# Operation Manual

## ST25T

Suntech International Ltd.

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# Warning

Our customers are required to be aware that connecting the wire inputs can be hazardous to both of the installer and your vehicle’s electrical system(s) if not done by an experienced installer. This document assumes you are aware of the inherent dangers of working in installing the device on the vehicle(s) and the machinery.

# Document Amendments

When it comes to the firmware version column with specific firmware number, any amendment(s) on the comments column should be made on this relevant firmware version (and the versions thereafter). Before applying any changes made in this protocol, you are required to make sure that you have upgraded the firmware suitable for the specified version.

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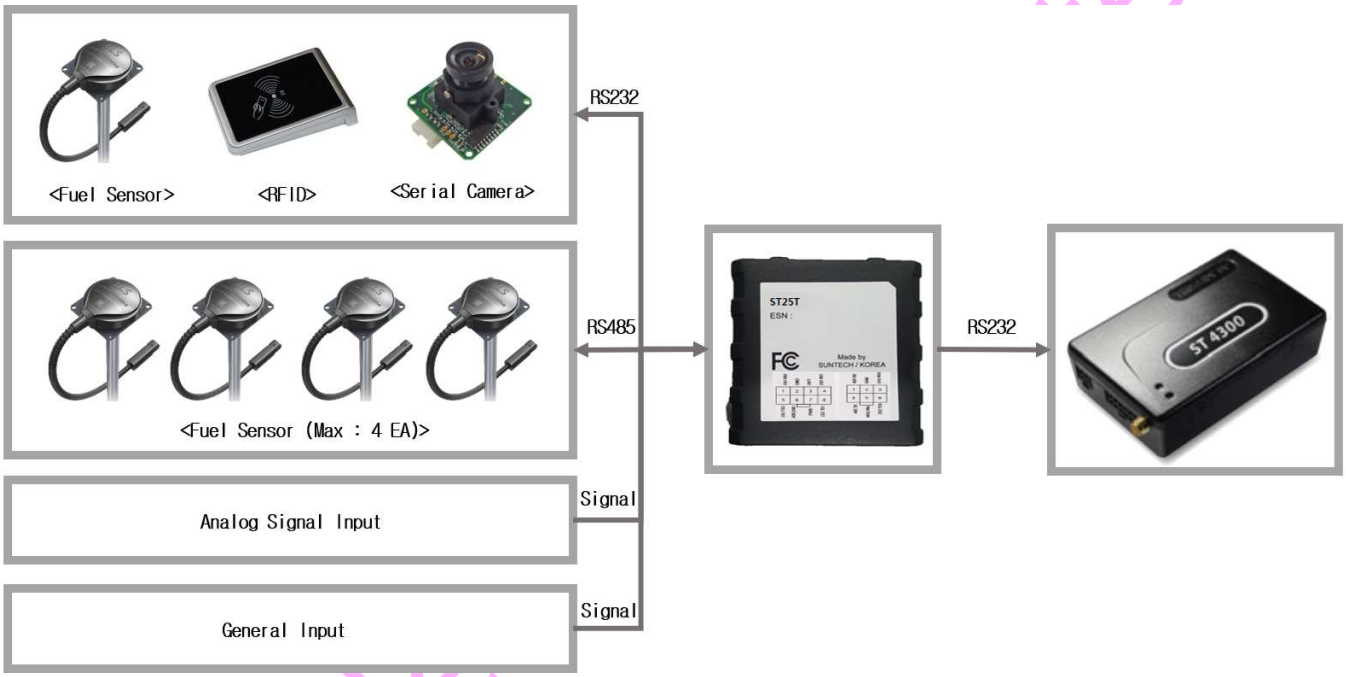
## 1. Introduction

The ST25T is highly featured multi-functional telematics box sending values of external sensors a tracking device such as ST600M/ST600MD or ST4300. By being connected with a tracking device such as ST600M/ST600MD or ST4300, it provides to the tracking device any information of fuel level values and the tracking device reports which can be sent to the server via the tracking device.

