications is used by the AccuLoad like a density analog input. As with an analog input, the density may be shared with other meters on the same or other load arms.

Temperature

The temperature retrieved from the mass meter via communications is only used by the AccuLoad if no other temperature is available on the AccuLoad. If a maintenance temperature or a temperature analog input is configured on the AccuLoad, these will take precedence over the temperature from the mass meter.

Alarms

652 MF: Mass Meter Comm Fail. This alarm is set when any command sent to a mass meter fails both the first and second attempt. The normal polling sequence to each of the mass meters is not interrupted by the occurrence of a mass meter communications alarm. The mass meter in alarm will be skipped in the polling loop until this alarm is cleared.

653 MO: Mass Meter Overdrive. This alarm is set when a mass meter reports a status indicating an overdrive condition exists. (This alarm is valid only for S-Mass.)

654 MT: Mass Meter Tube. This alarm is set when a mass meter reports a status indicating a tube imbalance condition exists. (This alarm is valid only for S-Mass.)

Program Parameters

System 707, 712, 717, 722 – Comm Port Function

This program code defines the function of the communications port. The factory default is "Minicomputer Host" on comm port 1. Selections are as follows:

- **(0) Not used** – This communications port is not selected for use
- **(1) Terminal host communications** – This communications port communicates with a terminal type device using a simplified communications protocol
- **(2) Minicomputer host communications** – This communications port communicates with a minicomputer type device using a sophisticated and secure communications protocol
- **(3) Modbus host communications**
- **(4) Printer** – Permits the AccuLoad III through this communication port to automatically output an end of a transaction report to a printer connected to the AccuLoad III

- **(5) Shared printer** – Same as number (4) above except the output report will go to a shared printer connected to one or more AccuLoads. (This requires special wiring. See the Installation manual for further details.)
- **(6) Smart injector control** – Permits the AccuLoad III through this communication port to communicate with and control up to twelve smart additive injector systems
- **(7) CIVACON Grounding and Overfill Monitor** – Permits the AccuLoad III through this communication port to communicate with the CIVACON Grounding and Overfill System
- **(8) Smith MMI** – Facilitates communication between the MMI and a Flow Control Module
- **(9) AccuLoad 2 Terminal-STD** – Uses terminal host communications to allow an AccuLoad III to communicate like an AccuLoad II-STD
- **(10) AccuLoad 2 Mini-STD** – Uses minicomputer host communications to allow an AccuLoad III to communicate like an AccuLoad II-STD
- **(11) AccuLoad 2 Terminal-SEQ** – Uses terminal host communications to allow an AccuLoad III to communicate like an AccuLoad II-SEQ
- **(12) AccuLoad 2 Mini-SEQ** – Uses minicomputer host communications to allow an AccuLoad III to communicate like an AccuLoad II-SEQ
- **(13) AccuLoad 2 Terminal-SQR** – Uses terminal host communications to allow an AccuLoad III to communicate like an AccuLoad II-SQR
- **(14) AccuLoad 2 Mini-SQR** – Uses minicomputer host communications to allow an AccuLoad III to communicate like an AccuLoad II-SQR
- **(15) AccuLoad 2 Terminal-RBM** – Uses terminal host communications to allow an AccuLoad III to communicate like an AccuLoad II-RBM
- **(16) AccuLoad 2 Mini-RBM** – Uses minicomputer host communications to allow an AccuLoad III to communicate like an AccuLoad II-RBM
- **(17) Smith Card Reader** – Assigns a communications channel to the Smith Card Reader Interface board, allowing passage of card data to a host computer
- **(18) S-Mass or Apollo Meter** – Assigns a communications channel to an S-Mass or Apollo Meter.

Note: Only one part may be configured for mass meter communications. This option is only available when using Revision 10.04 firmware or higher.

The communications port control must be correctly configured for the selected function.

Critical: Shared printing is only possible on port 1 [710, 715, and 720 only]

Critical: Comm port 4 can be a printer or injector control only

Critical: An address must not be zero

Critical: Only two ports may be configured for injector control

Critical: Only two ports may be configured for printer functions

Critical: Only two ports may be configured for host interface

Critical: Only one port may be used for CIVACON interface

Critical: Modbus requires 8-bit data.

