**Intellitrol MODBUS Manual for SuperTIM**

November 1, 2019

1 Overview 6

2 References 7

3 Hardware 7

4 Modbus Commands 7

5 Free Form Area 7

5.1 Spare Section Modbus Commands 8

6 Carrier Specific Data 8

6.1 Carrier Data Modbus commands 8

6.1.1 Carrier Name Function 9

6.1.2 Carrier Address Function 9

6.1.3 Contract Number Function 9

6.1.4 Operating Service Function 9

6.1.5 Driver ID Function 9

6.1.6 Compartment 1 Allowable Volume Function 10

6.1.7 Compartment 2 Allowable Volume Function 10

6.1.8 Compartment 3 Allowable Volume Function 10

6.1.9 Compartment 4 Allowable Volume Function 10

6.1.10 Compartment 5 Allowable Volume Function 10

6.1.11 Compartment 6 Allowable Volume Function 11

6.1.12 Compartment 7 Allowable Volume Function 11

6.1.13 Compartment 8 Allowable Volume Function 11

6.1.14 Compartment 9 Allowable Volume Function 11

6.1.15 Compartment 10 Allowable Volume Function 11

6.1.16 Compartment 11 Allowable Volume Function 12

6.1.17 Compartment 12 Allowable Volume Function 12

6.1.18 Compartment 13 Allowable Volume Function 12

6.1.19 Compartment 14 Allowable Volume Function 12

6.1.20 Compartment 15 Allowable Volume Function 12

6.1.21 Compartment 16 Allowable Volume Function 13

7 Service Center Specific Data 13

7.1 Service Center Data Modbus Commands 13

7.1.1 Vapor Tightness Certificate Type Function 13

7.1.2 Vapor Tightness Certificate Expiration Date Function 14

7.1.3 Vapor Tightness Certificate Number Function 14

7.1.4 Safe Loading Pass Certificate Type Function 14

7.1.5 Safe Loading Pass Certificate Expiration Date Function 14

7.1.6 Safe Loading Pass Certificate Number Function 15

7.1.7 Certificate 3 Type Function 15

7.1.8 Certificate 3 Expiration Date Function 15

7.1.9 Certificate 3 Number Function 15

7.1.10 Certificate 4 Type Function 16

7.1.11 Certificate 4 Expiration Date Function 16

7.1.12 Certificate 4 Number Function 16

7.1.13 Certificate 5 Type Function 16

7.1.14 Certificate 5 Expiration Date Function 17

7.1.15 Certificate 5 Number Function 17

8 Truck Builder Specific Data 17

8.1 Truck Builder Modbus Commands 17

8.1.1 TIM Data Valid Function 18

8.1.2 TIM Data Revision Function 18

8.1.3 Alternate TIM ID is Valid Function 18

8.1.4 Alternate TIM ID Function 18

8.1.5 Number of Compartments Function 19

8.1.6 Compartment Volume Units Function 19

8.1.7 Trailer ID Number Function 19

8.1.8 Compartment Configuration Function 19

8.1.9 Vapor Interlock Type Function 20

8.1.10 Compartment 1 Product Type Allowed Function 20

8.1.11 Compartment 2 Product Type Allowed Function 20

8.1.12 Compartment 3 Product Type Allowed Function 20

8.1.13 Compartment 4 Product Type Allowed Function 20

8.1.14 Compartment 5 Product Type Allowed Function 21

8.1.15 Compartment 6 Product Type Allowed Function 21

8.1.16 Compartment 7 Product Type Allowed Function 21

8.1.17 Compartment 8 Product Type Allowed Function 21

8.1.18 Compartment 9 Product Type Allowed Function 21

8.1.19 Compartment 10 Product Type Allowed Function 22

8.1.20 Compartment 11 Product Type Allowed Function 22

8.1.21 Compartment 12 Product Type Allowed Function 22

8.1.22 Compartment 13 Product Type Allowed Function 22

8.1.23 Compartment 14 Product Type Allowed Function 22

8.1.24 Compartment 15 Product Type Allowed Function 23

8.1.25 Compartment 16 Product Type Allowed Function 23

8.1.26 Maximum Loading Temperature Function 23

8.1.27 Temperature Units Function 23

9 Terminal Specific Data 24

9.1 Terminal Modbus Commands 24

9.1.1 Compartment 1 Fuel Type Loaded Function 24

9.1.2 Compartment 1 Fuel Batch Date Code Function 25

9.1.3 Compartment 1 Fuel Volume Loaded Function 25

9.1.4 Compartment 2 Fuel Type Loaded Function 25

9.1.5 Compartment 2 Fuel Batch Date Code Function 25

9.1.6 Compartment 2 Fuel Volume Loaded Function 26

9.1.7 Compartment 3 Fuel Type Loaded Function 26

9.1.8 Compartment 3 Fuel Batch Date Code Function 26

9.1.9 Compartment 3 Fuel Volume Loaded Function 26

9.1.10 Compartment 4 Fuel Type Loaded Function 27

9.1.11 Compartment 4 Fuel Batch Date Code Function 27

9.1.12 Compartment 4 Fuel Volume Loaded Function 27

9.1.13 Compartment 5 Fuel Type Loaded Function 27

9.1.14 Compartment 5 Fuel Batch Date Code Function 28

9.1.15 Compartment 5 Fuel Volume Loaded Function 28

9.1.16 Compartment 6 Fuel Type Loaded Function 28

9.1.17 Compartment 6 Fuel Batch Date Code Function 28

9.1.18 Compartment 6 Fuel Volume Loaded Function 29

9.1.19 Compartment 7 Fuel Type Loaded Function 29

9.1.20 Compartment 7 Fuel Batch Date Code Function 29

9.1.21 Compartment 7 Fuel Volume Loaded Function 29

9.1.22 Compartment 8 Fuel Type Loaded Function 30

9.1.23 Compartment 8 Fuel Batch Date Code Function 30

9.1.24 Compartment 8 Fuel Volume Loaded Function 30

9.1.25 Compartment 9 Fuel Type Loaded Function 30

9.1.26 Compartment 9 Fuel Batch Date Code Function 31

9.1.27 Compartment 9 Fuel Volume Loaded Function 31

9.1.28 Compartment 10 Fuel Type Loaded Function 31

9.1.29 Compartment 10 Fuel Batch Date Code Function 31

9.1.30 Compartment 10 Fuel Volume Loaded Function 32

9.1.31 Compartment 11 Fuel Type Loaded Function 32

9.1.32 Compartment 11 Fuel Batch Date Code Function 32

9.1.33 Compartment 11 Fuel Volume Loaded Function 32

9.1.34 Compartment 12 Fuel Type Loaded Function 33

9.1.35 Compartment 12 Fuel Batch Date Code Function 33

9.1.36 Compartment 12 Fuel Volume Loaded Function 33

9.1.37 Compartment 13 Fuel Type Loaded Function 33

9.1.38 Compartment 13 Fuel Batch Date Code Function 34

9.1.39 Compartment 13 Fuel Volume Loaded Function 34

9.1.40 Compartment 14 Fuel Type Loaded Function 34

9.1.41 Compartment 14 Fuel Batch Date Code Function 34

9.1.42 Compartment 14 Fuel Volume Loaded Function 35

9.1.43 Compartment 15 Fuel Type Loaded Function 35

