

# M5600/U5600 Software Manual

Wireless Pressure Transducers (Rev 3.0)



Wireless Pressure Transducers

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#### 1 Introduction

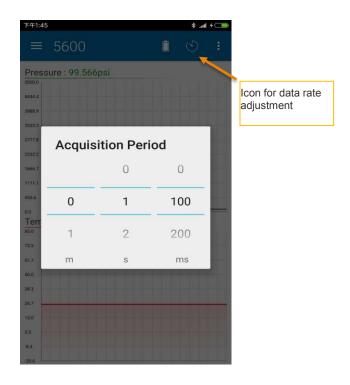
The M5600 and U5600 pressure transducers use standard 2.4GHz wireless communication tag. The long battery life and integration design make these transducers a perfect fit for many industrial and commercial applications including marine, residential, campers, water, hydraulic, irrigation, pool, medical 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.

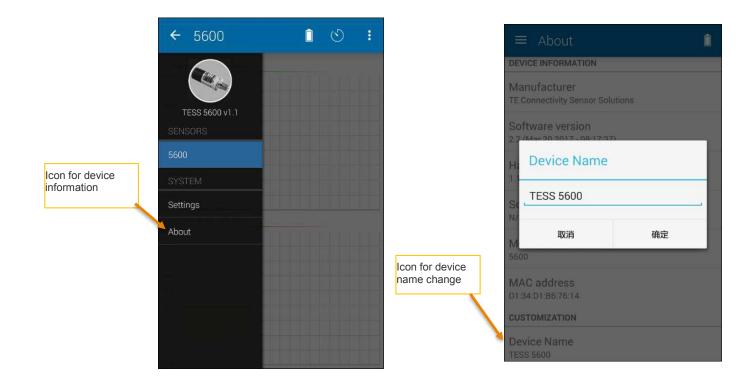
#### 2 Smartphone/Tablet Software Installation

- 1. Download and install the "<u>TE Sensor Tag</u>" app for iOS or Android<sup>™</sup> 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

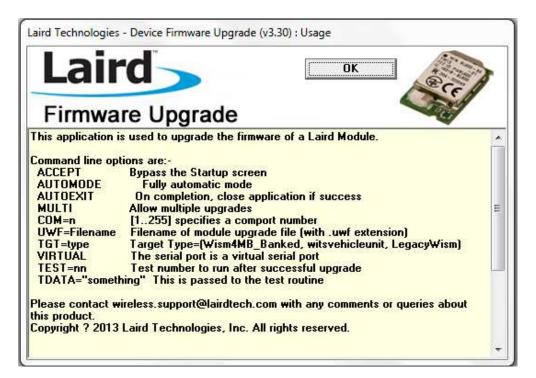
Then click "OK" to enter the command-line interface:

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."

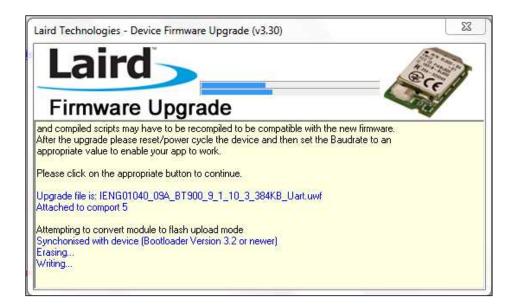


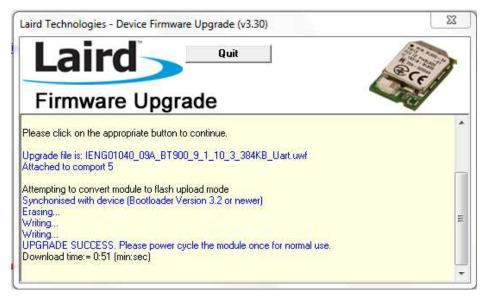
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Firmware Upgr	ade	and the second s
Platform BT900 Jpgrade File	COM 255	
Ipgrade File ENG01040_09A_BT900_9_1_10_3	_384KB_Uart.uwf	

