Overview

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

The AccuLoad III allows for temperature compensating for additives delivered into the product stream. With this method of additive injection, up to 20% of the total preset can consist of additive. Because the additive contribution to the preset is significant, temperature compensation is required to ensure accurate delivery of the additive.

Four flow rate controlled additives are available on the AccuLoad III-X. The first four injectors on the AccuLoad III-X can be configured as flow rate controlled additives. Each additive configured as a flow controlled additive can be associated with a temperature probe or can share a temperature probe already assigned to another additive or product. The additive can also be associated with a maintenance temperature. For more information, refer to the Reference section of this manual.

Additive and Product Totalization

Because a main product and associated flow controlled additive can have different meter factors, API tables, and temperature probes, it is appropriate to add the individual volume types of the product and additive together to obtain the true total throughput being delivered. If the flow controlled additive is located downstream of the main product meter, the following equations apply for determining the total throughput.

- Total IV = Product IV + Additive IV
- Total GV = Product GV + Additive GV
- Total GST = Product GST + Additive GST
- Total GSV = (Product GST * Product CPL) + Additive GST
- Total Mass = Product Mass + Additive Mass

With a mass input, the additive and product volumes are derived from the additive mass and product mass respectively. Total volumes are a summation of the respective additive and volume types. With mass pulse input, additive and product-indicated volumes (IV) are equal to the respective gross volume (GV).

Pressure compensation is not available for flow controlled additives. This applies to both upstream and downstream plumbed flow controlled additives.

When the flow controlled additive is located upstream of the main product meter, the additive and untreated product both flow through the main product meter. The main product amount is back-calculated from the total registered by the main product meter so the appropriate temperature compensated values can be applied separately for the additive and main product. This method of back-calculating the main product is identical to that used for an AccuLoad III Side Stream Blending Arm where the main product and minor product were totalized through the same meter, the minor product had its own meter upstream of the main meter, and the main product amounts could be calculated separately. The general equations for a volume pulse input are as follows:

- Total IV = Product meter pulses / Product meter k-factor
- Total GV = Total IV * Product meter average meter factor
- Product IV = Total IV – Additive IV
- Product GV = Total GV – Additive GV
- Total GST = Product GST + Additive GST
- Total GSV = (Product GST * Product CPL) + Additive GST
- Total Mass = Product Mass + Additive Mass

If the pulse input type is mass, the general equations with upstream additives are as follows:

- Total Raw Mass = Product meter pulses / Product meter k-factor
- Total Mass = Total Raw Mass * Product meter average meter factor
- Product Mass = Total Mass – Additive Mass
- Product IV = Product GV
- Additive IV = Additive GV

The additive and product volumes are derived from the additive mass and the product mass respectively.

The total volumes are the summation of the respective additive and product volume types as indicated above.

Additive and Product Totalization

The AccuLoad maintains non-resettable totals for each additive. For the flow controlled additive, which has several types of totals, the totals type selected for delivery will determine the type of total used for the non-resettable total.

With flow control additives, the following amount types are archived in flash storage:

- Batch Additive Gross Volume
- Batch Additive GST Volume
- Batch Additive Mass

These amount types are available only for additives one through four, as these are the only additives that can be configured as flow controlled additives.

Through the DY communications command, the following data is available for retrieval for the current batch in progress for each of the flow controlled additives:

- Batch Additive IV
- Batch Additive GV
- Batch Additive GST
- Batch Additive Mass
- Batch Additive Current Temperature
- Batch Additive Average Temperature
- Batch Additive Average Density
- Batch Additive Average CTL

When a new batch is started, all totals and averages, except for Additive Gross Volume, Additive GST Volume, and Additive Mass, are no longer available from any previous batch.

Through the DY communications command, the following data is available for retrieval for the current transaction in progress for each of the flow controlled additives:

- Transaction Additive IV
- Transaction Additive GV
- Transaction Additive GST
- Transaction Additive Mass

Once a new transaction is started, the additive IV totals are no longer available from any previous transaction. The GV, GST, and Mass totals are available for previous transactions because these values are archived.

Load Averages

When flow controlled additives with temperature compensation are used, the product averages in the product dynamic displays are those for the product (without additive) only.

Alarms

If the AccuLoad measures an additive temperature that exceeds the additive high temperature alarm limit programmed, an additive high temperature alarm will occur. If the measured temperature is less than the additive low temperature alarm limit, an additive low temperature alarm will occur. If the additive temperature probe becomes faulty, an additive temperature probe alarm will occur.