9.1.44 Compartment 15 Fuel Batch Date Code Function 35

9.1.45 Compartment 15 Fuel Volume Loaded Function 35

9.1.46 Compartment 16 Fuel Type Loaded Function 36

9.1.47 Compartment 16 Fuel Batch Date Code Function 36

9.1.48 Compartment 16 Fuel Volume Loaded Function 36

9.1.49 Terminal Name Function 36

9.1.50 Terminal Address Function 37

9.1.51 Gantry Number Function 37

Predefined Data Lists 37

Modbus Error Codes 40

**Revision History**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Revision** | **Who** | **Date** |  | **Changes Made** |
| 0.01 | SME | 11/19/18 |  | Major changes for new Super TIM layout and implementation. Based on Super Tim Rev 021 from 10/25/16 |
| 0.02 | DAA | 12/31/18 |  | Overview updated with PIDX code reference |
| 0.03 | HP | 11/1/19 |  |  |

# Overview

The Scully SuperTIM (Truck Identification Module), elevates tank truck loading to a new level of safety. Trucks outfitted with SuperTIM afford terminals with advanced automation to further avoid spills, improve throughput, and troubleshoot loading errors.

Each SuperTIM, provides a laser etched serial number with additional nonvolatile memory that can be safely accessed during the loading process.

Access to SuperTIM features is possible via Modbus with the Intellitrol II rack controller and firmware versions 1.7.0 and higher.

In addition to the typical Truck ID number used for tracking and VIP loading, the SuperTIM provides terminals with the following additional tank truck details:

* Safety Inspection Records
  + Vapor Certificate number and expiration date
  + Safe Loading Pass Certificate number and expiration date
  + Additional, carrier specific, certificate numbers and expiration dates
* Compartment Capacities
  + Number of compartments
  + Allowable capacities for each compartment
* Carrier Identification
  + Name and Address
  + Contract Number
  + Operating Service
  + Driver ID
* Truck Specifications
  + Trailer ID
  + Compartment configuration
  + Intellicheck on board overfill controller type
  + Vapor interlock type
* Truck Loading limits
  + Allowable Product Type by compartment
  + Maximum allowable Loading temperature

To enhance unloading safety, terminals can read and record the following information to the SuperTIM

* Product Details
  + Fuel type loaded in each compartment
  + Fuel batch last loaded in each compartment
  + Fuel volume loaded into each compartment
* Terminal details
  + Terminal Name and address for current load
  + Terminal gantry number for current load
  + Free form data for terminal specific use

Fuel types are saved as product family codes as defined by Petroleum Industry data Exchange.

The purpose of this specification is to document the high-level software interface for SuperTIM as supported by the Intellitrol II.

# References

43177 – Scully MODBUS User Guide

PIDX Product Code Standard 04-101-15-45-2010 (http://www.pidx.org/downstream-codes/)

# Hardware

The SuperTIM values are read and written through the Scully Intellitrol running firmware version 1.7.0 or latter.

# Modbus Commands

Most predefined data stored in the Super TIM memory can be accessed using the standard Modbus commands Read Multiple Registers (0x03), Write Single Register (0x06) and Write Multiple Registers (0x10) detailed in the Scully MODBUS User Guide. Reading and writing predefined data can also be performed using the Read TIM Data (0x53) and Write TIM Data (0x54) commands detailed in each section below. The holding register number(s) and subfunctions number for each predefined data field will be listed under that field description along with its Read Only or Read Write status.

# Free Form Area

Several companies have requested the ability to put proprietary information into the TIM so that information will follow the truck. One example could be an electronic copy of the last invoice. The Intellitrol will allow access to this through the Modbus. The Intellitrol software will not perform any action on the information stored here. The available memory range is from address 0x080 to 0x0FF.

## Spare Section Modbus Commands

Note that the data field must not exceed 70 bytes.

The Spare Section Modbus Write command:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Memory address 2 bytes | Data length  - 1 byte | Data in bytes LSB first | CRC  2 bytes |
| xx | 0x56 | 0x080 – 0x0FF | yy | aa, bb, cc, … | sstt |

Write response:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Memory address 2 bytes | Data length  - 1 byte | CRC  2 bytes |
| xx | 0x56 | 0x080 – 0x0FF | yy | sstt |

Spare Section Modbus Read command:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Memory address 2 bytes | Data length  - 1 bytes | CRC  2 bytes |
| xx | 0x55 | 0x080 – 0x0FF | yy | sstt |

Read Response:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Memory address 2 bytes | Data length  - 1 byte | Data in bytes LSB first | CRC  2 bytes |
| xx | 0x55 | 0x080 – 0x0FF | yy | aa, bb, cc, … | sstt |

# 

# Carrier Specific Data

The carrier specific predefined fields are detailed below.

## Carrier Data Modbus commands

The data length must not exceed 70 bytes.

Read Command:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined Data sub command  1 byte | Data \*\*  length  1 byte | CRC  2 bytes |
| xx | 0x53 | 0x01 – 0x15 | yy | sstt |

\*\* Optional

Read Response:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined Data sub command  1 byte | Data length  1 byte | Data in bytes LSB first | CRC  2 bytes |
| xx | 0x53 | 0x01 – 0x15 | yy | aa, bb, cc, … | sstt |

### Carrier Name Function

This is the name of the carrier company.

Sub Command – 0x01

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x300 – 0x309

Modbus Access – Read Only

### Carrier Address Function

This is the address of the carrier company.

