

M5600/U5600 Software Manual

Wireless Pressure Transducers (Rev 3.0)



Wireless Pressure Transducers

Contents

| 1 | Introduction | Description | 3 |
|---|--------------|--|----|
| 2 | Manual | Smartphone/Tablet Software Installation and Operation Manual | 3 |
| 3 | Manual | Windows Version Software Installation and Operation Manual | 5 |
| 4 | Source code | Software Source Code | 18 |
| 5 | Protocol | Software Protocol Specification | 19 |

1 Introduction

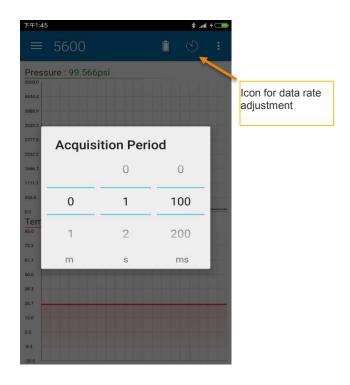
The M5600 and U5600 pressure transducers use standard 2.4GHz wireless communication tag. The long battery life and integration design make these transducers a perfect fit for many industrial and commercial applications including marine, residential, campers, water, hydraulic, irrigation, pool, medical and sprinkler systems, or anywhere you would need to monitor pressure without the need for wires.

By installing the Windows® version software on your PC or embedding the wireless signal in your integrated system, you can monitor pressure and temperature in real time.

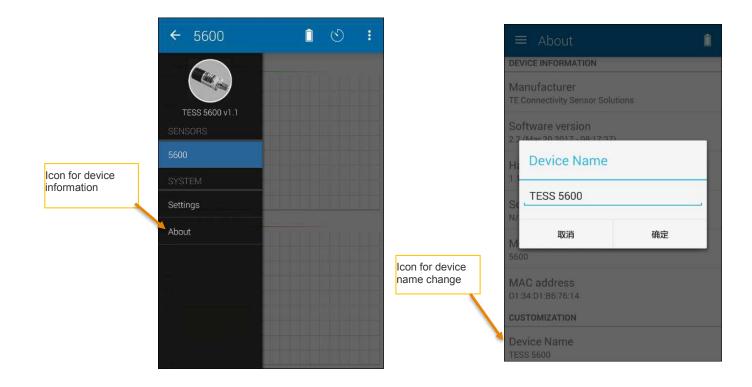
2 Smartphone/Tablet Software Installation

- 1. Download and install the "<u>TE Sensor Tag</u>" app for iOS or Android[™] from the Apple App Store or Google Play Store.
- 2. Install the battery into the transducer.
- 3. Turn on standard 2.4GHz wireless communication tag for smartphone/tablet.
- 4. Run "TE Sensor Tag" app on smartphone/tablet and it will start searching for the transducer.
- 5. Select the transducer (M5600 or U5600) found by the app to pair it to your smartphone/tablet.
- 6. Once paired, the pressure and temperature charting will begin automatically. Data is collected every 5 seconds (default interval for best battery life). Data collecting rate can be adjusted from 0.1s to 5s by step 0.1s.





7. The sensor name can be changed in "device information" as below illustration. (Default sensor name is "TESS 5600".)



3 Windows Version Software Installation and Operation Manual

Hardware & System Requirement

- PC with USB serial port support USB Dongle: BT900-US .
- •
- Operation system: Windows XP, Windows 7 or above .
- Microsoft .NET Framework4.5 or above .

Dongle Installation and Programming

1. Insert the USB Dongle (BT900-US) into the USB socket of the PC.



The PC will install the related USB drivers automatically.

| Device Setup | | |
|-----------------|---|------|
| Installing FT23 | Please wait while Setup installs necessary files on your system. This may take several minutes. | |
| ~ | C | lose |

2. After installing FT232R USB UART, open the PC's Device Manager and check if the USB Dongle has the port number assigned as below (COM5 in this example):



If not assigned, then it is necessary to install the FTDI FT232 USB Serial Converter Driver following instructions from the below link: <u>https://learn.sparkfun.com/tutorials/how-to-install-ftdi-drivers/windows---in-depth</u>

Verify COM port is assigned to the Dongle in the Device Manager before proceeding to the next step.