655: Additive High Temperature. Indicates the additive temperature is out of range of the high temperature setting.

656: Additive Low Temperature. Indicates the additive temperature is out of range of the low temperature setting.

657: Additive Temperature Probe. Indicates an additive temperature probe failure or an out-of-range condition (less than 2 mA / 0.5 Vdc / 52.11 Ω or greater than 23 mA / 5.5 Vdc / 220.88 Ω.

Program Codes

System 063, 069, 075, 081 – Flow Controlled Additive API Table

This entry selects the API Table to be used for temperature compensation are as follows:

- (0) Not used
- (4) 6
- (5) 6A
- (6) 6B
- (7) 6C
- (8) 6D
- (13) 24
- (14) 24A
- (15) 24B
- (16) 24D
- (21) 54
- (22) 54A
- (23) 54B
- (24) 54C
- (25) 54D
- (27) 24E
- (28) BR1A
- (29) BR1P
- (30) BR2P

Critical: API table conflicts with temperature units
Note: *No entry if Temperature Units = Not Used*
Help: Select the API table to be used for temperature compensation.

System 064, 070,076,082 – Reference Density

This code has a constant five-digit entry with a floating decimal point. The format is based on table and product selection. The program code format and data entry allows the programmable entry of the Reference Density when Table 54 is selected, Relative Density when Table 24 is selected, API when Table 6 is selected, and temperature coefficient when a C Table is selected. This entry represents the reference value used to calculate the volume correction factor. The range of this value will vary with the table selection chosen.
Note: *When Table 6 is selected, the leading digit will be used to show polarity, + = positive and a - = negative.*
Entry range based on table selection.

Table 6	-999.9 to +999.9 API
Table 24	0 to 9.9999 Relative Density
Table 54	0 to 9999.9 Reference Density
C Tables	0 to 0.9999 Percent per Degree Temperature

Note: *If the API table selection is changed, the previous five-digit entry for reference will not be converted. This value must be re-entered.*

The following are examples of the display when Tables 24, 54 or 6C and 54C are selected.

Table 6B selected: +43.2 API
Table 24 selected: 0.8175 Rel Density
Table 54 selected: 1150.2 Kg/M3
Table 6C or 54C selected: 0.0800 %/Deg. F or Deg. C

Fatal: Entry is out of specified range.
Note: *No entry if Density Units = Not Used*
Note: *No entry if API table is odd*
Help: Enter the product density at reference temperature or the temperature coefficient (for C tables).

System 065, 071, 077, 083 – Additive Shared Temperature Input

This entry allows the operator to indicate whether an additive is to share a temperature probe already assigned to another arm / meter or additive, and to select a specific probe to be shared. This eliminates having to configure multiple analog inputs for temperature. Selections are as follows:

- (0) Not Used
- (1) Arm 1 Meter 1
- (2) Arm 1 Meter 2
- (3) Arm 1 Meter 3
- (4) Arm 1 Meter 4
- (5) Arm 1 Meter 5
- (6) Arm 1 Meter 6
- (7) Arm 2 Meter 1
- (8) Arm 2 Meter 2
- (9) Arm 2 Meter 3
- (10) Arm 2 Meter 4
- (11) Arm 2 Meter 5
- (12) Arm 2 Meter 6
- (13) Arm 3 Meter 1
- (14) Arm 3 Meter 2
- (15) Arm 3 Meter 3
- (16) Arm 3 Meter 4
- (17) Arm 3 Meter 5
- (18) Arm 3 Meter 6
- (19) Arm 4 Meter 1
- (20) Arm 4 Meter 2
- (21) Arm 4 Meter 3
- (22) Arm 4 Meter 4
- (23) Arm 4 Meter 5
- (24) Arm 4 Meter 6
- (25) Arm 5 Meter 1
- (26) Arm 5 Meter 2
- (27) Arm 5 Meter 3
- (28) Arm 5 Meter 4
- (29) Arm 5 Meter 5
- (30) Arm 5 Meter 6
- (31) Arm 6 Meter 1
- (32) Arm 6 Meter 2
- (33) Arm 6 Meter 3
- (34) Arm 6 Meter 4
- (35) Arm 6 Meter 5
- (36) Arm 6 Meter 6
- (37) Flow Rate Injector #1
- (38) Flow Rate Injector #2
- (39) Flow Rate Injector #3
- (40) Flow Rate Injector #4

Note: *This parameter is only available when using Revision 10.04 firmware or higher.*
Note: *No entry if this injector is not configured as a flow rate controlled injector.*
Critical: Temperature probe already assigned to additive.
Help: Select if it is desired to use another meter or additive temperature input.