Sub Command – 0x02

Data Length – 40 Bytes

Data Type – ASCII String

Holding Registers – 0x30A – 0x31D

Modbus Access – Read Only

### Contract Number Function

This is the carriers contract number.

Sub Command – 0x03

Data Length – 10 Bytes

Data Type – ASCII String

Holding Registers – 0x31E – 0x322

Modbus Access – Read Only

### Operating Service Function

This is the operating service’s name.

Sub Command – 0x04

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x323 – 0x32C

Modbus Access – Read Only

### Driver ID Function

This is the ID of the driver.

Sub Command – 0x05

Data Length – 10 Bytes

Data Type – ASCII String

Holding Registers – 0x32D – 0x331

Modbus Access – Read Only

### Compartment 1 Allowable Volume Function

This is the allowable volume of compartment 1.

Sub Command – 0x06

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x332

Modbus Access – Read Only

### Compartment 2 Allowable Volume Function

This is the allowable volume of compartment 2.

Sub Command – 0x07

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x333

Modbus Access – Read Only

### Compartment 3 Allowable Volume Function

This is the allowable volume of compartment 3.

Sub Command – 0x08

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x334

Modbus Access – Read Only

### Compartment 4 Allowable Volume Function

This is the allowable volume of compartment 4.

Sub Command – 0x09

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x335

Modbus Access – Read Only

### Compartment 5 Allowable Volume Function

This is the allowable volume of compartment 5.

Sub Command – 0x0A

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x336

Modbus Access – Read Only

### Compartment 6 Allowable Volume Function

This is the allowable volume of compartment 6.

Sub Command – 0x0B

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x337

Modbus Access – Read Only

### Compartment 7 Allowable Volume Function

This is the allowable volume of compartment 7.

Sub Command – 0x0C

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x338

Modbus Access – Read Only

### Compartment 8 Allowable Volume Function

This is the allowable volume of compartment 8.

Sub Command – 0x0D

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x339

Modbus Access – Read Only

### Compartment 9 Allowable Volume Function

This is the allowable volume of compartment 9.

Sub Command – 0x0E

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x33A

Modbus Access – Read Only

### Compartment 10 Allowable Volume Function

This is the allowable volume of compartment 10.

Sub Command – 0x0F

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x33B

Modbus Access – Read Only

### Compartment 11 Allowable Volume Function

This is the allowable volume of compartment 11.

Sub Command – 0x10

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x33C

Modbus Access – Read Only

### Compartment 12 Allowable Volume Function

This is the allowable volume of compartment 12.

Sub Command – 0x11

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x33D

Modbus Access – Read Only

### Compartment 13 Allowable Volume Function

This is the allowable volume of compartment 13.

Sub Command – 0x12

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x33E

Modbus Access – Read Only

### Compartment 14 Allowable Volume Function

This is the allowable volume of compartment 14.

Sub Command – 0x13

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x33F

Modbus Access – Read Only

### Compartment 15 Allowable Volume Function

This is the allowable volume of compartment 15.

Sub Command – 0x14

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x340

Modbus Access – Read Only

### Compartment 16 Allowable Volume Function

This is the allowable volume of compartment 16.

Sub Command – 0x15

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x341

Modbus Access – Read Only

# Service Center Specific Data

The predefined service center specific fields are detailed below

## Service Center Data Modbus Commands

The following are used to read and write the functions shown in table 1. Note that the data length is optional on command 53 as the sub-command specifies the length. If specified, the memory address plus length must be within the targeted memory section.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data \*\*  length  1 byte | CRC  2 bytes |
| xx | 0x53 | 0x16 – 0x24 | yy | sstt |

\*\* Optional

Read Response:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data length  1 byte | Data in bytes LSB first | CRC  2 bytes |
| xx | 0x53 | 0x16 – 0x24 | yy | aa, bb, cc, … | sstt |

### Vapor Tightness Certificate Type Function

This is the certificate type for the vapor tightness certificate. For vapor tightness type this value will always be 1.

Sub Command – 0x16

Data Length – 1 Byte1

Data Type – Unsigned 8-bit integer

Holding Registers – 0x342 MS Byte

Modbus Access – Read Only

### Vapor Tightness Certificate Expiration Date Function

This is the Expiration date for the vapor tightness certificate.

Sub Command – 0x17

Data Length – 3 Bytes

Holding Registers – 0x342 LSB & 0x343

Modbus Access – Read Only

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x342 LS Byte | Reg 0x343 MS Byte | Reg 0x343 LS Byte |
| Month | Day | Year |

### Vapor Tightness Certificate Number Function

This is the vapor tightness certificate number.

Sub Command – 0x18

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x344 – 0x34D

Modbus Access – Read Only

### Safe Loading Pass Certificate Type Function

This is the safe loading pass certificate type. For safe loading pass type this value will always be 2.

Sub Command – 0x19

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x34E MS Byte

Modbus Access – Read Only

### Safe Loading Pass Certificate Expiration Date Function

This is the safe loading pass certificate expiration date.

Sub Command – 0x1A

Data Length – 3 Bytes

Holding Registers – 0x34E LS Byte – 0x34F

Modbus Access – Read Only

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x34E LS Byte | Reg 0x34F MS Byte | Reg 0x34F LS Byte |
| Month | Day | Year |

### Safe Loading Pass Certificate Number Function

This is the safe loading pass certificate number.

Sub Command – 0x1B

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x350 – 0x359

Modbus Access – Read Only

### Certificate 3 Type Function

This is the certificate 3 type.

Sub Command – 0x1C

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x35A MS Byte

Modbus Access – Read Only

### Certificate 3 Expiration Date Function

This is the certificate 3 expiration date.

Sub Command – 0x1D

Data Length – 3 Bytes

Holding Registers – 0x35A LS Byte 0x35B

Modbus Access – Read Only

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x35A LS Byte | Reg 0x35B MS Byte | Reg 0x35B LS Byte |
| Month | Day | Year |

### Certificate 3 Number Function

This is the certificate 3 number.

Sub Command – 0x1E

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x35C – 0x365

Modbus Access – Read Only

### Certificate 4 Type Function

This is the certificate 4 type.

Sub Command – 0x1F

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x366 MS Byte

Modbus Access – Read Only

### Certificate 4 Expiration Date Function

This is the certificate 4 expiration date.

Sub Command – 0x20

Data Length – 3 Bytes

Holding Registers – 0x366 LS Byte – 0x367

Modbus Access – R

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x366 LS Byte | Reg 0x367 MS Byte | Reg 0x367 LS Byte |
| Month | Day | Year |

### Certificate 4 Number Function

This is the certificate 4 number.

