TRUE ECHO®+

Radar and Pressure Dual Sensor

User Manual

APG®

Doc # 9006956
Part # 201258
Rev B1, 11/2025

CONTENTS

INTRODUCTION III
WARRANTY AND WARRANTY RESTRICTIONS IV
Repair and Returns IV
CHAPTER 1: DIMENSIONS AND WIRING 1
Dimensions 1
Wiring Information 2
CHAPTER 2: INSTALLATION AND REMOVAL PROCEDURES 3
Physical Installation Notes 3
Tools Needed 3
Installation Instructions 3
Sensor Placement 4
Removal Instructions 5
CHAPTER 3: DEFAULT BEHAVIOR 6
CHAPTER 4: PROGRAMMING 8
Radar Programming 8
Pressure Sensor Modbus Programming 10
CHAPTER 5: MAINTENANCE 12
General Care 12
APPENDIX: BEAM ANGLE REFERENCE TABLE 13

NOTE:
Find product specifications, accessories, and more in the Data Sheet. Go to
apgsensors.com/product/dual-sensor-plus

INTRODUCTION

Thank you for purchasing a **TRUE ECHO® Plus** Dual Sensor from APG. We appreciate your business! Please take a few minutes to familiarize yourself with your sensor and this manual.

The TRUE ECHO® Plus combines the accurate level readings of the CR-L radar with the precision PT-400 pressure transducer. Together, they form a versatile dual sensor that is uniquely engineered for detecting and measuring overfill or flood conditions so you don't have to operate in the dark when systems overflow.

The radar's narrow beam can detect small targets and achieve precise positioning with high resolution. It has a maximum measuring range of 49.2 feet (15 m) and a minimum blind zone of 8 inches (0.2 m). All TRUE ECHO CR-L radar sensors can be easily set up and field adjusted via the TRUE ECHO app.

When liquid levels rise and the radar is submerged, the pressure sensor continues the monitoring. This 30 psia sensor uses the same reliable technology as APG's PT-400. With heavy duty wetted materials, this robust sensor is designed to keep you in the know.

Reading your label
Every TRUE ECHO Plus sensor comes with a label that includes the instrument's part number, model number, and serial number. Please ensure that the part number on your label matches your order.

IMPORTANT:
FCC regulations require 75-85 GHz radars to be installed to ensure a vertically downward orientation at fixed locations only. They must not operate while being moved or while inside a moving container. Hand-held applications are prohibited as well as marketing to residential consumers.

WARRANTY AND WARRANTY RESTRICTIONS

This product is covered by APG's warranty to be free from defects in material and workmanship under normal use and service of the product for 24 months. For a full explanation of our Warranty, please visit https://www.apgsensors.com/resources/warranty-certifications/warranty-returns/. Contact Technical Support to receive a Return Material Authorization before shipping your product back.