System 066, 072, 078, 084 – Additive Maintenance Temperature

This code allows the entry of a maintenance temperature to be used when a temperature probe is not installed or working, but temperature related calculations are desired. The temperature units are dependent on the entry made in the Temperature Scale Se-

lect code. This four-digit entry has a range of –999.9 to 999.9 temperature units where –999.9 disables the maintenance temperature.

Note: *This parameter is only available when using Revision 10.04 firmware or higher.*
Note: *No entry if this injector is not configured as a flow rate controlled injector.*
Note: *An entry greater than -999.9 will override the temperature probe or transducer input if installed and will be used in all calculations where temperature is used.*
Note: *No entry if Temperature Units = Not Used*
Help: Select maintenance temperature if temperature probe is not installed or to override probe

System 067, 073, 079, 085 – Additive High Temperature Alarm Limit

This code allows the entry of a temperature reading that will cause a high temperature alarm to be generated. The temperature units will be dependent on the entry made in the Temperature Scale Select code. This four-digit entry has a range of –999.9 to +999.9 degrees F or C.

Note: *This parameter is only available when using Revision 10.04 firmware or higher.*
Note: *No entry if this injector is not configured as a flow rate controlled injector.*
Note: *An entry of "+999" will disable the alarm.*
Help: Enter temperature that will signal an alarm for high product temperature

System 068, 074, 080, 086 – Additive Low Temperature Alarm Limit

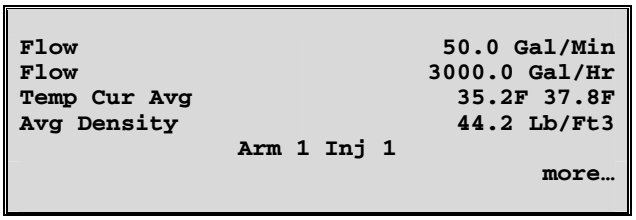
This code allows the entry of a temperature reading that will cause a low temperature alarm to be generated. The temperature units will be dependent on the entry made in the Temperature Scale Select code. This four-digit entry has a range of –999.9 to +999.9 degrees F or C.

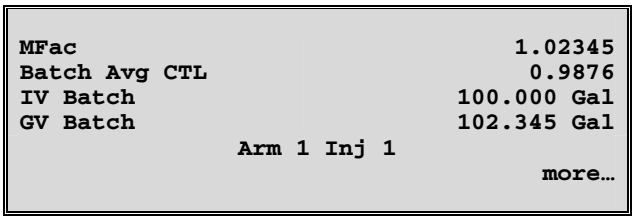
Note: *This parameter is only available when using Revision 10.04 firmware or higher.*
Note: *No entry if this injector is not configured as a flow rate controlled injector.*
Note: *"-999" will disable the alarm.*
Note: *No entry if Temperature Units = Not Used*
Help: Enter temperature that will signal an alarm for low product temperature.

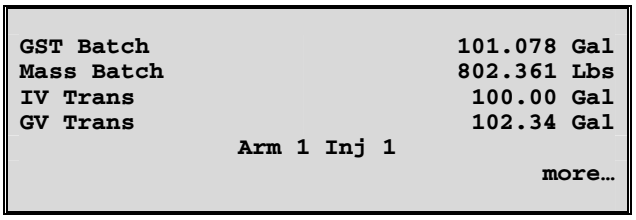
Flow Controlled Additives Dynamic Displays

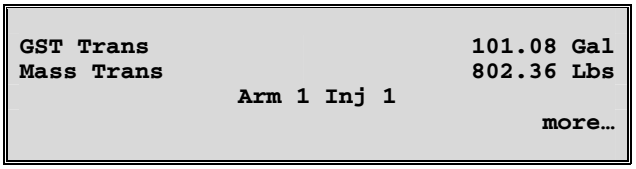
The screens on the following page are examples of the information that is available on the display for all configured flow controlled additives. If additives are not temperature compensated, Batch Average CTL, current and average temperature, GST values, GSV values, and Mass values are not displayed.

Note: *Flow Controlled Additives Dynamic Displays are available only when using Revision 10.04 firmware and up.*









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