Sub Command – 0x21

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x368 – 0x371

Modbus Access – Read Only

### Certificate 5 Type Function

This is the certificate 5 type.

Sub Command – 0x22

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x372

Modbus Access – Read Only

### Certificate 5 Expiration Date Function

This is the certificate 5 expiration date.

Sub Command – 0x23

Data Length – 3 Bytes

Holding Registers – 0x372 LS Byte – 0x373

Modbus Access – Read Only

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x372 LS Byte | Reg 0x373 MS Byte | Reg 0x373 LS Byte |
| Month | Day | Year |

### Certificate 5 Number Function

This is the certificate 5 number.

Sub Command – 0x24

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x374 – 0x37D

Modbus Access – Read Only

# Truck Builder Specific Data

The predefined truck builder specific fields are detailed below

## Truck Builder Modbus Commands

The following are used to read and write the functions shown in table 1. Note that the data length is optional on command 53 as the sub-command specifies the length. If specified, the memory address plus length must be within the targeted memory section.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data \*\*  length  1 byte | CRC  2 bytes |
| xx | 0x53 | 0x25 – 0x3F | yy | sstt |

\*\* Optional

Read Response:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data length  1 byte | Data in bytes LSB first | CRC  2 bytes |
| xx | 0x53 | 0x25 – 0x3F | yy | aa, bb, cc, … | sstt |

### TIM Data Valid Function

This is a flag to indicate the TIM data is valid.

Sub Command – 0x25

Data Length – 2 Bytes

Holding Registers – 0x37E

Modbus Access – Read Only

If TIM is valid the data will be:

|  |  |
| --- | --- |
| Byte 0 | Byte 1 |
| 0x55 | 0xAA |

### TIM Data Revision Function

This is the revision number of the TIM data. The initial release will be at revision 1.

Sub Command – 0x26

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x37F

Modbus Access – Read Only

### Alternate TIM ID is Valid Function

This is a flag to indicate the alternate TIM ID is a valid ID. If this flag is a 0x33 the alternate TIM ID is valid.

Sub Command – 0x27

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

0x33 = Alternate TIM ID is valid

Non 0x33 = Alternate TIM ID is not valid

Holding Registers – 0x380 LS Byte

Modbus Access – Read Only

### Alternate TIM ID Function

This is the alternate TIM ID.

Sub Command – 0x28

Data Length – 6 Bytes

Data Type – ASCII String

Holding Registers – 0x381 – 0x383

Modbus Access – Read Only

### Number of Compartments Function

This is the number of compartments on the truck.

Sub Command – 0x29

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x420 LS Byte

Modbus Access – Read Only

### Compartment Volume Units Function

This is the volume units for the compartments. This value is used for all compartment volume parameters.

Sub Command – 0x2A

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

1 = Gallons

2 = Imperial Gallons

3 = Litters

Holding Registers – 0x384 LS Byte

Modbus Access – Read Only

This is the volume of compartment 9.

### Trailer ID Number Function

This is the trailer ID number.

Sub Command – 0x2B

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x385 – 0x38E

Modbus Access – Read Only

### Compartment Configuration Function

This is the alternate TIM ID.

Sub Command – 0x2C

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

0 = Front to Rear

1 = Rear to Front

Holding Registers – 0x38F LS Byte

Modbus Access – Read Only

### Vapor Interlock Type Function

This is the trucks vapor interlock type.

Sub Command – 0x2D

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

0 = None

1 = In Ground Line

2 = As Last Sensor

Holding Registers – 0x390 LS Byte

Modbus Access – Read Only

### Compartment 1 Product Type Allowed Function

This is the product types allowed in compartment 1.

Sub Command – 0x2E

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x391 LS Byte – 0x392

Modbus Access – Read Only

### Compartment 2 Product Type Allowed Function

This is the product types allowed in compartment 2.

Sub Command – 0x2F

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x393 LS Byte – 0x394

Modbus Access – Read Only

### Compartment 3 Product Type Allowed Function

This is the product types allowed in compartment 3.

Sub Command – 0x30

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x395 LS Byte – 0x396

Modbus Access – Read Only

### Compartment 4 Product Type Allowed Function

This is the product types allowed in compartment 4.

Sub Command – 0x31

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x397 LS Byte – 0x398

Modbus Access – Read Only

### Compartment 5 Product Type Allowed Function

This is the product types allowed in compartment 5.

Sub Command – 0x32

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x399 LS Byte – 0x39A

Modbus Access – Read Only

### Compartment 6 Product Type Allowed Function

This is the product types allowed in compartment 6.

Sub Command – 0x33

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x39B LS Byte – 0x39C

Modbus Access – Read Only

### Compartment 7 Product Type Allowed Function

This is the product types allowed in compartment 7.

Sub Command – 0x34

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x39D LS Byte – 0x39E

Modbus Access – Read Only

### Compartment 8 Product Type Allowed Function

This is the product types allowed in compartment 8.

Sub Command – 0x35

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x39F LS Byte – 0x3A0

Modbus Access – Read Only

### Compartment 9 Product Type Allowed Function

This is the product types allowed in compartment 9.

Sub Command – 0x36

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3A1 LS Byte – 0x3A2

Modbus Access – Read Only

### Compartment 10 Product Type Allowed Function

This is the product types allowed in compartment 10.

Sub Command – 0x37

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3A3 LS Byte – 0x3A4

Modbus Access – Read Only

### Compartment 11 Product Type Allowed Function

This is the product types allowed in compartment 11.

Sub Command – 0x38

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3A5 LS Byte – 0x3A6

Modbus Access – Read Only

### Compartment 12 Product Type Allowed Function

This is the product types allowed in compartment 12.

Sub Command – 0x39

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3A7 LS Byte – 0x3A8

Modbus Access – Read Only

### Compartment 13 Product Type Allowed Function

This is the product types allowed in compartment 13.

Sub Command – 0x3A

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3A9 LS Byte – 0x3AA

Modbus Access – Read Only

### Compartment 14 Product Type Allowed Function

This is the product types allowed in compartment 14.

Sub Command – 0x3B

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3AB LS Byte – 0x3AC

Modbus Access – Read Only

### Compartment 15 Product Type Allowed Function

This is the product types allowed in compartment 15.

Sub Command – 0x3C

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3AD LS Byte – 0x3AE

Modbus Access – Read Only

### Compartment 16 Product Type Allowed Function

This is the product types allowed in compartment 16.

