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Intellitrol MODBUS Manual for SuperTIM

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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	

1 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.

2 References

43177 – Scully MODBUS User Guide
PIDX Product Code Standard 04-101-15-45-2010 (http://www.pidx.org/downstream-codes/)

3 Hardware

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

4 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.

5 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.

5.1 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

6 Carrier Specific Data

The carrier specific predefined fields are detailed below.

6.1 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

6.1.1 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

6.1.2 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

6.1.3 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

6.1.4 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

6.1.5 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

6.1.6 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

6.1.7 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

6.1.8 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

6.1.9 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

6.1.10 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

6.1.11 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

6.1.12 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

6.1.13 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

6.1.14 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

6.1.15 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

6.1.16 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

6.1.17 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

6.1.18 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

6.1.19 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

6.1.20 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

6.1.21 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

7 Service Center Specific Data

The predefined service center specific fields are detailed below

7.1 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

7.1.1 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

7.1.2 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

7.1.3 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

7.1.4 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

7.1.5 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

7.1.6 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

7.1.7 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

7.1.8 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

7.1.9 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

7.1.10 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

7.1.11 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

7.1.12 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

7.1.13 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

7.1.14 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

7.1.15 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

8 Truck Builder Specific Data

The predefined truck builder specific fields are detailed below

8.1 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

8.1.1 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

8.1.2 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

8.1.3 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

8.1.4 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

8.1.5 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

8.1.6 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.

8.1.7 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

8.1.8 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

8.1.9 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

8.1.10 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

8.1.11 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

8.1.12 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

8.1.13 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

8.1.14 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

8.1.15 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

8.1.16 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

8.1.17 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

8.1.18 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

8.1.19 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

8.1.20 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

8.1.21 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

8.1.22 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

8.1.23 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

8.1.24 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

8.1.25 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

8.1.26 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

8.1.27 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

9 Terminal Specific Data

The predefined terminal fields detailed below

9.1 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

9.1.1 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

9.1.2 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

9.1.3 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

9.1.4 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

9.1.5 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

9.1.6 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

9.1.7 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

9.1.8 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

9.1.9 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

9.1.10 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

9.1.11 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

9.1.12 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

9.1.13 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

9.1.14 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

9.1.15 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

9.1.16 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

9.1.17 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

9.1.18 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

9.1.19 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

9.1.20 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

9.1.21 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

9.1.22 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

9.1.23 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

9.1.24 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

9.1.25 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

9.1.26 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

9.1.27 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

9.1.28 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

9.1.29 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

9.1.30 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

9.1.31 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

9.1.32 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

9.1.33 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

9.1.34 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

9.1.35 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

9.1.36 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

9.1.37 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

9.1.38 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

9.1.39 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

9.1.40 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

9.1.41 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

9.1.42 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

9.1.43 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

9.1.44 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

9.1.45 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

9.1.46 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

9.1.47 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

9.1.48 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

9.1.49 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

9.1.50 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

9.1.51 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