Critical: Function conflicts with Port Control.

Critical: Permissive input must be configured with CIVACON.

Note: Options 8 through 16 are only available when using Revision 9 or higher firmware.

Note: When using Revision 9 firmware or higher, it is possible to program two host control ports for redundancy purposes. Note that only one host control port should be issuing control commands at any one time. It is up to the automation system to prevent conflicts when using this feature.

Help: KDC TB1:(232:1(TX), 2(RX), 3(RTS), 4(CTS), 5(COM)), (485:6(TX+), 7(TX-), 8(RX+), 9(RX-), 10(COM))

Meter 425 – Mass Meter Type

This parameter allows the operator to select the mass meter used by the meter. The factory default is "NA." Selections are as follows:

- (0) NA
- (1) S-Mass
- (2) Apollo

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Help: Select the type of mass meter, S-Mass or Apollo

Meter 426 – Mass Meter Sequence Number

This entry allows the operator to enter the specific sequence number assigned to a mass meter connected to the AccuLoad. The range of this entry is from 0 to 99999.

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Help: Last five digits of the Micro-Pak serial number or the Final Assembly Number for Apollo.

Meter 427 – S-Mass Coefficient Ka

This entry allows the operator to enter the Constant K_a from the S-Mass meter. This numeric entry has a range of 0.0000 to 63.99999. This parameter specifies the "Ka" value in the equation $K_aX^2+K_bX + K_c = \text{Density}$. See MNOM008 for more information.

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Enter the Ka from the S-Mass nameplate.

Meter 428 – S-Mass Coefficient Kb

This entry allows the operator to enter the Constant K_b from the S-Mass meter. This numeric entry has a range of -31.9999 to 31.9999. This parameter specifies the "Kb" value in the equation $K_aX^2+K_bX + K_c = \text{Density}$. See MNOM008 for more information.

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Enter the Kb from the S-Mass nameplate.

Meter 429 – S-Mass Coefficient Kc

This entry allows the operator to enter the Constant K_c from the S-Mass meter. This numeric entry has a range of -31.9999 to 31.9999. This parameter specifies the "Kc" value in the equation $K_aX^2+K_bX + K_c = \text{Density}$. See MNOM008 for more information.

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Enter the Kc from the S-Mass nameplate.

Meter 430 – S-Mass Density Factor

This factor is used to adjust the period of the tubes for the minute change in tube frequency that occurs with change in the flow rate. This factor is typically not changed in the field. The setting depends on the sensor size and materials of construction. Factory settings are as follows:

	Stainless Steel	Hastelloy
S25LF	N/A	030
S25	N/A	030
S50	020	028
S100	016	023
S200	019	027

If the Density Factor for your sensor is different from what is shown, consult your Smith Meter representative.

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Enter the Density Factor for the S-Mass.

Meter 431 – Mass Meter Pulse Multiplier

The mass meter flow rate pulse output is multiplied by this factor to increase the number of pulses per unit of volume resolution. The maximum frequency for the flow rate pulse output is 2500 Hz. Selections are as follows:

- (0) Times 1
- (1) Times 2
- (2) Times 4
- (3) Times 8
- (4) Times 16
- (5) Times .5

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Enter the multiplier for the flow pulse output 1, 2, 4, 8, 16, or .5.

Meter 432 – Mass Meter Low Flow Cutoff

This entry allows the operator to specify the low flow cutoff point. The range of this numeric entry is from 0 to 99. This is the Low Flow Cutoff for the S-Mass meter. The range is 0 to 99. A value of 10 approximates 1.0% of full scale flow, 20 approximates 2.0% of full flow etc. This function prevents counting extraneous pulses that may be generated while at no flow condition. Factory default is 20. See MN0M008 for more information.

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Enter the minimum flow to report. 10 = 1% of full scale flow.

Meter 433 – Mass Meter Tube Material

This entry allows the operator to specify the type of material from which the mass meter's tubes were constructed. Selections are as follows:

- (0) Stainless
- (1) Hastelloy

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Select the tube material (stainless or hastelloy) for this meter.

Meter 434 – Mass Meter Model

This entry allows the operator to specify the type of sensor contained in the mass meter. Selections are as follows:

- (0) Model 25
- (1) Model 50
- (2) Model 100
- (3) Model 200

Note: This parameter is only available when using Revision 10.04 firmware or higher.