## 2. Overview

The ST25T device from Suntech supports two RS232 and one RS485 interface ports as well as two ADC or INPUT ports. The diagram below shows how the Suntech ST25T device is connected to external sensors and device:




### 2-1. Parameter change

Parameters which have already been set on the device can be changed via RS232 connected with PC if a user needs to do so. Some controlling functions can also be implemented in the same way.
Please refer to the Commands Sections 4 below for details on the commands required to change these parameters.

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## 2-2. Features

Key features of the ST25T device are as follows:

**- Power Saving Modes (Power Down Mode)**
The device will go to sleep when host go to sleep or deepsleep to prevent draining the vehicle battery.

**- LED Indicators**

**Red LED:**
Main mcu data transmitting & receiving operation indication.

**Blue LED:**
Sub mcu data transmitting & receiving operation indication.

**- RS232 interface**
It handles RS232 sensor and device data communication.

**- RS485 interface**
It handles RS485 fuel sensor data communication.
The maximum number of RS485 fuel sensors supported by the ST25T device is four.

**- ADC or INPUT ports**

Device has:

- 2 ADC ports
- 2 INPUT ports

**- Upgrading Firmware**

Device firmware can be upgraded to provide the user with newly implemented services through the host RS232 connection. (Refer to Section 7)

Host RS232 baud rate is 115200 bps for upgrading firmware.

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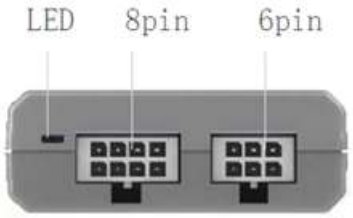
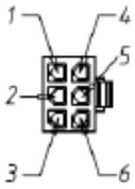
## 3. Event Cables

Event cable has 14 wires.



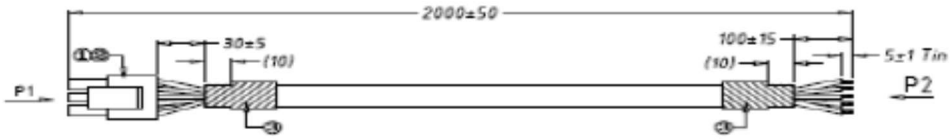

### ST25T Event line Description



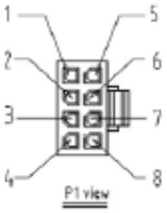

**6 pin Event line**

| | | | |
|---|---|---|---|
| BLK | PIN1 | RS485 RX | Tin |
| PURP | PIN2 | GND | Tin |
| Orange/Red | PIN3 | RS232 RX3 | Tin |
| NC | PIN4 | RS485 TX | Tin |
| GRAY | PIN5 | ADC/Input2 | Tin |
| Red/Blue | PIN6 | RS232 TX3 | Tin |

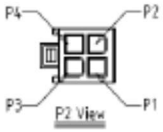
P1 view

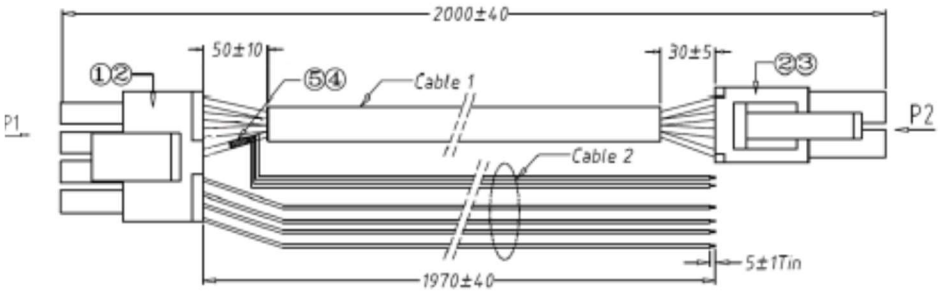



**8pin Event line**




| | | | |
|---|---|---|---|
| WHT | PIN1 | RS 232 RX2 | |
| BLK | PIN2 | GND | P3 |
| Brown/White | PIN3 | OUT | |
| Blue/Red | PIN4 | RS232 RX1 | P2 |
| Ligth Orange | PIN5 | RS232 TX2 | |
| Blue/Black | PIN6 | ADC/INPUT1 | |
| RED | PIN7 | Power 5V | P4 |
| Orange/Red | PIN8 | RS232 Tx1 | P1 |



