2004 ALADDIN TANK INTERFACE MODULE INSTALLATION

(For use with Aladdin controller models 440, 431, 413 and all 200 series)

The Tank Interface Module (TIM) interfaces three holding tank pressure sensors and an LP resistive sensor to the Aladdin system. In addition, the TIM may also perform automatic fresh water tank filling. The pressure sensors are used on the Fresh, Gray and Black tanks. When properly installed, the sensors provide a very accurate means of measuring fluid levels.

Pressure Sensor Installation

The pressure sensor shown in **Fig. 1** has a 3/4" male pipe thread on one end and a modular phone jack on the other. The sensor is both temperature and barometric pressure compensated.

Sensor P/N 16618613 has been replaced by P/N 16621189.

The sensor can measure a water column of 0 - 915mm (36"). During installation, make sure the distance between the center of the sensor and the full point of the tank does not exceed 36".

The sensor should be installed hand tight only. Use Teflon tape as a thread sealant.

The holding tank must have an unobstructed atmospheric vent in order for the pressure sensor to operate properly. A vent with a 1/2" diameter or larger is sufficient.

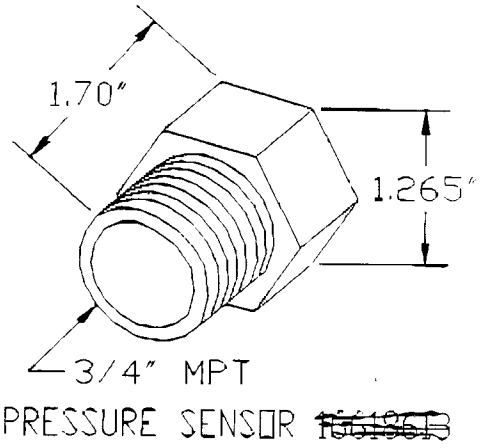

Fig. 1 16622728

Fig. 2 shows the most common method of sensor installation. The sensor performs best when mounted horizontal. On some occasions the sensor may be mounted vertical when screwed into the bottom of a fresh water tank only.

Do not install the sensor in a vertical position with the sensor port facing up on any black or gray water holding tanks. Sludge can build up on the sensor port and may affect the accuracy of the system.

Always mount the sensor on the lowest end of the tank. This is usually adjacent to the water outlet pipe.

In some installations, the sensor may also be mounted to the outlet pipe itself. Proper calibration is required with this type of installation to compensate for the water column height between the sensor port and the actual bottom of the tank.

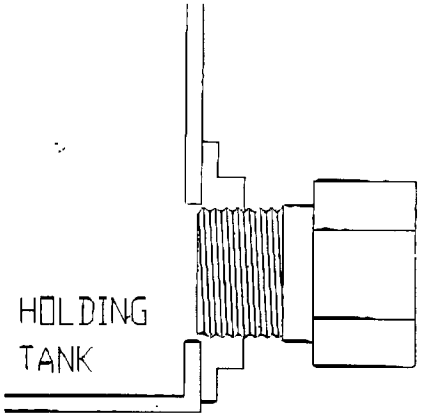

Fig. 2

LP Tank Sensor

The LP tank sensor is a 0-90 ohm sensor. Zero ohms correspond to an empty tank and 90 ohms corresponds to a full tank. An LP tank is considered full when the gauge reads 80% fluid volume. The remaining 20% volume is used for gas expansion with temperature change. When manufacturers specify the volume of an LP tank, they use the whole tank volume in gallons and not just the useable 80%.

The tank sensor is magnetically coupled to a float assembly within the tank. The sensor may have short wire leads or two quick disconnects, either may be used with the Aladdin system. Do not ground either of the two sensor leads to the chassis, as it will adversely effect the measurement of the tank.

Optional Fresh Tank Fill Valve/Solenoid

The Optional Fresh tank fill valve may be installed and controlled by the Aladdin TIM. **Fig. 3** shows a typical valve used for this purpose but any type 12 VDC valve may be used as long as it draws 5 Amps or less.

The valve control circuitry is all contained within the TIM and requires no special programming to use. The Aladdin system must be on in order for the auto fill system to function.