Sub Command – 0x3D

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3AF LS Byte – 0x3B0

Modbus Access – Read Only

### Maximum Loading Temperature Function

This is the maximum loading temperature.

Sub Command – 0x3E

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x421 MS Byte

Modbus Access – Read Only

### Temperature Units Function

This is the temperature units.

Sub Command – 0x3F

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

1 = °C

2 = °F

Holding Registers – 0x421 LS Byte

Modbus Access – Read Only

# Terminal Specific Data

The predefined terminal fields detailed below

## Terminal Modbus Commands

The following are used to read and write the functions shown in table 1. Note that the data length is optional on command 53 as the sub-command specifies the length. If specified, the memory address plus length must be within the targeted memory section.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data \*\*  length  1 byte | CRC  2 bytes |
| xx | 0x53 | 0x40 – 0x72 | yy | sstt |

\*\* Optional

Read Response:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data length  1 byte | Data in bytes LSB first | CRC  2 bytes |
| xx | 0x53 | 0x40 – 0x72 | yy | aa, bb, cc, … | sstt |

Terminal area Modbus Write Command

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data length  1 byte | Data in bytes LSB first | CRC  2 bytes |
| xx | 0x54 | 0x40 – 0x72 | yy | aa, bb, cc, … | sstt |

Write response:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Intellitrol Modbus address 1 byte | Modbus  Command | Predefined data sub command  1 byte | Data length  1 byte | CRC  2 bytes |
| xx | 0x54 | 0x40 – 0x72 | yy | sstt |

### 

### Compartment 1 Fuel Type Loaded Function

This is the fuel type loaded into compartment 1.

Sub Command – 0x40

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3B1 LS Byte – 0x3B2

Modbus Access – Read/Write

### Compartment 1 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 1.

Sub Command – 0x41

Data Length – 3 Bytes

Holding Registers – 0x3B3 LS Byte – 0x3B4

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3B3 LS Byte | Reg 0x3B4 MS Byte | Reg 0x3B4 LS Byte |
| Month | Day | Year |

### Compartment 1 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 1.

Sub Command – 0x42

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3B5

Modbus Access – Read/Write

### Compartment 2 Fuel Type Loaded Function

This is the fuel type loaded into compartment 2.

Sub Command – 0x43

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3B6 LS Byte – 0x3B7

Modbus Access – Read/Write

### Compartment 2 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 2.

Sub Command – 0x44

Data Length – 3 Bytes

Holding Registers – 0x3B8 LS Byte – 0x3B9

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3B8 LS Byte | Reg 0x3B9 MS Byte | Reg 0x3B9 LS Byte |
| Month | Day | Year |

### Compartment 2 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 2.

Sub Command – 0x45

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3BA

Modbus Access – Read/Write

### Compartment 3 Fuel Type Loaded Function

This is the fuel type loaded into compartment 3.

Sub Command – 0x46

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3BB LS Byte – 0x3BC

Modbus Access – Read/Write

### Compartment 3 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 3.

Sub Command – 0x47

Data Length – 3 Bytes

Holding Registers – 0x3BD LS Byte – 0x3BE

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3BD LS Byte | Reg 0x3BE MS Byte | Reg 0x3BE LS Byte |
| Month | Day | Year |

### Compartment 3 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 3.

Sub Command – 0x48

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3BF

Modbus Access – Read/Write

### Compartment 4 Fuel Type Loaded Function

This is the fuel type loaded into compartment 4.

Sub Command – 0x49

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3C0 LS Byte – 0x3C1

Modbus Access – Read/Write

### Compartment 4 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 4.

Sub Command – 0x4A

Data Length – 3 Bytes

Holding Registers – 0x3C2 LS Byte – 0x3C3

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3C2 LS Byte | Reg 0x3C3 MS Byte | Reg 0x3C3 LS Byte |
| Month | Day | Year |

### Compartment 4 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 4.

Sub Command – 0x4B

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3C4

Modbus Access – Read/Write

### Compartment 5 Fuel Type Loaded Function

This is the fuel type loaded into compartment 5.

Sub Command – 0x4C

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3C5 LS Byte – 0x3C6

Modbus Access – Read/Write

### Compartment 5 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 5.

Sub Command – 0x4D

Data Length – 3 Bytes

Holding Registers – 0x3C7 LS Byte – 0x3C8

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3C7 LS Byte | Reg 0x3C8 MS Byte | Reg 0x3C8 LS Byte |
| Month | Day | Year |

### Compartment 5 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 5.

Sub Command – 0x4E

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3C9

Modbus Access – Read/Write

### Compartment 6 Fuel Type Loaded Function

This is the fuel type loaded into compartment 6.

Sub Command – 0x4F

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3CA LS Byte – 0x3CB

Modbus Access – Read/Write

### Compartment 6 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 6.

Sub Command – 0x50

Data Length – 3 Bytes

Holding Registers – 0x3CC LS Byte – 0x3CD

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3CC LS Byte | Reg 0x3CD MS Byte | Reg 0x3CD LS Byte |
| Month | Day | Year |

### Compartment 6 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 6.

Sub Command – 0x51

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3CE

Modbus Access – Read/Write

### Compartment 7 Fuel Type Loaded Function

This is the fuel type loaded into compartment 7.

Sub Command – 0x52

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3CF LS Byte – 0x3D0

Modbus Access – Read/Write

### Compartment 7 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 7.

Sub Command – 0x53

Data Length – 3 Bytes

Holding Registers – 0x3D1 LS Byte – 0x3D2

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3D1 LS Byte | Reg 0x3D2 MS Byte | Reg 0x3D2 LS Byte |
| Month | Day | Year |

### Compartment 7 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 7.

Sub Command – 0x54

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3D3

Modbus Access – Read/Write

### Compartment 8 Fuel Type Loaded Function

This is the fuel type loaded into compartment 8.

Sub Command – 0x55

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3D4 LS Byte – 0x3D5

Modbus Access – Read/Write

### Compartment 8 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 8.

Sub Command – 0x56

Data Length – 3 Bytes

Holding Registers – 0x3D6 LS Byte – 0x3D7

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3D6 LS Byte | Reg 0x3D7 MS Byte | Reg 0x3D7 LS Byte |
| Month | Day | Year |

### Compartment 8 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 8.

Sub Command – 0x57

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3D8

Modbus Access – Read/Write

### Compartment 9 Fuel Type Loaded Function

This is the fuel type loaded into compartment 9.