Repair and Returns

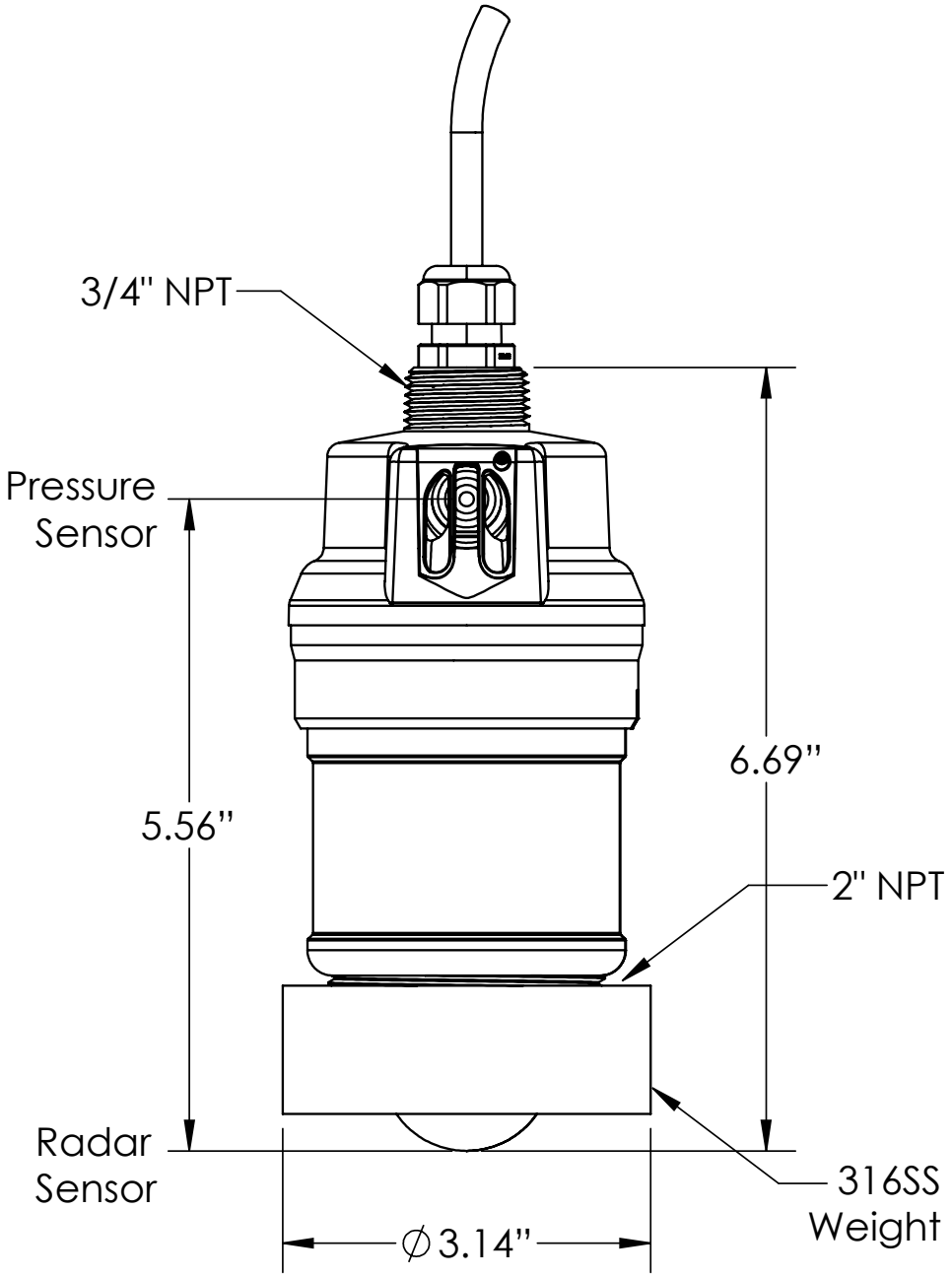
Should your TRUE ECHO Plus dual sensor require service, please contact the factory via phone, email, or online chat. We will issue you a Return Material Authorization (RMA) number with instructions. You can also find the form on our website by clicking "RMA" in the web footer, or go to apgsensors.com/RMA-Form.

- Phone: 888-525-7300
- Email: sales@apgsensors.com
- Online chat: www.apgsensors.com

Please have your part number and serial number available.

CHAPTER 1: DIMENSIONS AND WIRING

Dimensions



TRUE ECHO Plus Dual Sensor

IMPORTANT:
Any contact with the pressure sensor diaphragm can permanently damage the sensor. Use extreme caution.

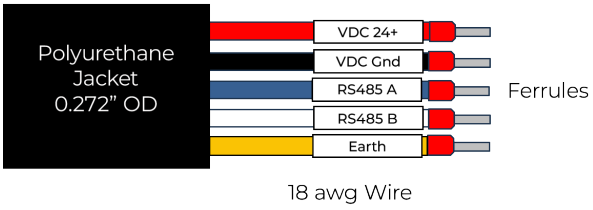
Wiring Information

Power Supply Table

Output	Voltage	Typical RMS Current	Peak Current 3.3ms Pulse Every 1s Update Cycle
RS-485	12-28 VDC 24 VDC 12 VDC	-- 9 to 12 mA 14.5 to 17.6 mA	-- 145 mA 234 mA

