Operating Manual, Sensing Unit:

1.0 INSTRUMENT FEATURES:

    1.1   The case is made of a recyclable ABS-PC blended material for high strength.

    1.2   The instrument, including the USB port, is rated to IP65 for Ingress Protection from dust and water.

    1.3   The case includes a breathable membrane to avoid any pressurization or condensation within the case while maintaining IP65 protection.

D-001517 rev 00

1.4   The instrument is equipped with an internal Lithium-ion rechargeable battery. The battery may be charged through the USB port.

1.5   The instrument may communicate with other devices through the USB port.

1.6   The instrument is equipped with a wireless (BLE) transmit and receive capability, including a built-in antenna.

2.0   FRONT PANEL:
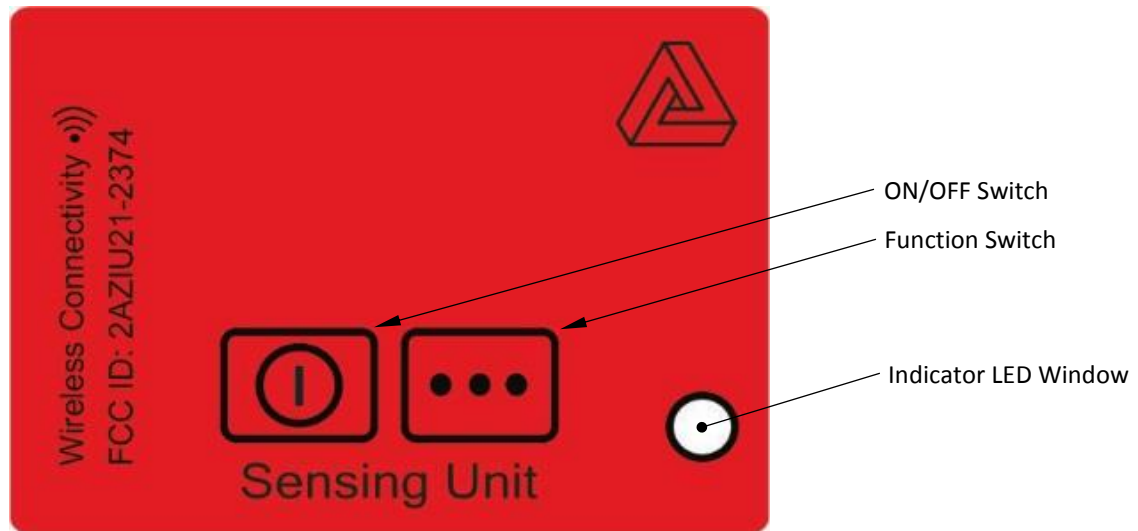
3.0   POWER ON/OFF:

3.1   <u>TURN ON:</u> Hold down [icon] until the red LED flashes, then release switch.

3.2   A slowly flashing green LED indicates the instrument is ON.

3.3   <u>TURN OFF:</u> Hold down [icon] until the red LED flashes once, and after a small delay, flashes a second time; then release switch. *NOTE: Each of the red LED flashes may occur when the green LED is on or off.*

3.4   No LED indicates the instrument is OFF.

4.0   STAND ALONE FUNCTIONALITY WHEN UNIT IS ON:

4.1   When the instrument is ON as in 3.2 above, it is in a default mode:

4.1.1   The instrument is collecting position data from the internal sensor.

D-001517 rev 00

4.1.2   The instrument is filing position data every 250 msecs to an internal flash drive. *The instrument stores data using a FIFO process and can store over <u>eleven hours</u> of continuous position data before overwriting oldest data.*

4.1.3   The instrument is NOT advertising for a BLE connection.

4.2   <u>TARE POSITION SENSOR:</u>   Hold down [•••] until the red LED flashes once, and after a small delay, flashes a second time; then release switch. The unit will display a burst of red LED flashes confirming that the tare operation has been successful. Then the slowly flashing green LED will return indicating normal operation as described in 4.1 above.