Sub Command – 0x58

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3D9 LS Byte – 0x3DA

Modbus Access – Read/Write

### Compartment 9 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 9.

Sub Command – 0x59

Data Length – 3 Bytes

Holding Registers – 0x3DB LS Byte – 0x3DC

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3DB LS Byte | Reg 0x3DC MS Byte | Reg 0x3DC LS Byte |
| Month | Day | Year |

### Compartment 9 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 9.

Sub Command – 0x5A

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3DD

Modbus Access – Read/Write

### Compartment 10 Fuel Type Loaded Function

This is the fuel type loaded into compartment 10.

Sub Command – 0x5B

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3DE LS Byte – 0x3DF

Modbus Access – Read/Write

### Compartment 10 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 10.

Sub Command – 0x5C

Data Length – 3 Bytes

Holding Registers – 0x3E0 LS Byte – 0x3E1

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3E0 LS Byte | Reg 0x3E1 MS Byte | Reg 0x3E1 LS Byte |
| Month | Day | Year |

### Compartment 10 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 10.

Sub Command – 0x5D

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3E2

Modbus Access – Read/Write

### Compartment 11 Fuel Type Loaded Function

This is the fuel type loaded into compartment 11.

Sub Command – 0x5E

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3E3 LS Byte – 0x3E4

Modbus Access – Read/Write

### Compartment 11 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 11.

Sub Command – 0x5F

Data Length – 3 Bytes

Holding Registers – 0x3E5 LS Byte – 0x3E6

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3E5 LS Byte | Reg 0x3E6 MS Byte | Reg 0x3E6 LS Byte |
| Month | Day | Year |

### Compartment 11 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 11.

Sub Command – 0x60

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3E7

Modbus Access – Read/Write

### Compartment 12 Fuel Type Loaded Function

This is the fuel type loaded into compartment 12.

Sub Command – 0x61

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3E8 LS Byte – 0x3E9

Modbus Access – Read/Write

### Compartment 12 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 12.

Sub Command – 0x62

Data Length – 3 Bytes

Holding Registers – 0x3EA LS Byte – 0x3EB

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3EA LS Byte | Reg 0x3EB MS Byte | Reg 0x3EB LS Byte |
| Month | Day | Year |

### Compartment 12 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 12.

Sub Command – 0x63

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3EC

Modbus Access – Read/Write

### Compartment 13 Fuel Type Loaded Function

This is the fuel type loaded into compartment 13.

Sub Command – 0x64

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3ED LS Byte – 0x3EE

Modbus Access – Read/Write

### Compartment 13 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 13.

Sub Command – 0x65

Data Length – 3 Bytes

Holding Registers – 0x3EF LS Byte – 0x3F0

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3EF LS Byte | Reg 0x3F0 MS Byte | Reg 0x3F0 LS Byte |
| Month | Day | Year |

### Compartment 13 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 13.

Sub Command – 0x66

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3F1

Modbus Access – Read/Write

### Compartment 14 Fuel Type Loaded Function

This is the fuel type loaded into compartment 14.

Sub Command – 0x67

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3F2 LS Byte – 0x3F3

Modbus Access – Read/Write

### Compartment 14 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 14.

Sub Command – 0x68

Data Length – 3 Bytes

Holding Registers – 0x3F4 LS Byte – 0x3F5

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3F4 LS Byte | Reg 0x3F5 MS Byte | Reg 0x3F5 LS Byte |
| Month | Day | Year |

### Compartment 14 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 14.

Sub Command – 0x69

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3F6

Modbus Access – Read/Write

### Compartment 15 Fuel Type Loaded Function

This is the fuel type loaded into compartment 15.

Sub Command – 0x6A

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3F7 LS Byte – 0x3F8

Modbus Access – Read/Write

### Compartment 15 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 15.

Sub Command – 0x6B

Data Length – 3 Bytes

Holding Registers – 0x3F9 LS Byte – 0x3FA

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3F9 LS Byte | Reg 0x3FA MS Byte | Reg 0x3FA LS Byte |
| Month | Day | Year |

### Compartment 15 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 15.

Sub Command – 0x6C

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x3FB

Modbus Access – Read/Write

### Compartment 16 Fuel Type Loaded Function

This is the fuel type loaded into compartment 16.

Sub Command – 0x6D

Data Length – 3 Bytes

Data Type – ASCII String

Holding Registers – 0x3FC LS Byte – 0x3FD

Modbus Access – Read/Write

### Compartment 16 Fuel Batch Date Code Function

This is the fuel batch date code loaded into compartment 16.

Sub Command – 0x6E

Data Length – 3 Bytes

Holding Registers – 0x3FE LS Byte – 0x3FF

Modbus Access – Read/Write

Data:

|  |  |  |
| --- | --- | --- |
| Byte 0 | Byte 1 | Byte 2 |
| Reg 0x3FE LS Byte | Reg 0x3FF MS Byte | Reg 0x3FF LS Byte |
| Month | Day | Year |

### Compartment 16 Fuel Volume Loaded Function

This is the volume of fuel loaded into compartment 16.

Sub Command – 0x6F

Data Length – 2 Bytes

Data Type – Unsigned 16-bit integer

Holding Registers – 0x400

Modbus Access – Read/Write

### Terminal Name Function

This is the name of the terminal for the last load.

Sub Command – 0x70

Data Length – 20 Bytes

Data Type – ASCII String

Holding Registers – 0x401 – 0x40A

Modbus Access – Read/Write

### Terminal Address Function

This is the address of the terminal for the last load.

Sub Command – 0x71

Data Length – 40 Bytes

Data Type – ASCII String

Holding Registers – 0x40B – 0x41E

Modbus Access – Read/Write

### Gantry Number Function

This is the gantry number for the last load.