3. Copy Window's client software "TESS-M5600_U5600_Software.zip" to the PC and unzip it. Double-click to run <u>UwTerminal</u> in folder: <u>TESS 5600\UwTerminal</u>\. User interface should display as below:

| 🛄 UwTerminal v6.93 | × |
|--|---|
| Terminal BASIC Config About | |
| Accept Decline | |
| This application is provided by Laird Technologies without warranty. You are welcome to check our website for the latest version. | Â |
| This message is displayed EITHER because "accept" is not specified in the command line OR at least one command line option has been specified with an invalid parameter. | |
| You can launch this application and bypass this window by creating a shortcut link and passing ACCEPT as a command line option. Other command line options are:- | _ |
| ACCEPT Bypass About screen on startup | |
| COM=n [1255] specifies a comport number | |
| BAUD=n [1200921600] Could be limited to 115200 depending on PC hardware | |
| STOP=n [12] | |
| DATA=n [7.8] | Ŧ |

4. Click "Accept" to enter the configuration interface. Select the proper COM port where the Dongle is installed and leave the others at default settings.

| UwTerminal v6.9 | 3 | |
|------------------|---|--|
| Terminal BASIC C | ionfig About | |
| OK Cancel | Quit | If you just want to |
| Comport | COM 🔄 🛛 🖵 Poll for port | enter the BASIC tab |
| C Tcp Socket | Baudrate 115200 💌 | and you do not have a comport, please |
| Line Terminator | Parity None 🔻 | select 'Top Socket' and then untick |
| © CR ⊂ LF | Stop Bits 1 | 'Client' so that |
| | Data Bits 8 👻 | streaming communications |
| C LF CR | Handshaking CTS/RTS - | happen over a tcp/ip connection from |
| | | within a smartBASIC application |
| | | Use AT+FWRH Command |
| Tra | ce/Log BASIC comms traffic in Terminal Window | 70 Max AT+FWRH Command Len |
| Log Filename | | Append |
| | | |

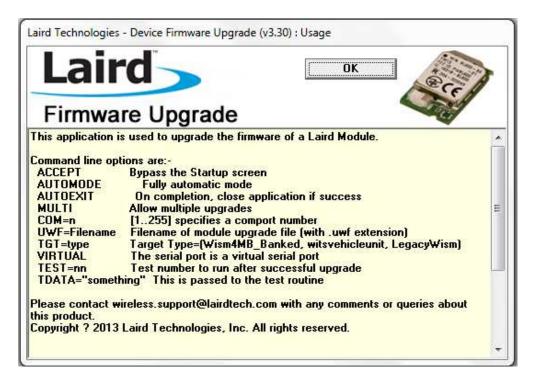
Then click "OK" to enter the command-line interface:

| UwTerminal v6.93 | | 23 |
|---|-----------------|----|
| Terminal BASIC Config About | | |
| CTS DSR DCD RIC RTS DTR REAK LocalEcho LineMode | Clear ClosePort | |
| Right-click for pop-up menu for more options. | | |
| Right-click for pop-up menu for more options. | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| [COM5:115200,N,8,1]{cr} | Tx Rx | |
| [[comparated/doi/1(ci] | | |

5. Input "at &F *" (at space &F space *) and press "Enter". The screen will display "FFS Erased, Rebooting..." Close the window by clicking the "X" at the upper right corner.

| UwTerminal v6.93 | | 23 |
|---|---------------|----|
| Terminal BASIC Config About | | |
| CTS DSR DCD RICE RTS DTR BREAK LocalEcho LineMode | ear ClosePort | |
| Right-click for pop-up menu for more options. Right-click for pop-up menu for more options. at &F * | | |
| FFS Erased, Rebooting | | |
| 00 | | |
| | | |
| | | |
| [COM5:115200,N,8,1]{cr} | x 8 Rx 30 | |

6. Run "<u>BT900UartFwUpgrade.exe</u>" in folder: <u>TESS 5600\BT900_9.1.10.3</u> to update the firmware. Follow these steps: Press "OK" → specify the correct COM port → press "OK" → press "Start Upgrade" → let it run until finish → pressing "Quit."