4.3   *<u>Toggle filing ON/OFF:</u>*   *Hold down* [•••] *until the red LED flashes once.*

4.4   *<u>Toggle BLE Advertising ON/OFF:</u>   Hold down* [Ⓘ] *until the red LED flashes once.*

5.0   PAIR THE UNIT TO AN OPERATOR INTERFACE UNIT:

5.1   Turn Sensing Unit ON to get slowly flashing green LED as in 3.1 above.

5.2   Turn Operator Interface ON.

5.3   Hold down [Ⓘ] until the red LED flashes once. *This turns on BLE advertising from the Sensing Unit.*

5.4   Press [**Enter** *(Select)*] on Operator Interface until one line appears on the display, then release.

5.5   Angles should begin appearing on the Operator Interface that represent the position of the Sensing Unit in real time.

5.6   *See Operating Manual for Operator Interface for more details.*

6.0   FILE DOWNLOADS TO PC:

6.1   With the Sensing Unit ON, plug into USB cable. The Windows directory view should appear:
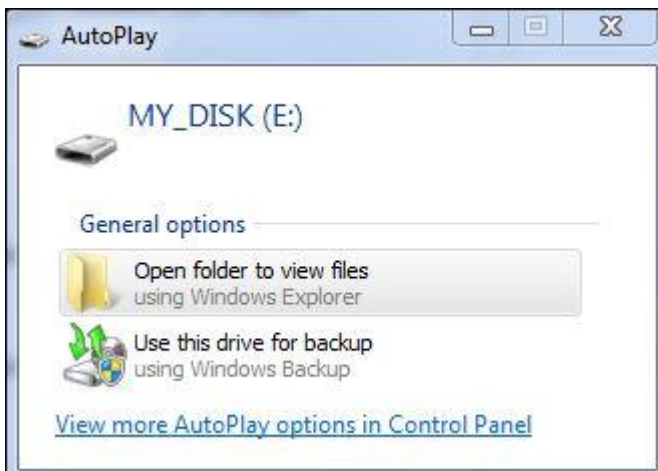
NOTE: If Sensing Unit is plugged in while OFF, Windows may display this message: "USB Device Not Recognized." Turn unit ON to get screen at left.

6.2 Select "Open folder to view files" to see something like below. The date/time stamp shown inside the various .DAT files is the relevant one. The date/time stamp shown for the .CFG file is either the date the file was originally created offline or the date the file was edited and saved under Windows, whichever is the most recent.

6.3 Files may be copied to some other folder or device.

6.4 Each .DAT file holds up to 10 minutes of data. FILE0001.DAT holds first 10 minutes of data after data filing was turned on. FILE0002.DAT holds next 10 minutes of data, and so on.

6.5 .DAT files may be deleted but when data filing begins again, it will start with the next sequential file name e.g. FILE0008.DAT in the example above.

6.6 Each new .DAT file will always be named in an ascending sequence up until FILE9999.DAT, at which point file naming will begin again at FILE0001.DAT.