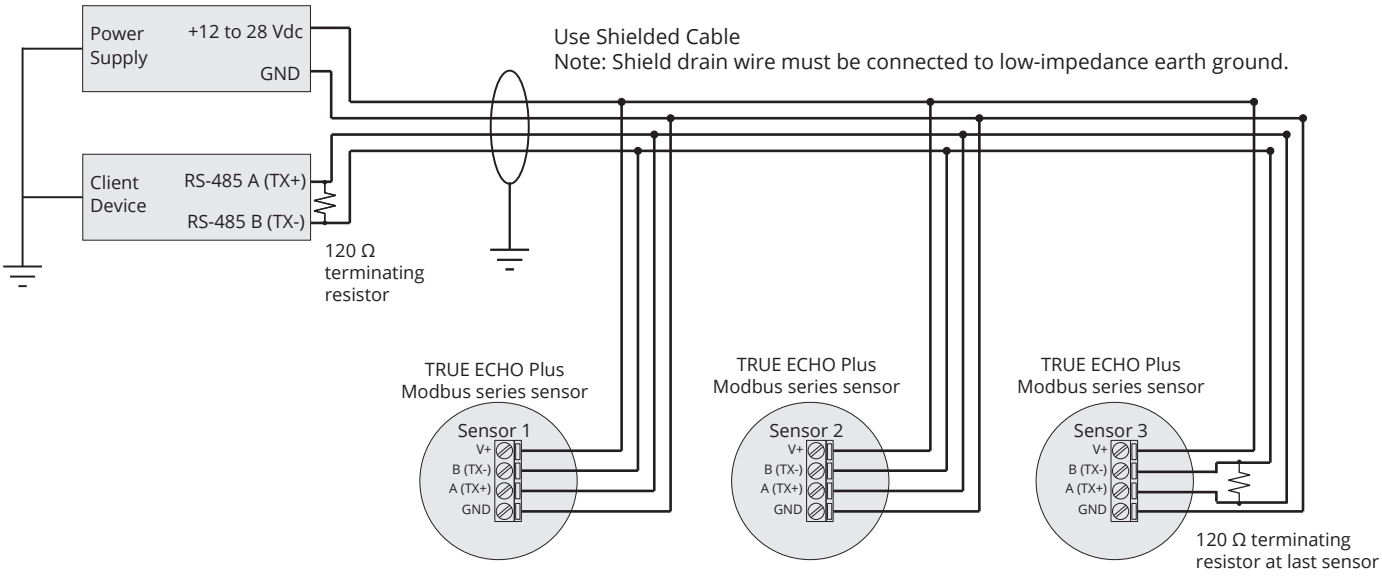
Wiring Pinout

	RS-485
Red	Power Supply 12 to 28 VDC +
Black	Power Supply Ground -
Blue	RS-485 A+
White	RS-485 B-
Yellow	Shield, Earth Ground



RS-485 Wires

NOTE:
Connect Shield wire to Power Supply Earth Ground.



IMPORTANT:
Some manufacturer's Modbus equipment uses reversed TX+/TX– pins. When making connections between APG equipment, reversing connections may be necessary if the sensor does not communicate with the controller.

CHAPTER 2: INSTALLATION AND REMOVAL PROCEDURES

Physical Installation Notes

- The material to be measured must have a dielectric constant greater than 2.
- In areas with direct sunlight, it is recommended to install the instrument in a cool place or use a sun visor to avoid excessive temperature and to provide good ventilation and heat dissipation.
- Mount your TRUE ECHO Plus sensor so that it has a clear, perpendicular path to the surface being monitored.
- Install at least 8 inches (0.2 m) from a side wall.
- The radar path should be free from obstructions and as open as possible for the 4° off axis beam pattern. Mount the sensor away from tank or vessel inlets.
- Be careful not to scratch or damage the radar face.

Tools Needed

- Tools to make electrical connection
- Mobile device (optional)
- Thread tape or sealant compound for threaded connections.