## 4. Omnicomm Fuel Sensor Setting

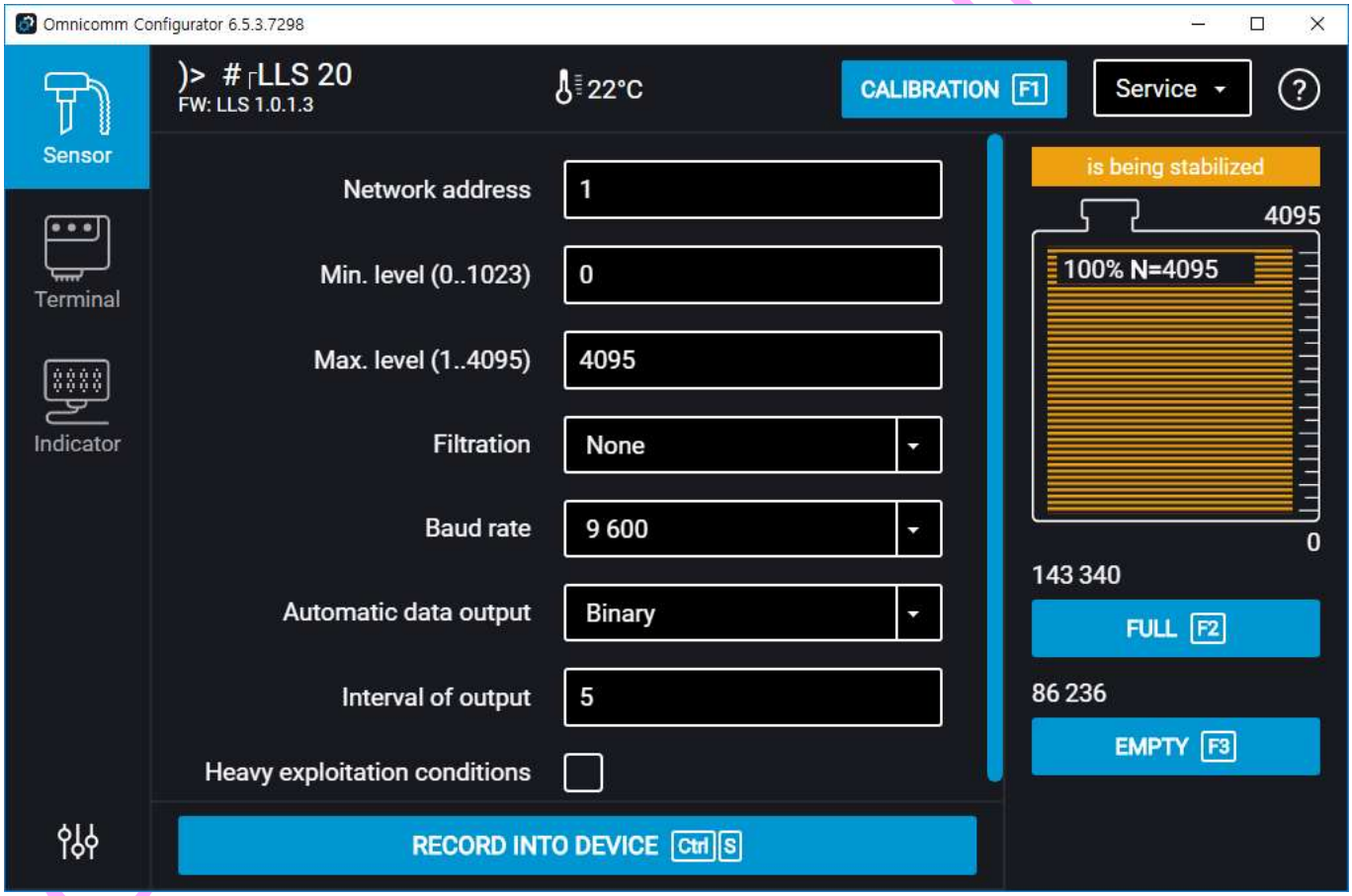
If you use omnicomm fuel sensor, you will have to set to like below:

1. Network address : 0 ~ 6
2. Baud rate : 9600 or 19200 or 38400 or 115200 bps
3. Automatic data Output : Binary
4. Interval of output : 5

To configure the fuel sensor, download the omnicomm configurator program from the URL below.

Downloadable URL :
https://www.omnicomm-world.com/fms-providers/resource-center/?group=386289&field=&type=387330

The ST25T device scans omnicomm fuel sensor network address from 0 to 6 only.
The data output mode and output interval of the omnicomm fuel sensor are set in the ST25T device.



# 5. Commands

All command and response string is ended with CR/LF characters.

## 5-1. From Host to Device

### 5-1-1. Presence Request

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $REQ_PRESENCE | String | Command |
| RS232_EXT1_DEV | 0 ~ 3 | 1byte int | RS232 Ext 1 Device<br>0 = None<br>1 = Omnicomm Fuel Sensor<br>2 = RFID<br>3 = Serial Camera |
| RS232_EXT2_DEV | 0 ~ 3 | 1byte int | RS232 Ext 2 Device<br>0 = None<br>1 = Omnicomm Fuel Sensor<br>2 = RFID<br>3 = Serial Camera |
| RS232_EXT1_BAUD | 0 ~ 6 | 1byte int | RS232 Ext1 Baudrate<br>0 = None<br>1 = 2400 bps<br>2 = 4800 bps<br>3 = 9600 bps<br>4 = 19200 bps<br>5 = 38400 bps<br>6 = 115200 bps |
| RS232_EXT2_BAUD | 0 ~ 6 | 1byte int | RS232 Ext2 Baudrate<br>0 = None<br>1 = 2400 bps<br>2 = 4800 bps<br>3 = 9600 bps<br>4 = 19200 bps<br>5 = 38400 bps<br>6 = 115200 bps |
| RS232_EXT1_FUEL_ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs232 ext1 fuel level for alert report |
| RS232_EXT2_FUEL_ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs232 ext2 fuel level for alert report |
| RS485_FUEL_BAUD | 0 ~ 6 | 1byte int | RS485 Fuel Sensor Baudrate |
| RS485_FUEL1_ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel1 level for alert report |
| RS485_FUEL2_ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel2 level for alert report |
| RS485_FUEL3_ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel3 level for alert report |
| RS485_FUEL4_ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel4 level for alert report |
| ADC1_USING | 0 ~ 1 | 1byte int | Support ADC 1<br>0 = Disable, 1 = Enable |
| ADC2_USING | 0 ~ 1 | 1byte int | Support ADC 2<br>0 = Disable, 1 = Enabl |
| INPUT1_TYPE | 0 ~ 3 | 1byte int | Support Input 1 |

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| | | | |
|---|---|---|---|
| | | | 0 = None<br>1 = Falling Edge<br>2 = Rising Edge<br>3 = Both Edge |
| INPUT1_CHAT | 0 ~ 9999 | 2bytes int | Input 1 chattering time<br>Default = 3 sec (unit : 100 ms)<br><br>If 0, input 1 is not checked. |
| INPUT2_TYPE | 0 ~ 3 | 1byte int | Support Input 2<br>0 = None<br>1 = Falling Edge<br>2 = Rising Edge<br>3 = Both Edge |
| INPUT2_CHAT | 0 ~ 9999 | 2bytes int | Input 1 chattering time<br>Default = 3 sec (unit : 100 ms)<br><br>If 0, input 2 is not checked. |
| END_OF_LINE | \r\n | String | |
| **[Command]** $REQ_PRESENCE;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0 | | | |