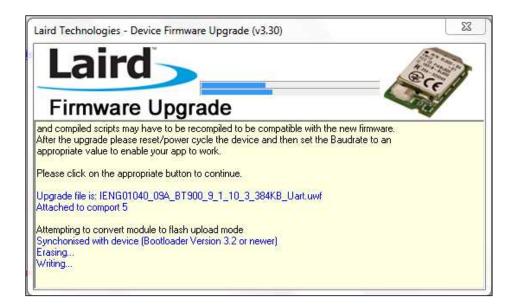


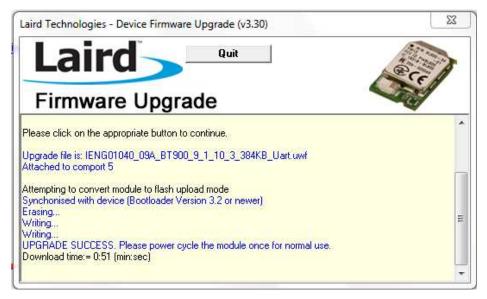
Wireless Pressure Transducers

| Firmware Upgr | ade | and the second s |
|---|-----------------|--|
| Platform BT900 Jpgrade File | COM 255 | |
| Ipgrade File ENG01040_09A_BT900_9_1_10_3 | _384KB_Uart.uwf | |

| Laird | Quit | Start Upgrade | e la |
|--|--|--|------|
| Firmware Upg | rade | | |
| Running on OS: Windows Vista or ne | wer | | |
| This application upgrades firmware in | the device from Laird | Technologies | |
| After the upgrade, it's configuration m and compiled scripts may have to be After the upgrade please reset/power appropriate value to enable your app | ay be reset to default recompiled to be com cycle the device and | values patible with the new firmwar | |
| After the upgrade, it's configuration m and compiled scripts may have to be After the upgrade please reset/power | ay be reset to default recompiled to be com cycle the device and to work. | values patible with the new firmwar | |

Wireless Pressure Transducers





Remove the USB Dongle and re-insert, repeat above steps 3 & 4.
 Input "at I 3" and press "Enter," displaying "9.1.10.3" which is the latest version of the firmware.

| UwTerminal v6.93 | | |
|-----------------------------|--|--------------------------------|
| Terminal BASIC Config About | | |
| CTS DSR DCD RI F | RTSIZ DTRIZ BREAK I LocalEcho | □ ✓ LineMode ✓ Clear ClosePort |
| | p menu for more options. p menu for more options. | |
| 10 3 9.1.10.3 0이 | | |
| | | |
| | | |
| | | |
| | | |
| [COM5:115200,N,8,1]{cr} | | Tx 8 Rx : |

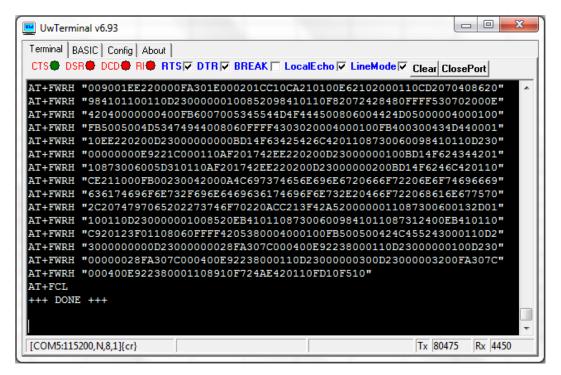
Input "at &F *" and press "Enter." Screen will display "FFS Erased, Rebooting..." Input "at+dir" and press "Enter."