Installation Instructions

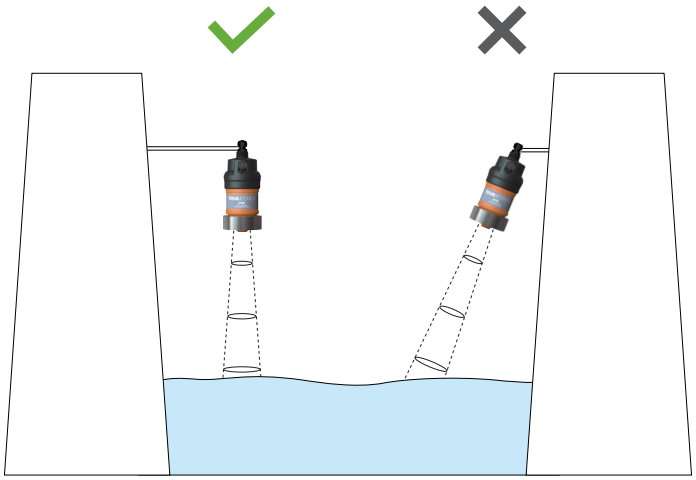
STEP 1: Attach the wires to your control system according to the Wiring Pinout.
STEP 2: Install the TRUE ECHO Plus, either by suspending by the cable (see steps below) or mounting the radar using the 2 inch NPT bottom threads or the 3/4 inch NPT top threads and nut. **Do not overtighten.**
STEP 3: Power on the TRUE ECHO Plus.
STEP 4: Program the radar settings using RS485 Modbus or the TRUE ECHO app to connect to the radar via your mobile device. For more information about programming the TRUE ECHO Plus Radar using the TRUE ECHO App, check out the TRUE ECHO CR-L User Manual. Find it at: apgsensors.com/product/dual-sensor-plus
STEP 5: Note the atmospheric pressure reading from the pressure sensor (Modbus ID 2) for future reference.

To suspend by cable:
STEP 1: Ensure the weight is installed on the 2” NPT threads.
STEP 2: Set the sensor to the desired height above the fluid to be monitored.
STEP 3: Using an appropriate cable clamp or gland, secure the cable to prevent it from sliding out of position.

> ***NOTE***:
> For information on mounting bracket accessory options, see the datasheet or contact APG.

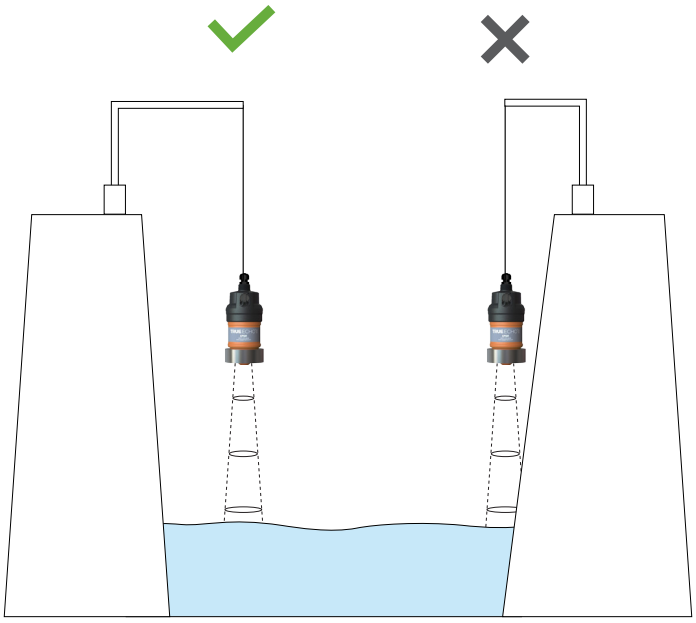
Sensor Placement

Ensure the radar level transmitter is installed **perpendicular** to the liquid surface.
Installing the radar at an angle will weaken the signal amplitude, cause unwanted reflections, and affect the normal range.



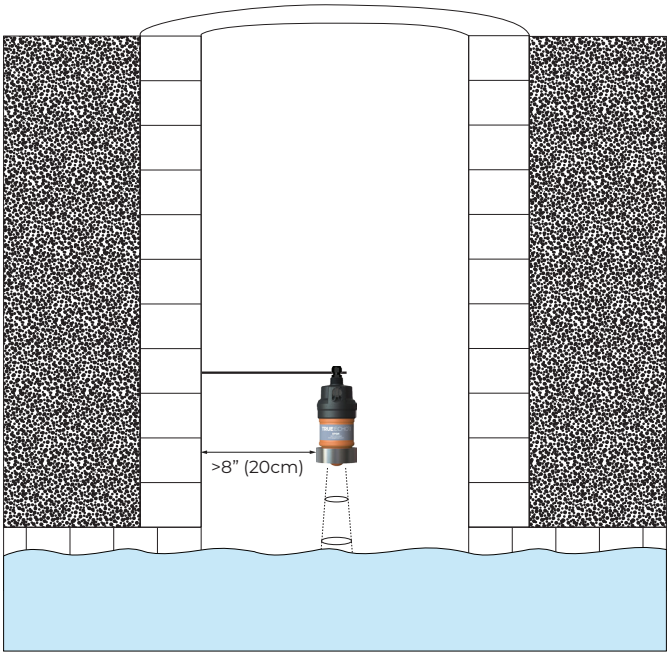
Position radar perpendicular to surface.