### 5-1-2. Handshake Message Acknowledge

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $ACK_HANDSHAKE | String | Command |
| END OF LINE | \r\n | String | |
| **[Command]** $ACK_HANDSHAKE | | | |

### 5-1-3. Version Request

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $CMD_REQ_VERSION | String | Command |
| END OF LINE | \r\n | String | |
| **[Command]** $CMD_REQ_VERSION<br>**[Response]** $RES_REQ_VERSION;ST25T;M.01.00.00;M.01.00.00 (Refer to Section 5-2-2) | | | |

### 5-1-4. Host Parameter Change

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $CMD_CHANGE_PARAM | String | Command |
| RS232_EXT1_DEV | 0 ~ 3 | 1byte int | RS232 Ext 1 Device<br><br>0 = None<br>1 = Omnicomm Fuel Sensor<br>2 = RFID |

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| | | | |
|---|---|---|---|
| | | | 3 = Serial Camera |
| RS232_EXT2_DEV | 0 ~ 3 | 1byte int | RS232 Ext 2 Device<br><br>0 = None<br>1 = Omnicomm Fuel Sensor<br>2 = RFID<br>3 = Serial Camera |
| RS232_EXT1_BAUD | 0 ~ 6 | 1byte int | RS232 Ext1 Baudrate<br><br>0 = None<br>1 = 2400 bps<br>2 = 4800 bps<br>3 = 9600 bps<br>4 = 19200 bps<br>5 = 38400 bps<br>6 = 115200 bps |
| RS232_EXT2_BAUD | 0 ~ 6 | 1byte int | RS232 Ext2 Baudrate<br><br>0 = None<br>1 = 2400 bps<br>2 = 4800 bps<br>3 = 9600 bps<br>4 = 19200 bps<br>5 = 38400 bps<br>6 = 115200 bps |
| RS232_EXT1_FUEL_ ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs232 ext1 fuel level for alert report |
| RS232_EXT2_FUEL_ ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs232 ext2 fuel level for alert report |
| RS485_FUEL_BAUD | 0 ~ 6 | 1byte int | RS485 Fuel Sensor Baudrate |
| RS485_FUEL1_ ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel1 level for alert report |
| RS485_FUEL2_ ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel2 level for alert report |
| RS485_FUEL3_ ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel3 level for alert report |
| RS485_FUEL4_ ALT_LEVEL | 0 ~ 4095 | 2bytes int | Value of changing rs485 fuel4 level for alert report |
| ADC1_USING | 0 ~ 1 | 1byte int | Support ADC 1<br>0 = Disable, 1 = Enable |
| ADC2_USING | 0 ~ 1 | 1byte int | Support ADC 2<br>0 = Disable, 1 = Enable |
| INPUT1_TYPE | 0 ~ 3 | 1byte int | Support Input 1<br><br>0 = None<br>1 = Falling Edge<br>2 = Rising Edge<br>3 = Both Edge |
| INPUT1_CHAT | 0 ~ 9999 | 2bytes int | Input 1 chattering time<br>Default = 3 sec (unit : 100 ms)<br><br>If 0, input 1 is not checked. |
| INPUT2_TYPE | 0 ~ 3 | 1byte int | Support Input 2 |

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| | | | |
|---|---|---|---|
| | | | 0 = None<br>1 = Falling Edge<br>2 = Rising Edge<br>3 = Both Edge |
| INPUT2_CHAT | 0 ~ 9999 | 2bytes int | Input 1 chattering time<br>Default = 3 sec (unit : 100 ms)<br><br>If 0, input 2 is not checked. |
| END OF LINE | \r\n | String | |
| **[Command]** $CMD_CHANGE_PARAM;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0 | | | |

### 5-1-5. Reset

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $CMD_RESET | String | Command |
| END OF LINE | \r\n | String | |
| **[Command]** $CMD_RESET | | | |