Sub Command – 0x72

Data Length – 1 Byte

Data Type – Unsigned 8-bit integer

Holding Registers – 0x41F LS Byte

Modbus Access – Read/Write

# Predefined Data Lists

Below are lists of the predefined TIM data used with the MODBUS 0x53 and 0x54 commands:

Table 1: Carrier Specific Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **Holding Register(s)** | **Definition** | **Number of bytes** |
| 0x01 | 0x300-0x309 | Carrier Name | 20 |
| 0x02 | 0x30A-0x31D | Carrier Address | 40 |
| 0x03 | 0x31E-0x322 | Contract Number | 10 |
| 0x04 | 0x323-0x32C | Operating Service | 20 |
| 0x05 | 0x32D-0x331 | Driver ID | 10 |
| 0x06 | 0x332 | Compartment 1 Allowable Volume | 2 |
| 0x07 | 0x333 | Compartment 2 Allowable Volume | 2 |
| 0x08 | 0x334 | Compartment 3 Allowable Volume | 2 |
| 0x09 | 0x335 | Compartment 4 Allowable Volume | 2 |
| 0x0A | 0x336 | Compartment 5 Allowable Volume | 2 |
| 0x0B | 0x337 | Compartment 6 Allowable Volume | 2 |
| 0x0C | 0x338 | Compartment 7 Allowable Volume | 2 |
| 0x0D | 0x339 | Compartment 8 Allowable Volume | 2 |
| 0x0E | 0x33A | Compartment 9 Allowable Volume | 2 |
| 0x0F | 0x33B | Compartment 10 Allowable Volume | 2 |
| 0x10 | 0x33C | Compartment 11 Allowable Volume | 2 |
| 0x11 | 0x33D | Compartment 12 Allowable Volume | 2 |
| 0x12 | 0x33E | Compartment 13 Allowable Volume | 2 |
| 0x13 | 0x33F | Compartment 14 Allowable Volume | 2 |
| 0x14 | 0x340 | Compartment 15 Allowable Volume | 2 |
| 0x15 | 0x341 | Compartment 16 Allowable Volume | 2 |

Table 2: Service Center Specific Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **Holding Register(s)** | **Definition** | **Number of bytes** |
| 0x16 | 0x342 MSB | Vapor Tightness Certificate Type | 1 |
| 0x17 | 0x342 LSB - 0x343 | Vapor Tightness Certificate Expiration Date | 3 |
| 0x18 | 0x344-34D | Vapor Tightness Certificate Number | 20 |
| 0x19 | 0x34E MSB | Safe Loading Pass Certificate Type | 1 |
| 0x1A | 0x34E LSB - 0x34F | Save Loading Pass Certificate Expiration Date | 3 |
| 0x1B | 0x350-0x359 | Safe Loading Pass Certificate Number | 20 |
| 0x1C | 0x35A MSB | Certificate 3 Type | 1 |
| 0x1D | 0x35A LSB - 0x35B | Certificate 3 Expiration Date | 3 |
| 0x1E | 0x35C-0x365 | Certificate 3 Number | 20 |
| 0x1F | 0x366 MSB | Certificate 4 Type | 1 |
| 0x20 | 0x366 LSB-0x367 | Certificate 4 Expiration Date | 3 |
| 0x21 | 0x368-0x371 | Certificate 4 Number | 20 |
| 0x22 | 0x372 MSB | Certificate 5 Type | 1 |
| 0x23 | 0x372 LSB-0x373 | Certificate 5 Expiration Date | 3 |
| 0x24 | 0x374-0x37D | Certificate 5 Number | 20 |

Table 3: Builder Specific Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **Holding Register(s)** | **Definition** | **Number of bytes** |
| 0x25 | 0x37E | TIM Data Valid | 2 |
| 0x26 | 0x37F | TIM Data Mapping Revision | 2 |
| 0x27 | 0x380 LSB | Alternate TIM ID is Valid | 1 |
| 0x28 | 0x381-0x383 | Alternate TIM ID | 6 |
| 0x29 | 0x420 LSB | Number of Compartments | 1 |
| 0x2A | 0x384 LSB | Compartment Volume Units | 1 |
| 0x2B | 0x385-0x38E | Trailer ID Number | 20 |
| 0x2C | 0x38F LSB | Compartment Configuration | 1 |
| 0x2D | 0x390 LSB | Vapor Interlock Type | 1 |
| 0x2E | 0x391 LSB-0x392 | Compartment 1 Product Types Allowed | 3 |
| 0x2F | 0x393 LSB-0x394 | Compartment 2 Product Types Allowed | 3 |
| 0x30 | 0x395 LSB-0x396 | Compartment 3 Product Types Allowed | 3 |
| 0x31 | 0x397 LSB-0x398 | Compartment 4 Product Types Allowed | 3 |
| 0x32 | 0x399 LSB-0x39A | Compartment 5 Product Types Allowed | 3 |
| 0x33 | 0x3AB LSB-0x39C | Compartment 6 Product Types Allowed | 3 |
| 0x34 | 0x39D LSB-0x39E | Compartment 7 Product Types Allowed | 3 |
| 0x35 | 0x39F LSB-0x3A0 | Compartment 8 Product Types Allowed | 3 |
| 0x36 | 0x3A1 LSB-0x3A2 | Compartment 9 Product Types Allowed | 3 |
| 0x37 | 0x3A3 LSB-0x3A4 | Compartment 10 Product Types Allowed | 3 |
| 0x38 | 0x3A5 LSB-0x3A6 | Compartment 11 Product Types Allowed | 3 |
| 0x39 | 0x3A7 LSB-0x3A8 | Compartment 12 Product Types Allowed | 3 |
| 0x3A | 0x3A9 LSB-0x3AA | Compartment 13 Product Types Allowed | 3 |
| 0x3B | 0x3AB LSB-0x3AC | Compartment 14 Product Types Allowed | 3 |
| 0x3C | 0x3AD LSB-0x3AE | Compartment 15 Product Types Allowed | 3 |
| 0x3D | 0x3AF LSB-0x3B0 | Compartment 16 Product Types Allowed | 3 |
| 0x3E | 0x421 MSB | Maximum Loading Temperature | 1 |
| 0x3F | 0x421 LSB | Temperature Units | 1 |