Note: No entry if not selected as installed densitometer type

Help: Select the sensor model of the meter.

Program Mode Diagnostics

Mass Meter Menu

Selecting "Mass Meter Menu" from Program Mode Diagnostics displays the opening mass meter diagnostics screen. Mass meter diagnostics display mass meter information and allow the operator to perform certain maintenance tasks. These diagnostics are only available when a mass meter has been configured for use and when the AccuLoad III is equipped with Revision 10.04 firmware or higher.

```
Mass Meter Diagnostics
-> Arm 6 Meter 1
```

Press ENTER to accept the arm and meter selection shown on the screen. The following display will then appear.

```
Arm 6 Meter 1
-> Revision and Date
Magnitude and Drive
Zero
Tare
```

Revision and Date

Selecting "Revision and Date" from the Mass Meter Diagnostics menu displays a screen similar to that

shown below. This option indicates the software version and date associated with the mass meter.

```

                Arm 6 Meter 1
Revision                14
Date                   10/03
```

Magnitude and Drive

Selecting "Magnitude and Drive" from the Mass Meter Diagnostics menu displays a screen similar to that shown below.

```

                Arm 6 Meter 1
-> Drive                XXXX
   Forward Magnitude    XXXX
   Reverse Magnitude    XXXX
```

This screen displays the current valves and is dynamically updated. Press CLEAR to return to the Mass Meter Diagnostics menu.

Zero

Selecting "Zero" from the Mass Meter Diagnostics menu displays a screen similar to that shown below. This option allows the operator to prove an Add-Pak injector. Note that "Test Inject" won't work if the additive injector is not programmed as an Add-Pak. In this case, a pop-up will appear with the message "Injector Not Configured."

```

                Arm 6 Meter 1

                Are You Sure?
-> Yes
   No
```

Position the cursor beside "Yes" and press ENTER to set the meter to zero. The screen will then display "Zeroing in Progress" until the process is complete. Once the meter has been set back to zero, the message will change to "Zeroing Complete – Press Clear to Exit." Note that there can be no flow in progress when "Zero" is initiated.

Position the cursor beside "No" and press ENTER to abort the zero function and return the display to the Mass Meter Diagnostics menu.

Tare

Selecting "Tare" from the Mass Meter Diagnostics menu displays a screen similar to that shown below.

```

                Arm 6 Meter 1

Current Tare                XXX
Enter New Tare              → XXX
```

This screen allows the operator to specify a new tare value for a mass meter. Use the keypad to indicate the new tare value and then press ENTER. The display will return to the Mass Meter Diagnostics menu.

Pass-Through Communications

Two new commands (MC and MR) have been added to the Smith protocol supported by the AccuLoad to allow a host system to send commands and receive responses to / from the mass meter connected to the AccuLoad. For more information about these commands, refer to the following pages.

Command Code MC – Mass Meter Send

This command allows a host system to send commands to a mass meter connected to an AccuLoad.

Command:

"MC_m...m"

Where

m...m = Mass Meter command text as defined in MN0M008
for the S-Mass, or MN0M012 for the Apollo

Responses:

OK Good response

Or ...

"NOXX" The command was not sent to the Mass Meter.

Where

XX = "01" if the AccuLoad is in Program Mode
 = "02" if the AccuLoad is released
 = "19" if no Mass Meter comm port is defined

Remarks: See "MR" for retrieval of the response from the mass meter.

Constraints: None

Special Case: None

Comm. Modes: Polling only, Poll & Authorize, Remote Control, Poll & Program

Command Code MR – Mass Meter Receive

This command allows a host system to receive commands from a mass meter connected to an AccuLoad.

Command:

"MR"

Responses:

"MR_r...r" Good response

Where

r...r = Mass Meter response text as defined in MNOM008 for the S-Mass, or for MNOM012 for the Apollo

or ...

"NOXX" No response is available from the mass meter.

Where

XX = "06" when no data was received from the Mass Meter

Remarks: See "MC" for a description of how to send a command to the mass meter.

Constraints: None

Special Case: None

Comm. Modes: Polling only, Poll & Authorize, Remote Control, Poll & Program

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

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