Dispenser Interface Protocol

User Guide

VEEDER-ROOT

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Introduction

This document describes the command protocol for the RS-232 dispenser interface. In particular it focuses on the ASR event reports and responses. The Dispenser Interface Module (DIM) will accept both ASR event reports as described in this document, and standard RS-232 commands described in the TLS-350 UST Monitoring Systems RS-232 Interface and TLS-250 & TLS-250i Tank Level Sensing System RS-232 Interface for General Purpose Use Serial Interface Manuals.

The TLS reconciliation software requires information about dispensing activity. This protocol provides a reporting method that allows fuel pump system controllers and point of sale terminals to input this data into the TLS as events occur. This document defines the event reports that can be sent to the DIM and how the TLS will respond.

Related Manuals

576013-635	TLS-350 UST Monitoring Systems RS-232 Interface Manual
576013-693	TLS-250 & TLS-250i Tank Level Sensing System RS-232 Interface for General Purpose Use Manual

Hardware Configuration

The TLS requires a properly configured RS-232 dispenser interface module installed on the communication bus of the TLS-350 enhanced platform.

Connections

The RS-232 signals on TLS D-connector are as shown below:

PIN	Description	Direction
2	Transmit data	Out
3	Receive data	In
7	Signal ground	•

Communication Parameters

The TLS operates in full duplex mode (transmit and receive can occur simultaneously). However, the protocol limits communication to one command at a time. A second command should not be sent before the first command has received a response. Communication parameters are programmable at the TLS-350 front panel. Do not enable the programmable ETX feature on the TLS. This protocol requires the ASCII 03 ETX.

Start bit	1
Data bits	7 or 8
Parity	Odd, even or none
Stop bits	1 or 2
Communication rate	9600

Terminology

In order to minimize confusion, the terminology used in this protocol is defined in this section.

FUELING POSITION	A fueling dispenser that is uniquely identified by the SYSTEM CONTROLLER and is capable of only one TRANSACTION at a time.
METER	A device that measures the dispensed product volume at a FUELING POSITION. This device is not connected to more than one product (tank) and is not active for more than one FUELING POSITION at a time. For a two product blender, two meters would be required to report the total volume for one TRANSACTION.
TRANSACTION	A complete fueling cycle. A transaction consists of a START EVENT and STOP EVENT.
START EVENT	The beginning of a TRANSACTION. A FUELING POSITION has been selected and is authorized to dispense a product. From this point on the customer is in control of the fuel dispensing.
STOP EVENT	The end of a TRANSACTION. Dispensing is complete, and the FUELING POSITION is no longer authorized to dispense fuel without beginning another TRANSACTION. At this point, the meters will be read to determine the volume dispensed.
TRANSACTION VOLUME	The total amount of product dispensed through a METER for a single TRANSACTION. METER total is reset to 0 after each TRANSACTION.
CUMULATIVE VOLUME	The total of all product volume TRANSACTIONS to pass though a METER. METER total is not reset after each TRANSACTION.
SYSTEM CONTROLLER	Controls fuel pump activity and reports TRANSACTION events to the TLS.

Event Data

A fueling transaction includes selecting a fuel position, fuel dispensing, and deselecting the fuel position. The complete transaction is documented in two events, a start event and stop event. This section describes the data required to report them.

Fueling Position ID

Identifies the active fueling position. Only one transaction can occur at a fueling position at a time. Therefore, simultaneous events cannot share the same fueling position ID. A fueling position ID is required for a valid start event. See “Fuel Positions” on page 12.

Meter ID

Identifies the active meter at the fueling position. If the meter ID is reported, the metered volume must also be reported. Blends require both high and low feedstock meter IDs. This information is not required for a start event but is required for a stop event when volumes are reported. See “Fuel Position Meters” on page 12.

Metered Volume

This is the volume dispensed at a meter. Stop events report both a transaction volume and cumulative volume for each meter used in the transaction. The transaction volume is the amount of product dispensed during that one transaction. Cumulative volume is the total (non-resettable) product volume of all transactions dispensed through that meter. TLS requires transaction totals for each reported meter. Cumulative totals are desirable as they enable the TLS to recover from errors such as lost transactions and should be provided whenever available.

The TLS can be configured to accept event report volumes in three different units, U.S., Imperial and Metric. The system controller must report all volumes with the same unit.

Metered volumes must be obtained directly from calibrated meters.

Time Delay

This is the number of seconds the report was delayed before it was transmitted to the TLS. Events must be sent to the TLS in the order that they occur. Event reports are considered instantaneous to the second. However, if communication is delayed and the event reports are queued up, this data reports the length of the delay. Time delay should normally be 0.

Event Queues

If communication is interrupted, and the queue of events on the system controller becomes full, overwrite old events in the queue with new events.