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	

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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 :

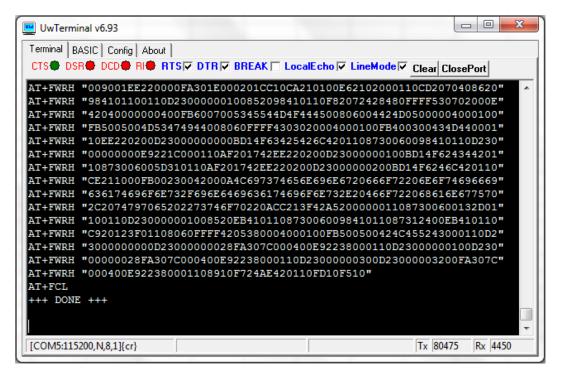
Input "at &F \*" and press "Enter." Screen will display "FFS Erased, Rebooting..." Input "at+dir" and press "Enter."

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

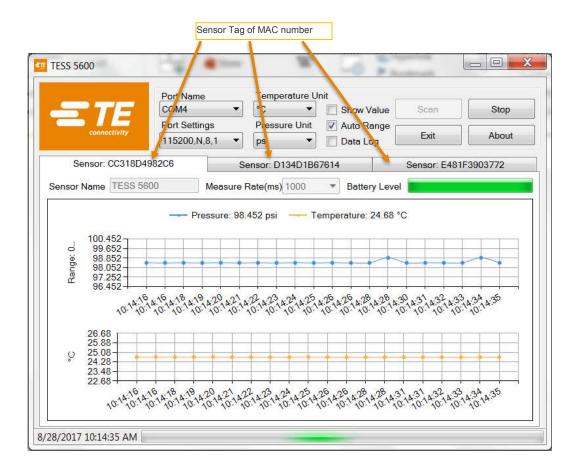
1. Double-click to run <u>TESS 5600 for Windows</u> in folder: <u>TESS 5600\bin\Release\</u>. The client software user interface should display as below. Certain explanations can be found when moving the cursor onto the words.

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.

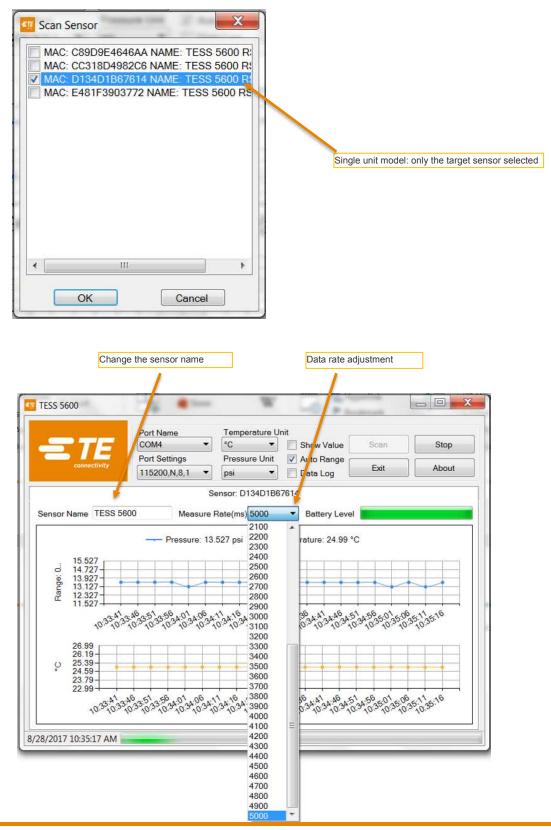
MAC	C89D9E4 CC318D4 D037E3D	982C6	NAME:	TESS 56	600 R
MAC	D134D1B DC976FA E481F390	3D750	NAME:	MEAS 5	600 F
	EA61BD1		Distantion of the		1.2.1

 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")



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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>

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## 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".



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