Table 4: Terminal Specific Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **Holding Register(s)** | **Definition** | **Number of bytes** |
| 0x40 | 0x3B1 LSB-0x3B2 | Compartment 1 Fuel Type Loaded | 3 |
| 0x41 | 0x3B3 LSB-0x3B4 | Compartment 1 Fuel Batch Date Code Loaded | 3 |
| 0x42 | 0x3B5 | Compartment 1 Fuel Volume Loaded | 2 |
| 0x43 | 0x3B6 LSB-0x3B7 | Compartment 2 Fuel Type Loaded | 3 |
| 0x44 | 0x3B8 LSB-0x3B9 | Compartment 2 Fuel Batch Date Code Loaded | 3 |
| 0x45 | 0x3BA | Compartment 12 Fuel Volume Loaded | 2 |
| 0x46 | 0x3BB LSB-0x3BC | Compartment 3 Fuel Type Loaded | 3 |
| 0x47 | 0x3BD LSB-0x3BE | Compartment 3 Fuel Batch Date Code Loaded | 3 |
| 0x48 | 0x3BF | Compartment 3 Fuel Volume Loaded | 2 |
| 0x49 | 0x3C0 LSB-0x3C1 | Compartment 4 Fuel Type Loaded | 3 |
| 0x4A | 0x3C2 LSB-0x3C3 | Compartment 4 Fuel Batch Date Code Loaded | 3 |
| 0x4B | 0x3D4 | Compartment 4 Fuel Volume Loaded | 2 |
| 0x4C | 0x3C5 LSB-0x3C6 | Compartment 5 Fuel Type Loaded | 3 |
| 0x4D | 0x3C7 LSB-0x3C8 | Compartment 5 Fuel Batch Date Code Loaded | 3 |
| 0x4E | 0x3C9 | Compartment 5 Fuel Volume Loaded | 2 |
| 0x4F | 0x3CA LSB-0x3CB | Compartment 6 Fuel Type Loaded | 3 |
| 0x50 | 0x3CC LSB-0x3CD | Compartment 6 Fuel Batch Date Code Loaded | 3 |
| 0x51 | 0x3CE | Compartment 6 Fuel Volume Loaded | 2 |
| 0x52 | 0x3CF LSB-0x3D0 | Compartment 7 Fuel Type Loaded | 3 |
| 0x53 | 0x3D1 LSB-0x3D2 | Compartment 7 Fuel Batch Date Code Loaded | 3 |
| 0x54 | 0x3D3 | Compartment 7 Fuel Volume Loaded | 2 |
| 0x55 | 0x3D4 LSB-0x3D5 | Compartment 8 Fuel Type Loaded | 3 |
| 0x56 | 0x3D6 LSB-0x3D7 | Compartment 8 Fuel Batch Date Code Loaded | 3 |
| 0x57 | 0x3E8 | Compartment 8 Fuel Volume Loaded | 2 |
| 0x58 | 0x3D9 LSB-0x3DA | Compartment 9 Fuel Type Loaded | 3 |
| 0x59 | 0x3DB LSB-0x3DC | Compartment 9 Fuel Batch Date Code Loaded | 3 |
| 0x5A | 0x3DD | Compartment 9 Fuel Volume Loaded | 2 |
| 0x5B | 0x3DE LSB-0x3DF | Compartment 10 Fuel Type Loaded | 3 |
| 0x5C | 0x3E0 LSB-0x3E1 | Compartment 10 Fuel Batch Date Code Loaded | 3 |
| 0x5D | 0x3E2 | Compartment 10 Fuel Volume Loaded | 2 |
| 0x5E | 0x3E3 LSB-0x3E4 | Compartment 11 Fuel Type Loaded | 3 |
| 0x5F | 0x3E5 LSB-0x3E6 | Compartment 11 Fuel Batch Date Code Loaded | 3 |
| 0x60 | 0x3E7 | Compartment 11 Fuel Volume Loaded | 2 |
| 0x61 | 0x3E8 LSB-0x3E9 | Compartment 12 Fuel Type Loaded | 3 |
| 0x62 | 0x3EA LSB-0x3EB | Compartment 12 Fuel Batch Date Code Loaded | 3 |
| 0x63 | 0x3EC | Compartment 12 Fuel Volume Loaded | 2 |
| 0x64 | 0x3ED LSB-0x3EE | Compartment 13 Fuel Type Loaded | 3 |
| 0x65 | 0x3EF LSB-0x3F0 | Compartment 13 Fuel Batch Date Code Loaded | 3 |
| 0x66 | 0x3F1 | Compartment 13 Fuel Volume Loaded | 2 |
| 0x67 | 0x3F2 LSB-0x3F3 | Compartment 14 Fuel Type Loaded | 3 |
| 0x68 | 0x3F4 LSB-0x3F5 | Compartment 14 Fuel Batch Date Code Loaded | 3 |
| 0x69 | 0x3F6 | Compartment 14 Fuel Volume Loaded | 2 |
| 0x6A | 0x3F7 LSB-0x3F8 | Compartment 15 Fuel Type Loaded | 3 |
| 0x6B | 0x3F9 LSB-0x3FA | Compartment 15 Fuel Batch Date Code Loaded | 3 |
| 0x6C | 0x3FB | Compartment 15 Fuel Volume Loaded | 2 |
| 0x6D | 0x3FC LSB-0x3FD | Compartment 16 Fuel Type Loaded | 3 |
| 0x6E | 0x3FE LSB-0x3FF | Compartment 16 Fuel Batch Date Code Loaded | 3 |
| 0x6F | 0x400 | Compartment 16 Fuel Volume Loaded | 2 |
| 0x70 | 0x401-0x40A | Terminal Name | 20 |
| 0x71 | 0x40B-0x41E | Terminal Address | 40 |
| 0x72 | 0x41F | Gantry Number | 1 |

# Modbus Error Codes

Below are the Modbus error codes or exceptions:

|  |  |
| --- | --- |
| Cmd | Explanation |
| 0x01 | Modbus Command not supported |
| 0x02 | Invalid Address |
| 0x03 | Illegal data |
| 0x04 | Execution Fault |
| 0x05 | Acknowledge |
| 0x06 | Busy |
| 0x07 | Negative Acknowledgement |
| 0x08 | Memory Partition Error |
| 0x09 | TIM command error – Could also mean no T.I.M |
| 0x0A | not a SuperTIM - The Dallas chip in the TIM is not a DS1996 |
| 0x0B | Valid error – the Truck Builder Table Valid location did not contain 0x55AA |
| 0x0C | Number of compartments exceed the maximum number of 16 |
| 0x0D | SPI Loader Family Error |
| 0x0E | SPI Write Error |
| 0x0F | SPI Read Error |
| 0x10 | TIM memory size or data length Error |
| 0x11 | TIM Write to scratch pad error |
| 0x12 | TIM Verify scratch pad error |
| 0x13 | TIM Copy scratch pad error |
| 0x14 | Valid Flag not valid for this entry |
| 0x15 | Reading Intellitrol Serial Number Error |
| 0x16 | MALLOC - allocating memory Error |
| 0x17 | I2C Bus Error |
| 0x18 | Read Real Time Clock Error |
| 0x19 | Read Only Register |