8. Right-click inside the window and click "load precompiled BASIC"

| UwTerminal v7.20 | | | | om |
|---------------------------|---|----------------------|------|-------------------------|
| Terminal BASIC Config Abo | out RTSI7 DTRI7 BREAK LocalEcho Li | neMode 🗸 Clear Close | Port | |
| at &F * | | | | |
| FFS Erased, Rebootin | ng | | | |
| 00 | | | | |
| 00 at+dir | XCompile XCompile + Load | | | |
| 00 | XCompile + Load + Run Lookup Selected ErrorCode Loopback (Rx->Tx) | | | |
| | Download • | BASIC | • | Load BASIC source |
| | Font | Data | • | Multi Load BASIC Source |
| | Run | Config | • | Load Precompiled BASIC |
| | Automation | Stream File Out | | Erase File |
| | Batch | The second | | Dir |
| [COM6:115200,N,8,1]{cr} | File Player | Tx 211 | Rx | Run |
| | Compile + Load | | | |

| Look in: | J Software | ◆ 🗈 💣 💷 🔹 | |
|-------------|-----------------------|--------------------|----------|
| Ca. | Name | Date modified | Туре |
| cent Places | smartZ.uwc | 3/30/2016 10:38 AM | UWC File |
| | | | |
| Desktop | | | |
| A Controp | | | |
| | | | |
| Libraries | | | |
| | | | |
| Computer | | | |
| | | | |
| Network | | | |
| | * | | , |
| | File name: smartZ.uwc | • | Open |
| | Files of type: | - | Cancel |

Text will scroll and after 1-2 minutes, it will display "DONE."



Close the "UwTerminal" window. Remove the USB Dongle and re-insert.

Monitoring Software Operation Manual

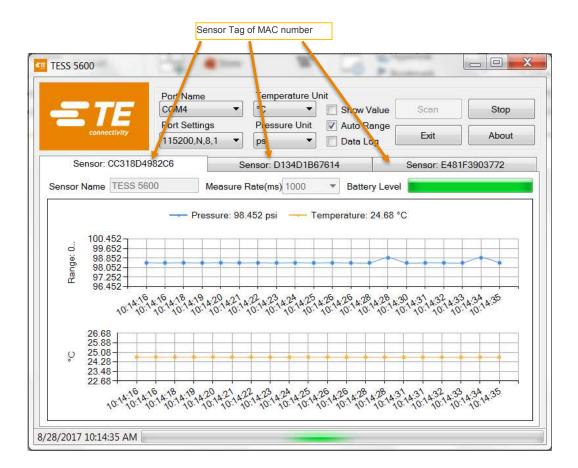
1. Double-click to run <u>TESS 5600 for Windows</u> in folder: <u>TESS 5600\bin\Release\</u>. The client software user interface should display as below. Certain explanations can be found when moving the cursor onto the words.

| USB serial port selection | Temperature | unit selection | Pressure unit s | election | | |
|---------------------------|--|--|-----------------|--------------|---------------|--|
| | 1 | | 1 | | | |
| TESS 5600 | | | | | _ 0 % | 7 |
| | Port Name COM4 Port Settings 115200,N,8,1 | Temperature Unit °C Pressure Unit psi | Show Value | Scan Exit | Stop About | |
| | | | | | | Display for pressure and temperature |
| | | | | | | temperature |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 8/28/2017 9:24:20 AM | | | | | | |

2. Ensure the Port Name matches the COM number in the Device Manager. Click the "Scan" button, and then a "Scan" window will pop up to search for available wireless devices. Tick the MAC number to match the target device. Maximum 5 units can be selected.