### 5-1-6. Disconnected Check

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $CMD_DISCON_CHECK | String | Command |
| END OF LINE | \r\n | String | |
| **[Command]** $CMD_DISCON_CHECK<br>**[Response]** $ACK_DISCON_CHECK;ST25T (Refer to Section 5-2-3) | | | |

### 5-1-7. Uart Fuel Sensor Param Request

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $REQ_FUEL_PARAM | String | Command |
| END OF LINE | \r\n | String | |
| **[Command]** $REQ_FUEL_PARAM<br>**[Response]** $RES_FUEL_PARAM;ST25T;0;0;0;0;0;0;0;0;0;0;0;0 (Refer to Section 5-2-9) | | | |

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## 5-2. From Device to Host

### 5-2-1. Handshake Message

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $MSG_HANDSHAKE | String | Command |
| MODEL | ST25T | String | Model Name |
| END OF LINE | \r\n | String | |
| **[Command]** $MSG_HANDSHAKE;ST25T | | | |

### 5-2-2. Version Request Response

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $RES_REQ_VERSION | String | Command |
| MODEL | ST25T | String | Model name |
| MAIN_MCU_VERSION | M.01.00.00 | String | |
| SUB_MCU_VERSION | M.01.00.00 | String | |
| END OF LINE | \r\n | String | |
| **[Command]** $RES_REQ_VERSION;ST25T;M.01.00.00;M.01.00.00 | | | |

### 5-2-3. Disconnected Check Acknowledge

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $ACK_DISCON_CHECK | String | Command |
| MODEL | ST25T | String | Model name |
| END OF LINE | \r\n | String | |
| **[Command]** $ACK_DISCON_CHECK;ST25T | | | |

### 5-2-4. Uart Fuel Sensor Connected Event

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $EVT_UART_FUEL_CON | String | Command |
| MODEL | ST25T | String | Model name |
| FUEL_NUM | 0 ~ 5 | 1byte int | Fuel sensor number<br>0 = RS232 Fuel 1<br>1 = RS232 Fuel 2<br><br>2 = RS485 Fuel 1<br>3 = RS485 Fuel 2<br>4 = RS485 Fuel 3<br>5 = RS485 Fuel 4 |
| FUEL_LEVEL | 0 ~ 4095 | 2bytes int | Fuel sensor level |

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| | | | |
|---|---|---|---|
| END OF LINE | \r\n | String | |
| **[Command]** $EVT_UART_FUEL_CON;ST25T;0;0 | | | |

### 5-2-5. Uart Fuel Sensor Disconnected Event

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $EVT_UART_FUEL_DISCON | String | Command |
| MODEL | ST25T | String | Model name |
| FUEL_NUM | 0 ~ 5 | 1byte int | Fuel sensor number<br>0 = RS232 Fuel 1<br>1 = RS232 Fuel 2<br><br>2 = RS485 Fuel 1<br>3 = RS485 Fuel 2<br>4 = RS485 Fuel 3<br>5 = RS485 Fuel 4 |
| FUEL_LEVEL | 0 | 2bytes int | Fuel sensor level |
| END OF LINE | \r\n | String | |
| **[Command]** $EVT_UART_FUEL_DISCON;ST25T;0;0 | | | |

### 5-2-6. Uart Fuel Sensor Upper Event

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $EVT_UART_FUEL_UPPER | String | Command |
| MODEL | ST25T | String | Model name |
| FUEL_NUM | 0 ~ 5 | 1byte int | Fuel sensor number<br>0 = RS232 Fuel 1<br>1 = RS232 Fuel 2<br><br>2 = RS485 Fuel 1<br>3 = RS485 Fuel 2<br>4 = RS485 Fuel 3<br>5 = RS485 Fuel 4 |
| FUEL_LEVEL | 0 ~ 4095 | 2bytes int | Fuel sensor level |
| END OF LINE | \r\n | String | |
| **[Command]** $EVT_UART_FUEL_UPPER;ST25T;0;0 | | | |