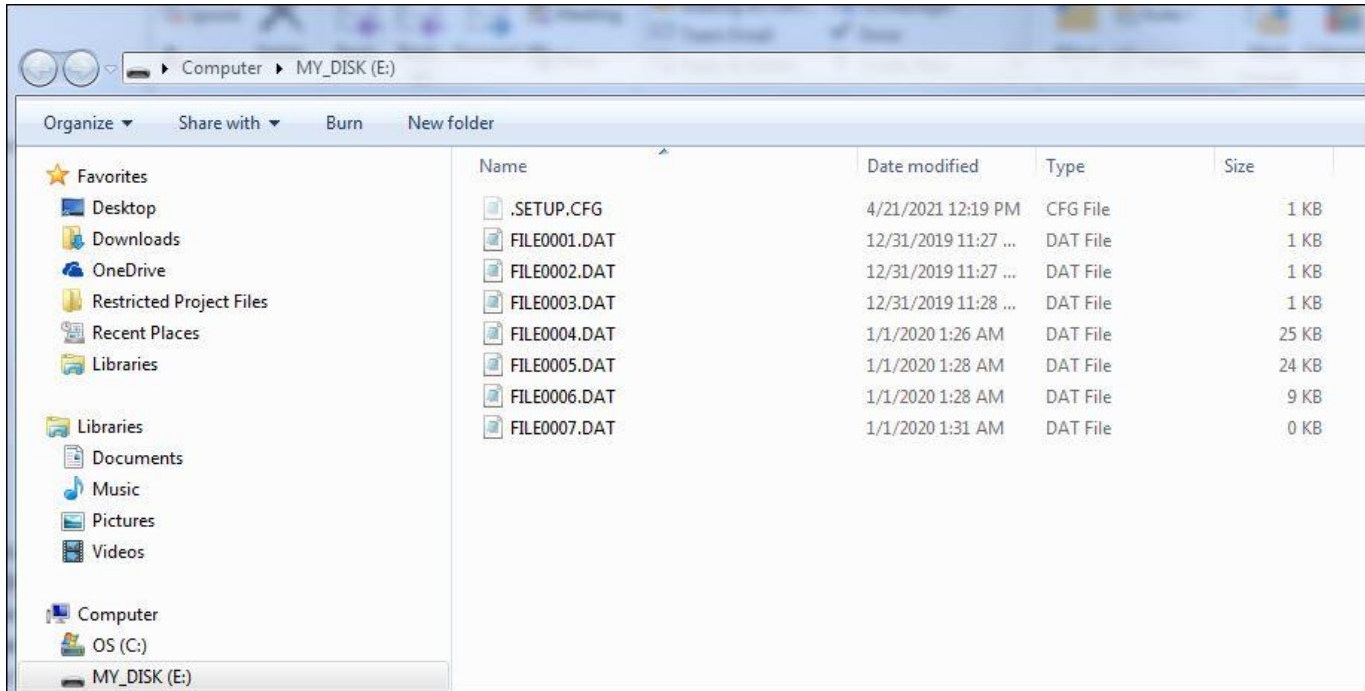6.7 If the Sensing Unit was turned off, or data filing was turned off, during one of the 10 minute increments mentioned in 6.4, that file will be saved as a partial and when filing resumes, a new file will be begun.
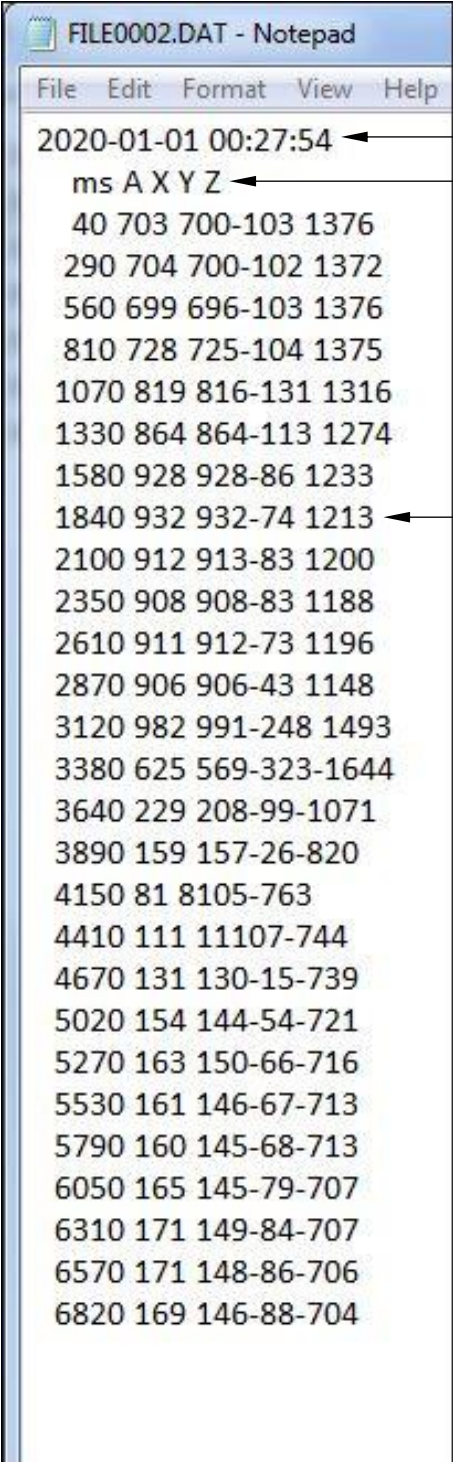
6.8 SETUP.CFG is the settings file for the instrument. This file may be edited and re-saved to the Sensing Unit to change the settings, and thus the operation.