The TIM, upon receiving the 12V auto fill power, will turn on the fill valve if the Fresh tank is below 100%. The valve will remain on until the tank reaches 100% full. If the system is left in Auto mode, the fill valve will remain off until the fluid level drops to 80% at which time it will again fill the tank to 100%. This prevents unnecessary cycling of the fill valve.

To top off the tank if the system has been left in auto mode, the user simply turns the auto fill switch off and then back to auto. The TIM will then immediately fill the tank back to 100%. Turning OFF the Aladdin system and then back ON again will accomplish the same thing.

If auto mode is selected the TIM will monitor the water level as the tank fills. If the tank level does not increase in one minute, the TIM will cancel the tank fill and turn off the fill valve. This prevents operating the valve when no water pressure is supplied to the fill system. After correcting the problem, the user may switch the fill system off and back to auto to once again resume auto fill.

A backlit switch may be used to indicate when the valve is active by simply wiring the light in parallel to the valve power wires.

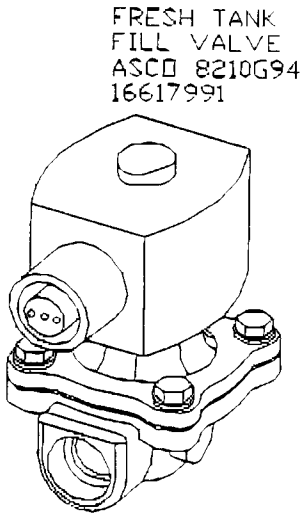

Fig. 3

TIM Installation and Wiring

The connections to and from the TIM are done with modular phone connectors and Molex Mini-fit connectors. The module and connectors are not waterproof and must be housed inside a protective compartment that is free of moisture and debris.

See **Fig. 4** for a wiring diagram of the module and external sensors.