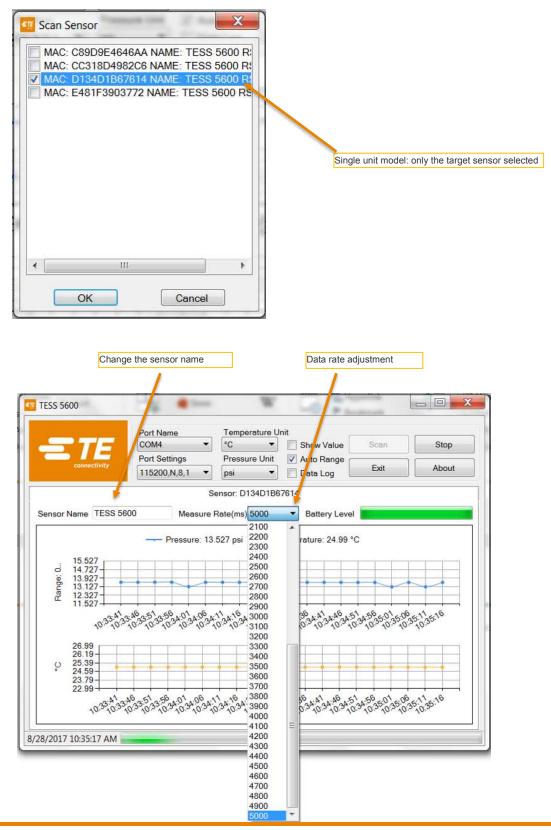
| MAC | C89D9E4 CC318D4 D037E3D | 982C6 | NAME: | TESS 56 | 600 R |
|-----|--------------------------------|-------|-------------------|---------|-------|
| MAC | D134D1B DC976FA E481F390 | 3D750 | NAME: | MEAS 5 | 600 F |
| | EA61BD1 | | Distantion of the | | 1.2.1 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

 The software will start receiving and recording data on battery level and real-time pressure and temperature. Maximum 5 devices can be displayed in parallel. The initial communication time of each unit takes 30 sec approx. By clicking the sensor tag of Mac number, different sensor measurement can be taken. Clicking the "Stop" button will stop the data taking process.



4. Data rate and sensor name can be changed in single unit model (only one sensor selected in scan window). By clicking icon "measure rate", data rate can be adjusted (Default value is 5000ms). And sensor name can be changed by inputing in rectangle.

(Default sensor name is "TESS 5600")



Wireless Pressure Transducers

5. When "Data Log " is enabled and the interval set, , all data will be saved in the folder (default: <u>\\TESS\\data\\</u>) as a *.dat file which can be opened with MS Excel.

| Temperature Ur | nit | |
|----------------|------------|------|
| •C • | Show Value | Scan |
| Pressure Unit | Auto Range | |
| psi 🔻 | 🔽 Data Log | Exit |

| | А | A B C | | D | E | F |
|----|-------------------|----------------------------|--------------|------------------|-----------------------|---------------------|
| 1 | Pressure Range Mi | Pressure Range Min(psi): 0 | | | | |
| 2 | Pressure Range Ma | ax(psi): 5000 | | | | |
| 3 | Date Time | MAC Address | Product Name | Battery Level(%) | Temperature Value(°C) | Pressure Value(psi) |
| 4 | 10:53:33 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.338 |
| 5 | 10:53:38 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.336 |
| 6 | 10:53:43 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.34 |
| 7 | 10:53:48 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.336 |
| 8 | 10:53:53 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.337 |
| 9 | 10:53:58 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.337 |
| 10 | 10:54:03 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.337 |
| 11 | 10:54:08 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.335 |
| 12 | 10:54:13 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.744 |
| 13 | 10:54:18 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.339 |
| 14 | 10:54:23 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.337 |
| 15 | 10:54:28 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.334 |
| 16 | 10:54:33 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.336 |
| 17 | 10:54:38 AM | D134D1B67614 | TESS 5600 | 100 | 24.81 | 13.335 |

Note: Temperature unit is fixed centi-degree and pressure unit is fixed PSI in data file.

The "Date Time" column can be formatted to display seconds as shown below:

| | | | Form | at Cells | ? 🗙 |
|---|-------------------------------|--|---|--|---------------------------|
| Number | Alignment | Font | Border | Fill | Protection |
| <u>C</u> ategory: | | | | | |
| General Number Currency Accountin | meral Amber mber rrency | | le 016 9:33:11 | | |
| Date | | m/d/y | yy <mark>y h:</mark> mm:ss | | |
| Time Percentage Fraction Scientific Text Special Custom | | _(* #,# _(\$* #, _(* #,# [\$-409 [\$-409 | .0 n:ss ##0_);_(\$* (#, #0_);_(* (#,## ##0.00_);_(\$* | t0);_(* "-"_); (#,##0.00); ;,##0.00);_(1 im d, yyyy | |
| | ~ | | | | Delete |
| Type the r | number format | code, usin | g one of the | existing co | odes as a starting point. |

4 Software source code

- 1. Souce code file are all in the folder : <u>TESS 5600\ Source code V2.0</u>, compiled based on **Microsoft visual studio 2013**, **C sharp** language.
- 2. SmartZ command lines are quoted to interact with BT900 dongle for data communcation.