6.9 NOTE: "Show hidden files" must be turned on in Windows Explorer to see .CFG file.

6.10 An example .SETUP.CFG file is shown here:

```
.SETUP.CFG - Notepad

File   Edit   Format   View   Help

# VS00748-01                                                    ← Firmware version number
# CfgVal1 - Scan rate in ms (10 is min)
# CfgVal2 - Multiplier for BLE notification rate (0 means no notifications)
# CfgVal3 - Data collection time in minutes (0 means no scheduled collection)
# CfgVal4 - Data collection bitmap:
# Bit 1 - collect data at scan (0) or notification (1) rate
# Bit 2 - auto start collection after power up or reboot
# Bit 3 - delete oldest data if disk is full
# Bit 4 - file data in text (0) or binary (1) format
# Bit 5 - start BLE advertising after power up

CfgVal1=10
CfgVal2=25
CfgVal3=0
CfgVal4=7
CfgVal5=0
CfgVal6=0
```

Firmware version number

Settings description

Actual Settings

6.11 An example .DAT file is shown here:

```
FILE0002.DAT - Notepad
File  Edit  Format  View  Help
2020-01-01 00:27:54
  ms A X Y Z
   40 703 700-103 1376
  290 704 700-102 1372
  560 699 696-103 1376
  810 728 725-104 1375
 1070 819 816-131 1316
 1330 864 864-113 1274
 1580 928 928-86 1233
 1840 932 932-74 1213
 2100 912 913-83 1200
 2350 908 908-83 1188
 2610 911 912-73 1196
 2870 906 906-43 1148
 3120 982 991-248 1493
 3380 625 569-323-1644
 3640 229 208-99-1071
 3890 159 157-26-820
 4150 81 8105-763
 4410 111 11107-744
 4670 131 130-15-739
 5020 154 144-54-721
 5270 163 150-66-716
 5530 161 146-67-713
 5790 160 145-68-713
 6050 165 145-79-707
 6310 171 149-84-707
 6570 171 148-86-706
 6820 169 146-88-704
```

Hours meter reading when filing begain in this file. Also see 6.13

Data Column headers:
ms: elapsed milliseconds since data filing begain
A: total angle
X: angle in X-direction
Y: angle in Y-direction
Z: angle in Z-direction

Rightmost digit of any angle is tenths of a degree. If a space preceeds the angle, it is positive.
E.g. this line:
  A= 93.2º
  X= 93.2º
  Y= -7.4º
  Z= 121.3º
Note: This line was filed 1.84 seconds after filing began.

6.12 Before unplugging the Sensing Unit, <u>always</u> use the Windows "eject" function first.

6.13 The Hours Meter

6.13.1 This is an internal elapsed time counter that only advances when the Sensing Unit is on.

6.13.2 The counter begins with a value of 2020-01-01 00:00:00 when the instrument is new or a hardware reset of the instrument has been executed.

6.13.3 The counter is of the form: YYYY-MM-DD hh:mm:ss

6.13.4 An exact Hours Meter number is obtained by taking the value at the top of the data file and subtracting 2020-01-01 00:00:00

6.13.5 Using the example .DAT file above, the Hours Meter time would be 0 years, 0 months, 0 days, 0 hours, 27 minutes, 54 seconds.

7.0 INSTRUMENT SETTINGS DESCRIPTION:

7.1 CfgVal1 - Scan rate (from position sensor chip) in msecs (10 is minimum value)

7.2 CfgVal2 - Multiplier for BLE notification rate (0 means no notifications)

7.3 CfgVal3 - Data collection time in minutes (0 means no scheduled collection)

7.4 CfgVal4 - Data collection bitmap:

7.4.1 Bit 1 - file data at scan (0) or notification (1) rate

7.4.2 Bit 2 - auto start filing after power up or reboot

7.4.3 Bit 3 - delete oldest data if disk is full (FIFO)

7.4.4 Bit 4 - file data in text (0) or binary (1) format

8.0 ACTUAL INSTRUMENT DEFAULT SETTINGS:

8.1 CfgVal1=10

8.2 CfgVal2=25

8.3 CfgVal3=0

8.4 CfgVal4=15 (1111)

8.5 CfgVal5=0 (not currently used)

8.6 CfgVal6=0 (not currently used)

9.0 FILE DOWNLOADS TO USB MEMORY STICK:

9.1 Not currently implemented.