Ensure that there are no interferences within the beam angle, such as riverbanks, tank walls, ladders, steps, etc.



Ensure no interference in the beam angle.

Install the radar at least 8 inch (20 cm) away from side walls. When installing in wells or pipes, place the radar as close to the center as possible to avoid interference from the walls.



Install radar away from walls in wells and pipes.

Removal Instructions

Removing your TRUE ECHO Plus from service must be done with care.

STEP 1: Ensure power is turned off.
STEP 2: Disconnect the wires.
STEP 3: Remove the TRUE ECHO Plus from its mount.
STEP 4: Store it in a dry place, at a temperature between -40° to 158°F (-40° to 70°C).

CHAPTER 3: DEFAULT BEHAVIOR

The TRUE ECHO Plus Dual Sensor is pre-configured to provide measurements for the most common application type and will not necessarily need additional configuration before installation and use.

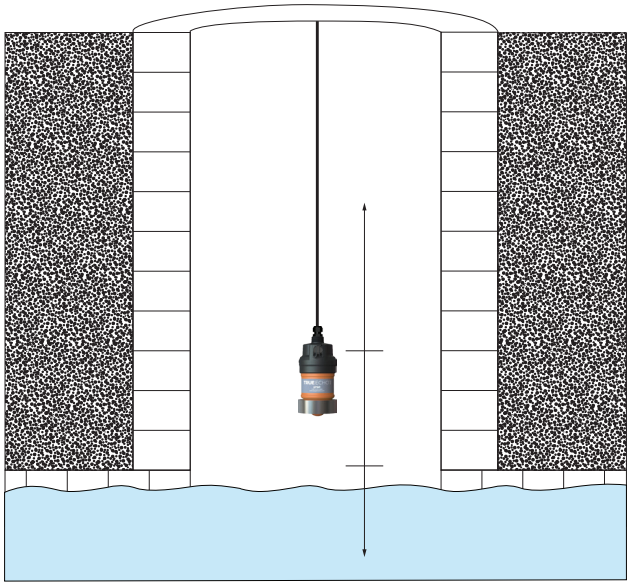
The radar sensor on Modbus ID 1 is configured to report the measured distance or level (in meters) from the sensor face up to its maximum distance of 15 m (49 ft) in register 30038 or 30040 respectively. Due to the nature of the technology, the radar cannot provide accurate measurements in its blind zone of 0.2 m (8 in) from the sensor face. If a target gets closer to the face than the blind zone allows, the sensor will continue to report the last valid reading it obtained until a valid target can be detected.

The pressure sensor on Modbus ID 2 is configured to report its readings (in absolute PSI) in register 30300. Because the sensor is referenced to vacuum, it will always read at least the current barometric pressure. Any pressure above barometric indicates presence of liquid above the sensor.

Condition 1: No overflow

- The radar is reporting a value between the blind zone and maximum distance (0.2 to 15 m).
- The pressure sensor is reporting local barometric pressure.