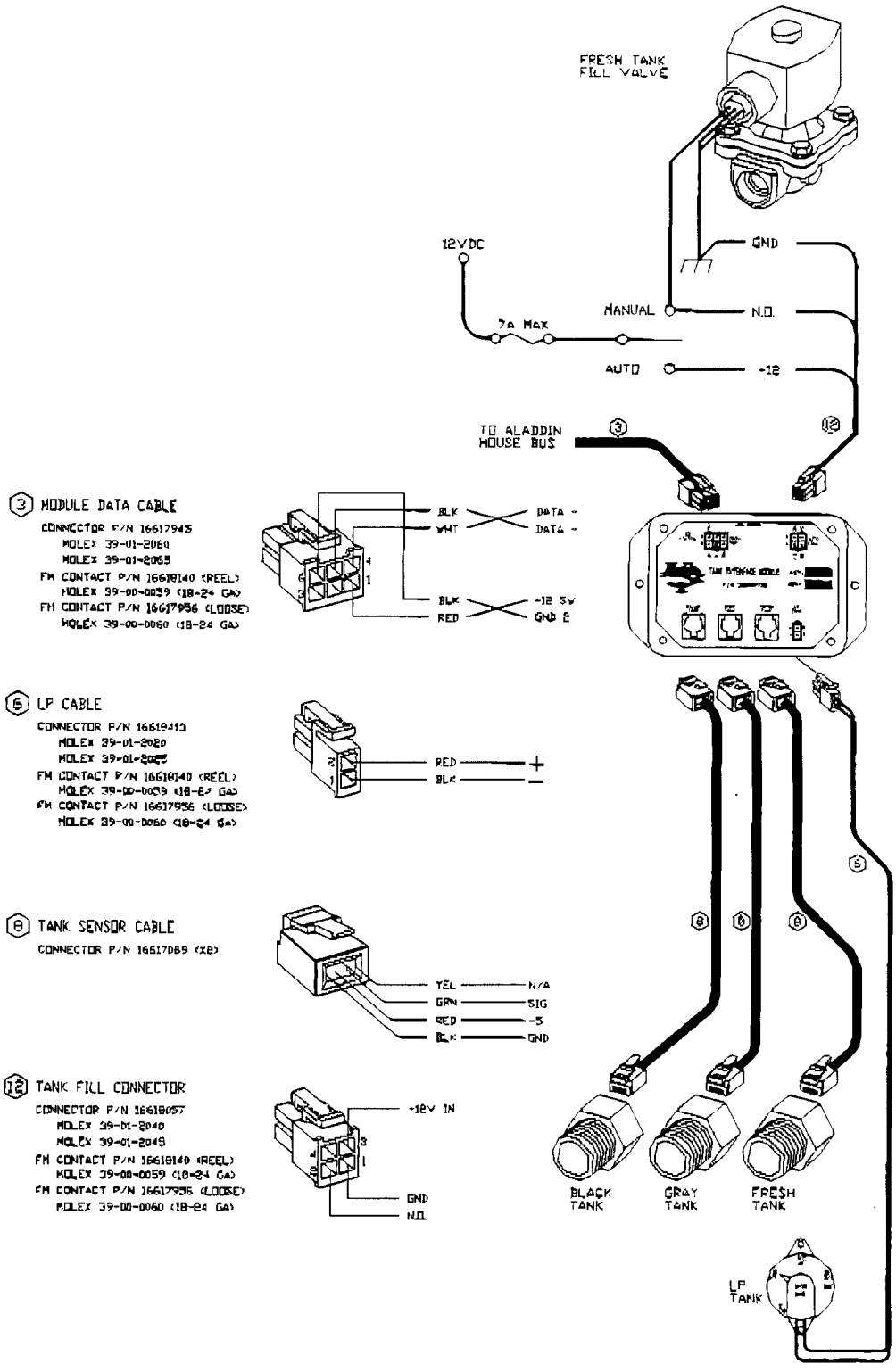

Fig. 4

Calibration Procedures

The Aladdin system tank levels are very accurate when the installation and calibration is done properly. All calibration information for tank levels is stored in non-volatile memory within the TIM itself. Even when power is removed for extended periods of time, the calibration information will stay intact.

The calibrations for the 2004 Aladdin system have now been protected by a maintenance code. This code must be entered in order to get to the actual calibration screens. This protects the calibration settings from unauthorized tampering. Only qualified maintenance personnel should perform system calibrations.

Auto Fill Calibration

The Fresh Water Auto Fill requires no calibration or set up. If the system is not to be used, simply do not install the auto fill connection to the TIM. Auto fill is programmed to keep the water level between 80% and 100% when activated.

LP Tank Calibration

LP tank calibration is done during production of the Tank Interface Module. There are no field calibrations required. The only setting required is the tank capacity. Any observed errors in the LP tank readings are most likely related to the tank sender or the wiring. Good solid connections are the best way to guarantee great results. Use waterproof connections when connecting the LP sensor wires to the LP tank sender. This will prevent corrosion from affecting the LP tank readings.

Holding Tank Calibration

There are two calibrations required for each holding tank. One is known as the EMPTY calibration and the other is the FULL calibration. In 2004 the way in which the calibration information is entered into the system has changed allowing greater flexibility. The person performing the calibration can enter the exact calibration numbers they desire. They also have the option of filling the tanks with water to perform the full calibrations or a "Dry" calibration may be performed without the need for any water. The method used depends on the installation.

The empty calibration is used to tell the system where the empty position of the tank is located. This number usually corresponds to the output of the pressure sensor when no water is present. Even though water may not be present, the pressure sensor still outputs a small voltage potential that the TIM digitizes and displays. Since no two pressure sensors are identical, the Empty calibration must be performed on each tank sensor.

Full Calibration tells the system where the full position of each tank is located. This calibration can be done in two different ways. The Wet Full Calibration requires filling the tank to the normally full position and entering in the calibration number. The Dry Full Calibration does not require the tank to be filled; however the Empty Calibration must be performed first. Calculations are then performed to generate the proper Full calibration value to be entered into the system.

During both the Empty and Full calibration procedures, the numbers entered represent 1 bit each. Each bit is equal to 1mm of fluid level change.

Empty Calibration

1) Drain tank to its normally empty position (See **fig. 5**). If sensor is mounted on a drainpipe or other plumbing, make sure the pipe is filled with water so the tank is at the normally empty position (See **fig. 6**).

2) Using the Aladdin Joystick, navigate to the SYSTEM OPTIONS screen and then to the SYSTEM SETUP screen.

3) When prompted, enter the maintenance code **1218**

4) Select Tank Calibration

5) Select the tank you would like to calibrate EMPTY.

6) Enter the Empty Calibration value, which should be equal to the RAW value displayed at the bottom of the screen. Exit the screen by moving the joystick left or right.