Report Message Format

All event report messages are configured in a format consistent with the TLS-350 and TLS-250 serial interface command protocol. Standard RS-232 protocol messages are called commands, event data messages are referred to as reports. Event report messages have the following structure:

SOH	Security Code	Function Code	Data Field	EOT

SOH

Control-A character (01_{16}) marks the beginning of the message string.

Security Code

The security code is a six-digit code used to limit RS-232 access to the TLS for security or networking purposes. This field is optional on TLS-250 and TLS-350 command formats and is also optional when using the dispenser interface. Event command security code follows the same rules and format as the RS-232 TLS commands.

Function Code

This field contains the command codes that the TLS interprets to determine the required action. ASR report codes, TLS-350 command codes and TLS-250 command codes can be used in this field. The field length will vary depending on the function code.

ASR REPORTS

ASR report function codes are 1 character symbols that identify which report is being sent in the data field.

Table 1.- Event Report Code Commands

Symbol	Definition
B	Start Event data report
C	Stop Event data report
D	Event status report

TLS-250 COMMANDS

The dispenser interface supports TLS-250 3 character command. See TLS-250 & TLS-250i Tank Level Sensing System RS-232 Interface for General Purpose Use (Manual No. 576013-693) serial interface manual.

TLS-350 COMMANDS

The dispenser interface supports TLS-350 6 character command. See TLS-350 UST Monitoring Systems RS-232 Interface (Manual No. 576013-635) serial interface manual.

Data Field

This field contains data required to execute the command specified in the function code field. The length of this field depends on the data requirements for the function code.

EOT

Control-D character (04_{16}) marks the end of the message string.

ASR Reports

This section describes the function codes and data fields for ASR event and status reports.

Data Symbols

The symbols defined below are used to specify the event report data field requirements. Each symbol character represents one ASCII character byte.

SYMBOL **DESCRIPTION**

I Event Message Identifier. Start Events and Stop Events contain event IDs to help the dispenser interface module identify transmissions that are repeated as a result of communication errors. Once an event report (start or end) is successfully transmitted, the Event Message ID must change so the next event report (start or end) will get a new ID in the range 0 - 9. An event report must keep the same ID until it is successfully transmitted. The status report does not require an ID.

Format: ASCII Decimal

Range: '0' to '9'

EE Error Flag byte. Bit mapped errors where each active high bit represents an error condition.

Bit Map: (MSB) 7 6 5 4 3 2 1 0 (LSB)

Format: ASCII Hexadecimal.

Range: '00' to 'FF

BIT	ERROR
0	Data lost. (Queue overwrite.)
1-7	Reserved, should be 0.

SSSS Seconds Delay. Number of seconds the event was delayed before it was transmitted.

Format: ASCII Decimal

Range: '0000' to '9999'

PP Fueling Position. Dispensing location identifier.

Format: ASCII Decimal

Range: '00' to '99'

Each position must have a unique identifier. See “Fuel Positions” on pag e12.

SYMBOL	DESCRIPTION
N	Number of Meter ID and volume sets to follow. Format: ASCII Decimal Range: '0' to '9' '0' Meter ID and volume not reported. This value implies that no product was dispensed during this transaction. '1' Single product (one meter & volume set) '2' Blended product (two meter & volume sets) Meter ID and volume set consists of: 1 Meter Identifier 1 Cumulative volume 1 Transaction volume This field is only used in a stop event report.
M	Meter Identifier. Format: ASCII Decimal Range: '0' to '9' Each meter at a fueling position must have a unique identifier.
DDDDDD.DD	Cumulative Volume for meter identified in previous M field. Format: ASCII Decimal This field is required for all meter volume reports in a stop event report. The data provides enhanced TLS error recovery and should be provided if available. 0 fill unused digits. The decimal point is included in the string. ***If this information is not available from a calibrated meter, fill this field with '?' characters. ('?????????').*** Do not fill both transaction and cumulative volume fields with '?' in the same event report.
dddd.ddd	Transaction Volume for meter identified in previous M field. Format: ASCII Decimal This field is required for all volume reports in a stop event. 0 fill unused digits. The decimal point is included in the string. ***If this information is not available directly from a calibrated meter (do not use blend ratios of a transaction meter), fill this field with '?' characters. ('????????').*** Do not fill both transaction and cumulative volume fields with '?' in the same event report.
CCCC	Two byte check sum. Format: ASCII Hexadecimal The four characters represent a 16-bit binary count which is the 2's complemented sum of all the preceding characters transmitted in the message, including the <SOH>. Overflows are ignored. The data integrity check is done by converting the four check sum characters to the 16-bit binary number and adding the transmitted data field characters to it. The binary result should be 0.

Event Reports

These reports are used to send the transaction event data to the TLS.

START EVENT REPORT

<SOH>B**IEESSSSPPCCCC**<EOT>

Where: <SOH> = Start of message marker. (01_{16})

B = Function code 'B', Start event report.