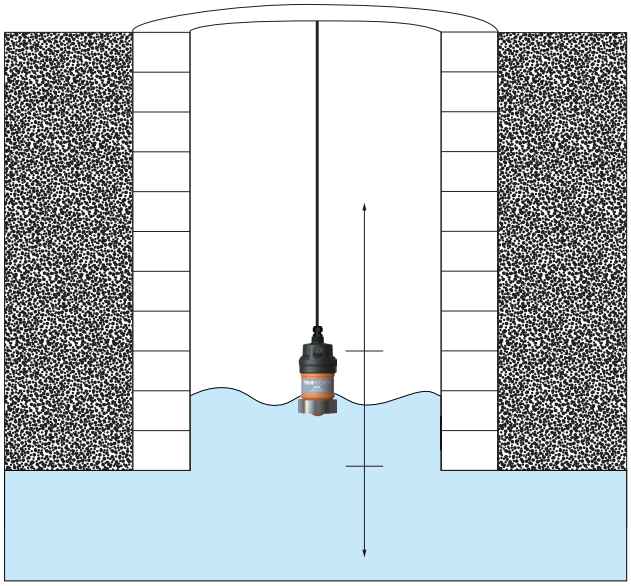
This indicates normal operation, where the pressure sensor is not measuring any liquid and the radar is accurately reporting the liquid height.



Condition 2: Intermediate overflow

- The radar is reporting a value less than or equal to the blind zone distance (≤ 0.2m). This is because the radar continues to report the last valid reading if no new valid target can be found.
- The pressure sensor is reporting local barometric pressure.

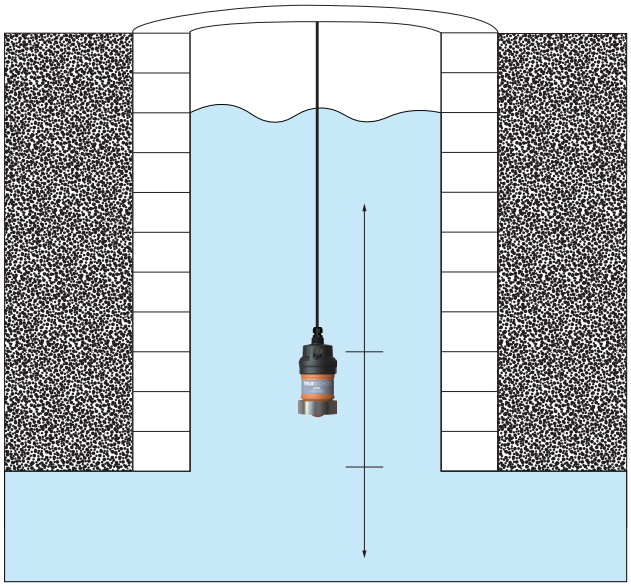
The liquid level is above the measurement range of the radar sensor but has not yet reached the pressure sensor. The true liquid level may lie anywhere between the beginning of the radar blind zone and the pressure sensor itself (≤ 0.34 m of space). Neither sensor can provide accurate measurements in this condition.



Condition 3: Overflow

- The radar is reporting a value less than or equal to the blind zone distance (≤ 0.2 m). This is because the radar continues to report the last valid reading if no new valid target can be found.
- The pressure sensor is reporting greater than local barometric pressure.

The liquid level is above the measurement range of the radar sensor and has submerged the pressure sensor. Only readings from the pressure sensor are accurate.



CHAPTER 4: PROGRAMMING

> ***NOTE***:
> By default, the Radar Sensor is Modbus ID 1. By default, the Pressure Sensor is Modbus ID 2.

Radar Programming

Radar Programming with App

The TRUE ECHO Plus Radar Sensor can be easily set up using the TRUE ECHO Radar App. To change settings and parameters easily with your mobile device, download the free TRUE ECHO Radar App by searching “TRUE ECHO” in the Apple or Google Play Store.

For more information about programming the TRUE ECHO Plus Radar using the TRUE ECHO App, check out the TRUE ECHO User Manual. Find it at: apgsensors.com/product/dual-sensor-plus

> ***NOTE***:
> The Radar Sensor will not read when submerged. Additionally, short-wave radio connection is not available when the radar is submerged.

Radar Programming with Modbus

TRUE ECHO Plus Radar sensors use standard RS-485 Modbus RTU protocol. The sensors can only operate as server devices. Sensor default transmission settings are 9600 Baud, 8 Bits, 1 Stop Bit, No Parity, and require a minimum delay of 100 ms between transactions. The Radar sensor has a default **Modbus ID 1**.

Modbus communication may override short-wave radio communication. Using both simultaneously may result in slower app response times.