### 5-2-7. Uart Fuel Sensor Lower Event

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $EVT_UART_FUEL_LOWER | String | Command |
| MODEL | ST25T | String | Model name |
| FUEL_NUM | 0 ~ 5 | 1byte int | Fuel sensor number<br>0 = RS232 Fuel 1 |

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| | | | |
|---|---|---|---|
| | | | 1 = RS232 Fuel 2<br><br>2 = RS485 Fuel 1<br>3 = RS485 Fuel 2<br>4 = RS485 Fuel 3<br>5 = RS485 Fuel 4 |
| FUEL_LEVEL | 0 ~ 4095 | 2bytes int | Fuel sensor level |
| END OF LINE | \r\n | String | |
| **[Command]** $EVT_UART_FUEL_LOWER;ST25T;0;0 | | | |

### 5-2-8. Uart Fuel Sensor Error Event

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $EVT_UART_FUEL_ERROR | String | Command |
| MODEL | ST25T | String | Model name |
| FUEL_NUM | 0 ~ 1 | 1byte int | Fuel sensor number<br>0 = RS232 Fuel 1<br>1 = RS232 Fuel 2 |
| ERROR_NUM | 0 ~ 1 | 1byte int | Fuel error number<br>0 = Fuel net address scan fail<br>1 = Fuel max level excess |
| END OF LINE | \r\n | String | |
| **[Command]** $EVT_UART_FUEL_ERROR;ST25T;0;0 | | | |

### 5-2-9. Uart Fuel Sensor Param Request Response

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $RES_FUEL_PARAM | String | Command |
| MODEL | ST25T | String | Model name |
| RS232_FUEL1_LEVEL | 0 ~ 4095 | 2bytes int | RS232 fuel 1 level |
| RS232_FUEL2_LEVEL | 0 ~ 4095 | 2bytes int | RS232 fuel 2 level |
| RS485_FUEL1_LEVEL | 0 ~ 4095 | 2bytes int | RS485 fuel 1 level |
| RS485_FUEL2_LEVEL | 0 ~ 4095 | 2bytes int | RS485 fuel 2 level |
| RS485_FUEL3_LEVEL | 0 ~ 4095 | 2bytes int | RS485 fuel 3 level |
| RS485_FUEL4_LEVEL | 0 ~ 4095 | 2bytes int | RS485 fuel 4 level |
| RS232_FUEL1_STATUS | 0 ~ 1 | 1byte int | RS232 fuel 1 status |
| RS232_FUEL2_STATUS | 0 ~ 1 | 1byte int | RS232 fuel 2 status |
| RS485_FUEL1_STATUS | 0 ~ 1 | 1byte int | RS485 fuel 1 status |
| RS485_FUEL2_STATUS | 0 ~ 1 | 1byte int | RS485 fuel 2 status |
| RS485_FUEL3_STATUS | 0 ~ 1 | 1byte int | RS485 fuel 3 status |
| RS485_FUEL4_STATUS | 0 ~ 1 | 1byte int | RS485 fuel 4 status |
| END OF LINE | \r\n | String | |
| **[Command]** $RES_REQ_FUEL_PARAM;ST25T;0;0;0;0;0;0;0;0;0;0;0;0 | | | |

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### 5-2-10. Input State Event

| Field | Value | Format | Description |
|---|---|---|---|
| CMD | $EVT_INPUT_STATE | String | Command |
| MODEL | ST25T | String | Model name |
| INPUT_NUM | 0 ~ 1 | 1byte int | Fuel sensor number<br>0 = INPUT 1<br>1 = INPUT 2 |
| STATE | 0 ~ 1 | 1byte int | Input state<br>0 = Falling<br>1 = Rising |
| END OF LINE | \r\n | String | |
| **[Command]** $EVT_INPUT_STATE;ST25T;0;0 | | | |

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## Revisions

| Rev. No. | Date | Modifications were made on: | Writer |
|---|---|---|---|
| 1.00 | 19-01-15 | Construct Protocol. | JH Sim |

Information to the user.
NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

§15.21 Information to user.
The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

Caution
Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

FCC Compliance Information : This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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- End of the Document -