I = Event ID

EE = Error flag

SSSS = Seconds delay

PP = Fueling Position

CCCC = Check sum of proceeding characters.

<EOT> = End of message marker. (04_{16})

Example Report 1: <SOH>B000000012FE0A<EOT>

- Event ID = 0
- Transmission delay = 0 seconds
- Selected Fueling Position = 12

Example Report 2: <SOH>B100000501FE06<EOT>

- Event ID = 1
- Transmission delay = 5 seconds
- Selected Fueling Position = 1

STOP EVENT REPORT

<SOH>C**IEESSSSPPNM$_1$DDDDDD.DD$_1$dddd.ddd$_1$...M$_N$DDDDDD.DD$_N$dddd.ddd$_N$CCCC**<EOT>

Where:

<SOH> = Start of message marker. (01_{16})

C = Function code 'C', stop event report.

I = Event ID

EE = Error flag

SSSS = Seconds delay

PP = Fueling Position

N = Number of Meter ID and volume sets to follow.

M$_X$ = Meter Identifier

DDDDDD.DD$_X$ = Cumulative volume for meter identified in previous M field.

dddd.ddd$_X$ = Transaction volume for meter identified in previous M field.

CCCC = Check sum of proceeding characters.

<EOT> = End of message marker. (04_{16})

Note: The subscript X will range from 1 to N, where N = the Number of Meter ID and volume pairs field.

Example Report 1: <SOH>C20000021211002366.340010.112FA5A<EOT>

- Event ID = 2
- Transmission delay = 2 seconds
- Selected Fueling Position = 12
- Selected meter = 1
- Cumulative total = 2366.34
- Transaction total = 10.112

Example Report 2: <SOH>C30000020521?????????0005.1122002357.710005.650F65A<EOT>

- Event ID = 3
- Transmission delay = 2 seconds
- Selected Fueling Position = 5
- Selected meter = 1,2 (blend)
- Cumulative totals = *unknown*$_1$, 2357.71$_2$
- Transaction totals = 5.112$_1$, 5.65$_2$

Example Report 3: <SOH>C20000071211002366.340010.112FA59<EOT>

- The TLS did not respond to example 1 message after 5 seconds so it is repeated.
- Transmission delay = 2 seconds

Status Report

When there are no transmissions from the system controller (ASR event reports or any other TLS commands) in a 60 second period, the TLS expects the ASR Event status report to ensure communication has not been broken. Otherwise, after 60 seconds of no communication, the TLS assumes there is a communication fault.

Status Report: <SOH>D<EOT>

Where:

<SOH> = Start of message marker. (01_{16})

D = Function code 'D', event status report.

<EOT> = End of message marker. (04_{16})

TLS Response

This section describes the TLS response to ASR event and status reports only. The TLS responses to standard RS-232 TLS-350 and TLS-250 commands are described in TLS-350 UST Monitoring Systems RS-232 Interface (Manual No. 576013-635) and TLS-250 & TLS-250i Tank Level Sensing System RS-232 Interface for General Purpose Use (Manual No. 576013-693) Serial Interface Manuals.

Table 2.- ASR Report Responses

Response	Description
ACK	(06_{16}) Acknowledge: message received, no errors.
NAK	(15_{16}) Negative acknowledge: check sum or transmit error. Retransmit.
Timeout	Incomplete transmission. Retransmit.

If a NAK or timeout occurs, the system controller must retransmit ASR event reports with the delay field updated. Timeout period should not be less than 3 seconds.

Reconciliation System Limitations

The reconciliation systems have predefined data limitations. Please notify Gilbarco/Veeder-Root if the system implementing this protocol can exceed the boundaries defined here.

Fuel Positions

The total number of fueling positions supported is 36. The fuel position unique identifier (See “Fueling Position ID” on page 4, “Data Symbols” on page 7) may be larger than 36. However, there can not be more than 36 unique identifiers reported.

Fuel Position Meters

The total number of meters (See “Meter ID” on page 4, “ Data Symbols” on page 7) that a single fuel position can report is 6.

Configuration String

This is a 12 character string that is entered at the TLS keypad and is sent to the DIM over the RS232 communication port. It defines for the DIM the external communication port parameters and conversion factors for the event data. The following parameters can be entered in any order. Omitted parameters will cause the DIM to use the **highlighted default**.

Baud Rate

String	Rate
B9	**9600**
B4	4800
B2	2400
B1	1200
B6	600
B3	300

Data Bits

String	Bits
V	**7**
D	8

Parity

String	Type
N	No Parity
E	Even
O	**Odd**

Stop Bits

String	Bits
H	**1**
S	2

Dispenser Data Unit Conversion

Specifies the units reported in the transaction and cumulative data fields of the stop event.

Conversion

String	Unit
G	Gallons
M	**Metric (Liters)**
I	Imperial Gallon

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