7) The system should be back on the Tank calibration screen and the value you just entered should appear next to the tank you calibrated empty.

Repeat this process for all tanks that require EMPTY calibration.

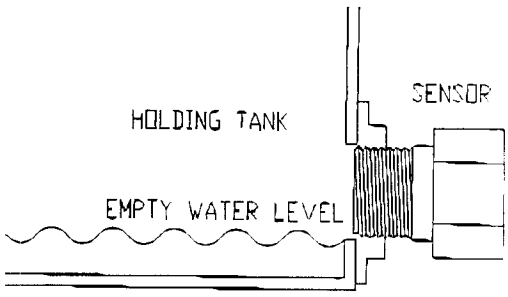

Fig. 5

Wet Full Calibration (Requires Filling Tank)

This method requires filling the tank to perform FULL calibration.

1) Fill the tank to the normally full position. This is usually 3/4" down from the top of the tank (See **fig. 7**).

2) Using the Aladdin Joystick, navigate to the SYSTEM OPTIONS screen and then to the SYSTEM SETUP screen.

3) When prompted, enter the maintenance code **1218**

4) Select Tank Calibration

5) Select the tank you would like to calibrate FULL.

6) Enter the Full Calibration value, which should be equal to the RAW value displayed at the bottom of the screen. Exit the screen by moving the joystick left or right.

7) The system should be back on the Tank calibration screen and the value you just entered should appear next to the tank you calibrated Full.

Repeat this process for all tanks that require FULL calibration.

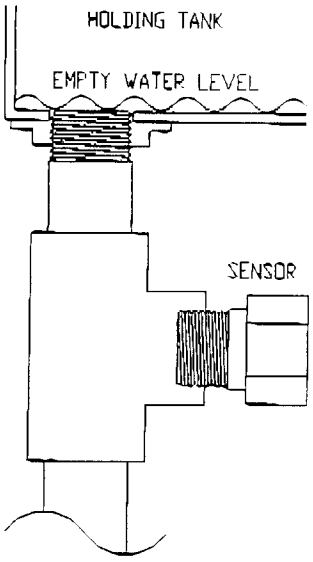

Fig. 6

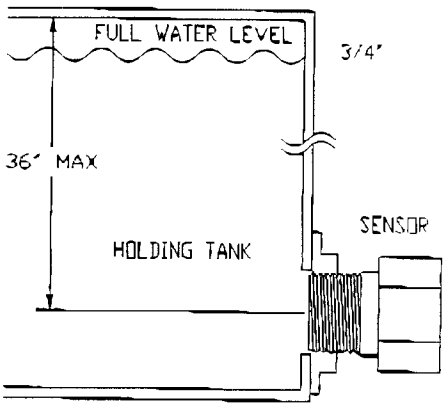

Fig. 7

Dry Full Calibration (Tank at any level)

This method does not require filling the tank to perform FULL calibration. An Empty calibration must be performed prior to this method being used.

1) Measure the tank height from the center of the sensor to the top of the tank (See **fig. 8**). If the sensor is mounted on a drainpipe or other plumbing, measure the height of the tank per **fig.9**. The tank height measured must be 36" (914mm) or less.

2) Convert this measurement to millimeters (mm)

mm = inches X 25.4

1/8" = 0.125" = 3mm
1/4" = 0.250" = 6mm
3/8" = 0.375" = 10mm
1/2" = 0.500" = 13mm
5/8" = 0.625" = 16mm
3/4" = 0.750" = 19mm
7/8" = 0.875" = 22mm

3) Subtract 19mm from the tank height measurement (This gives us the 3/4" air gap above the full water level). The resultant number is the **Full Cal Factor** used in the following steps.

4) Using the Aladdin Joystick, navigate to the SYSTEM OPTIONS screen and then to the SYSTEM SETUP screen.

5) When Prompted, enter the maintenance code **1218**

6) Select Tank Calibration

7) Select the tank you would like to calibrate FULL.

8) Enter the Full Calibration value. The value entered for the selected tank is:

Full Cal Value = Full Cal Factor + Empty Cal Value

Exit the screen by moving the joystick left or right.

9) The system should be back on the Tank calibration screen and the value you just entered should appear next to the tank you calibrated Full.

Repeat this process for all tanks that require FULL calibration using this method.