Note: SmartZ is a smartBASIC application provied by LairdTech . See "<u>Application Note - BT900 with smartZ Sample Application</u>" for details in folder: <u>TESS 5600\</u>

Wireless Pressure Transducers

5 Software Protocol Specification

UUID

F000AB30-0451-4000-B000-000000000000

AVAILABLE CHARACTERISTICS

| Name | UUID | Bytes | Read / Write | Notified |
|-----------|--------------------------------------|-------|--------------|----------|
| Data | F000AB31-0451-4000-B000-000000000000 | 14 | Read | YES |
| Data Rate | F000AB32-0451-4000-B000-000000000000 | 12 | Read / Write | YES |
| Status | F000AB3F-0451-4000-B000-000000000000 | 1 | Read | NO |

DATA CHARACTERISTIC BYTES FIELDS

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-------|-------|-------|---|---|-------|----------|------|------|----------|----------|------|------|----------|
| T LSB | T MSB | P LSB | Ρ | Ρ | P MSB | Pmin LSB | Pmin | Pmin | Pmin MSB | Pmax LSB | Pmax | Pmax | Pmax MSB |

T is a 16 bits signed integer, equals 0x7FFF if erroneous.

P, Pmin and Pmax are 32 bits signed integers, equal 0x7FFFFFFF if erroneous.

T is a temperature value with 0.01°C accuracy.

P, Pmin and Pmax are pressure values with 0.1Pa accuracy

CONVERSION

Temperature (°C) = T / 100

Pressure (Pa) = P / 10

Pressure (Psi) = P / 10 / 6894.7

DATA RATE CHARACTERISTIC BYTES FIELDS

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|------------------|--------------|--------------|------------------|------------|-----|-----|---------|---------|-----|-----|---------|
| Data rate LSB | Data rate | Data rate | Data rate MSB | Min LSB | Min | Min | Min MSB | Max LSB | Max | Max | Max MSB |

Data rate, Min and Max are 32 bits unsigned integers.

Data rate is the actual sensor data rate in milliseconds. Min is the minimum admissible data rate in milliseconds. Max is maximum minimum admissible data rate in milliseconds.

NB. Only Data rate can be written.

STATUS

| 0x00 | ОК |
|------|--------------|
| 0x01 | Sensor error |

NB. All signed integers use two's complement representation.

M5600/U5600 SOFTWARE MANUAL Wireless Pressure Transducers

Battery Service

UUID

F000180F-0451-4000-B000-00000000000

AVAILABLE CHARACTERISTICS

| Name | UUID | Bytes | Read / Write | Notified |
|------|--------------------------------------|-------|--------------|----------|
| Data | F0002A19-0451-4000-B000-000000000000 | 2 | Read | YES |

DATA CHARACTERISTIC BYTES FIELDS

| Byte 0 | Byte 1 |
|-------------------|--------|
| Battery Level (%) | Status |

0% to 100% represents a supply voltage from 2.0V to 3.0V with 1%/bit resolution.

STATUS

| 0x00 | Discharging |
|------|-------------|
| 0x01 | Charging |

Device Name Service

| UUID | F000FA00-0451-4000-B000-00000000000 |
|------|-------------------------------------|
| | |

AVAILABLE CHARACTERISTICS

| Name | UUID | Bytes | Read / Write | Notified |
|---------------------|--------------------------------------|-------|--------------|----------|
| Device Name | F000FA01-0451-4000-B000-000000000000 | 18 | Read/Write | NO |
| Default Device Name | F000FA02-0451-4000-B000-000000000000 | 18 | Read | NO |

Both Device Name and Default Device name are in ASCII format. Unused bytes should be nulled. Default Device Name is "TESS 5600".



本

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