Read Input Registers 3x (Function Code 04)

Modbus Register	Data Type	Function
0000	Uint, 16	Distance (cm)
0001	Uint, 16	Distance (mm)
0002	Uint, 16	Level (cm)
0003	Uint, 16	Level (mm)
0036	Float 32, CDAB	Space (selected units)
0038	Float 32, CDAB	Level (selected units)
0040	Float 32, CDAB	Distance (selected units)

Read Holding Registers 4x (Function Code 03)*

Modbus Register	Data Type	Function	Value Range	Default
0062	Hex, 16 bit	Application Type	0000: Solid 2000: Liquid 4000: Demo	2000: Liquid
0063	Hex, 16 bit	Unit Setting	0000: Millimeter 0800: Centimeter 1000: Meter 1800: Inch 2000: Feet	1000: Meter
0064	Float 32, CDAB	Damping Setting	0 to 100 seconds	2 seconds
0066	Float 32, CDAB	Blind Zone Setting	0 to 15 meters	0.2 meters
0068	Float 32, CDAB	Range Setting	0 to 15 meters	15 meters
0070	Float 32, CDAB	High Level Setting	0 to 14.9 meters	0 meters
0072	Float 32, CDAB	Low Level Setting	0 to 15 meters	15 meters
0080	Float 32, CDAB	Distance Offset	15 to -15 meters	0 meters
0096	Float 32, CDAB	Filling/ Emptying Rate	0.001 to 0.1 meter/ second	0.002 meter/ second
0098	Float 32, CDAB	FalseEchoLearn, Start	0 to 15 meters	0 meters
0100	Float 32, CDAB	FalseEchoLearn, End	0 to 15 meters	0 meters
0108 0109 0110 0111	ASCI Hex, Swap Characters	Radar Name	2F to F2 05 to 50 14 to 41 52 to 25	See Radar Label. i.e. F2504125
5121	Hex, 16	Factory Reset	0001	0
5893	Uint, 16	Baud Rate	0 = 1200 1 = 2400 2 = 4800 3 = 9600 4 = 14400 5 = 19200 6 = 38400 7 = 56000 8 = 115200 9 = 256000	3 = 9600
5894	Uint, 16	Address	1-247	1
5895	Hex, 16	Parity	High 8 bits 0 = None 1 = Odd 2 = Even	None
		Stop Bit	Low 8 bits 0 = 1 bit 1 = 1.5 bits 2 = 2 bits	1

*NOTE: Use Write Function Code 16. Write Function Code 6 is not suported.

Pressure Sensor Modbus Programming

The TRUE ECHO Plus Pressure Sensor uses standard Modbus RTU protocol (RS–485). The sensors can only operate as server devices. Sensor default transmission settings are **9600 Baud**, **8 Bits**, **1 Stop Bit**, **No Parity**, and require a minimum delay of 300 ms between transactions to return the contents of all registers. Commands returning fewer registers will require shorter delays. See TRUE ECHO Plus Pressure Sensor Modbus Register Lists. The Pressure Sensor has a default **Modbus ID 2**.

> ***NOTE***:
> For more information about Modbus RTU, please visit www.modbus.org.

TRUE ECHO Plus Pressure Sensor Modbus Register Lists

> The registers listed below are reference addresses. To convert a reference address to an offset address, remove the first digit then subtract one.
> Example 1: Reference address = 30300 → Offset register = 299
> Example 2: Reference address = 40400 → Offset register = 399

Input Registers (0x04)

Register	Returned Data
30299	Model Type
30300	Pressure (PSI)
30301	N/A
30302	N/A
30303–30304	Calculated (raw)
30305–30306	Pressure (PSI) (float)
30307	Firmware Version
30308	N/A
30309	Trip 1 Status
30310	Trip 2 Status
30311	N/A

> ***NOTE***:
> The Calculated Readings will be returned without a decimal place. In order to obtain the true result, the Decimal Place setting must be taken into account.

Holding Registers (0x03) – TRUE ECHO Plus Pressure Sensor

Register	Function	Value Range
40400	Device Address	1 to 247*
40401	Units	0 to 16
40402	Application Type	0 or 8
40403	N/A	N/A
40404	Decimal (Calculated)	0 to 3
40405-40406	N/A	N/A
40407	Zero Offset	-15,000 to 30,000 PSI
40408	Pressure Decimal	0 to 3
40409-40410	N/A	N/A
40411	Parameter Default	0 = No; 1 = Restore Defaults
40412	Averaging	0 to 10
40413-40414	N/A	N/A
40415	Sample Rate	10 to 1000 milliseconds
40416-40418	N/A	N/A
40419	Baud Rate	0 to 5 (2400, 9600, 19200, 38400, 57600, 115200)
40420	Parity	0 to 2 (none, even, odd)
40421	Stop Bit	0 or 1 (0 = 1 stop bit; 1 = 2 stop bits)
40422–40429	N/A	N/A
40430	Trip 1 Pressure	-15,000 to 30,000 PSI
40431	Trip 1 Window	0 to 30,000 PSI
40432	Trip 1 Type	0 to 29
40433	Trip 2 Pressure	-15,000 to 30,000 PSI
40434	Trip 2 Window	0 to 30,000 PSI
40435	Trip 2 Type	0 to 29
40436–40437	Multiplier	0.0001 to 99.9999 (float)
40438–40439	Description	A to Z, 0 to 9, /.-,+* (16 char)
40446	Temperature Offset	-20 to 20
40447–40454	N/A	N/A

* Pressure sensor default Device Address is 2.

40401 – Units

Determines the units of measure for the calculated reading.

0 = PSI	5 = mmH2O†	10 = mmHG‡	14 = inSW
1 = BAR	6 = cmH2O†	11 = cmHG‡	15 = ftSW
2 = mBAR	7 = mH2O†	12 = inHG‡	16 = mSW
3 = kPa	8 = inH2O†	13 = kg/cm^2	
4 = MPa	9 = ftH2O†		

† All H2O pressure measurements @ 20° C.
‡ All HG pressure measurements @ 0° C.

40402 – Application Type

Determines the units of measure for the calculated reading.
0 = Standard (units selected in 40401 are displayed)
8 = Custom (units selected in 40401 and multiplier in 40436-40437 are used to compute desired units; description in 40438-40439 is label for measurement)

CHAPTER 5: MAINTENANCE

General Care

Your TRUE ECHO Plus is very low maintenance and will need little care as long as it is installed correctly. However, in general, you should:

- Avoid applications for which the sensor was not designed, such as extreme temperatures, contact with incompatible corrosive chemicals, or other damaging environments.
- Inspect the threads whenever you remove the sensor from duty or change its location.
- Clean the diaphragm with extreme care. If using a tool is required, make sure it does not touch the diaphragm.
- It is recommended to inspect and clean the sensor after a flood to remove debris and check for damage.

IMPORTANT:
Any contact with the pressure sensor diaphragm can permanently damage the sensor. Use extreme caution.

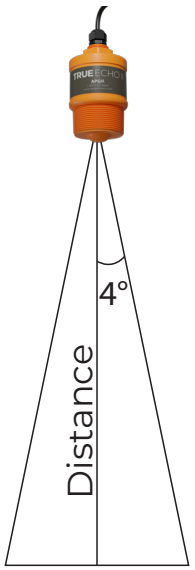
APPENDIX: BEAM ANGLE REFERENCE TABLE

The TRUE ECHO Plus Dual Radar Sensor has a 4° half angle beam. The diameter of the measuring spot can be calculated using:

Distance * tan(4) * 2

Distance (ft)	Diameter of measuring spot (ft)
1	0.140
2	0.280
4	0.559
6	0.839
8	1.119
10	1.399
12	1.678
14	1.958
16	2.238
18	2.517
20	2.797
22	3.077
24	3.356
26	3.636
28	3.916
30	4.196
32	4.475
34	4.755
36	5.035
38	5.314
40	5.594
42	5.874
44	6.154
46	6.433
48	6.713
49.213	6.883

Distance (m)	Diameter of measuring spot (m)
1	0.140
2	0.280
3	0.420
4	0.559
5	0.699
6	0.839
7	0.979
8	1.119
9	1.259
10	1.399
11	1.538
12	1.678
13	1.818
14	1.958
15	2.098



Diameter of measuring spot

Automation Products Group, Inc.
Tel: 1 (888) 525-7300 or 1 (435) 753-7300

e-mail: sales@apgsensors.com
www.apgsensors.com

Automation Products Group, Inc.
1025 W. 1700 N.
Logan, UT 84321