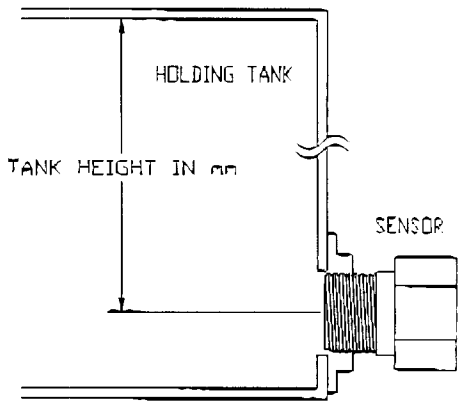

Fig. 8

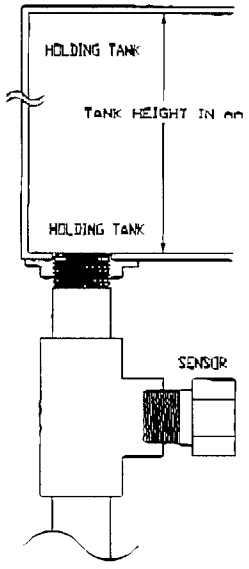

Fig. 9

Example Calculations:

Tank Height = 20.625" = 524mm

Full Cal Factor = 524mm - 19mm = 505

Empty Cal Value = 45

Full Cal Value = 505 + 45 = 550

Setting Tank Capacities

Proper setting of the tank capacities allows the system to accurately calculate the fluid volume in gallons. Setting of the tank capacities will in no way effect the tank calibrations performed earlier. The gallons for the Fresh, Gray, Black and LP tanks are stored inside the Tank Interface module. The values are stored in non-volatile memory and will remain even during long power outages.

1) Using the Aladdin Joystick, navigate to the SYSTEM OPTIONS screen and then to the SYSTEM SETUP screen.

2) When prompted, enter the maintenance code **1218**

3) Select Set Tank Capacities

4) Select the tank you would like to set the capacity on.

Note: Fuel tank capacity is also on this screen. The gallons value entered here is stored in the Aladdin controller and not in the Tank Interface Module.

5) Enter the Tank Capacity value. Exit screen by moving joystick left or right.

Note: The LP tank capacity is the total volume of the tank in gallons. Do not subtract the upper 20% used for expansion.

6) The system should be back on the Tank Capacity screen and the value you just entered should appear next to the tank you set.

Repeat this process for all tanks that require capacity changes.

Electrical Specifications

Module Dimensions L5.5" x W3.3" x H1.37"	Min	Nom	Max	Units
Supply Voltage	7	12	20	VDC
Supply Current (all sensors attached)	-	30	-	mA
Operational temperature	0 (32)	25 (77)	70 (158)	Deg C (F)
Holding Tank Resolution	-	1mm H2O	-	Per Bit
LP Tank Resolution	-	0.2%	-	Per Bit
LP Tank Accuracy (Sender accuracy +/-5%)	+/- 7%	+/-5%	-	Full Scale
LP Sensor loop Current	-	19	44	mA
Pressure sensor current limiting (+5V)	-	140	-	mA
Auto Fill Supply Voltage	9	12	15	VDC
Auto Fill Max Load Current	-	-	5	Amps DC

Troubleshooting

The TIM is powered by switched +12 from the controller and is only powered up when the Aladdin system is on and running.

• **Problem 1** - No holding tank data is displayed or is xxxx and all other modules are working.
• **Solution** - Check to see if the module has power. Look on the side of the TIM, the status LED should be blinking rapidly indicating power and data is present. If the Status LED is on solid, then power is present but data communication is missing or wired backwards. Check data bus to TIM. Swap the data cable with an adjacent working module if you suspect a bad data cable. If all attempts to get the module communicating fail, return the TIM module for repair.

• **Problem 2** - Gallons and Percentages are way off on one or more tanks.
• **Solution** - Check for proper installation and calibration any time this problem is suspected. Also check if the problem is thermal drift of the tank sensor. If drift is unacceptable, change pressure sensor using new sensor P/N 16621189.

The most common installation errors are:

1) The cables used on the pressure sensors are flat telephone cord. The color code is: Red is +5; Black is ground; and Green is the signal wire. Keep this wire away from noisy high current cables (like modified sine inverter battery cables and high current AC runs.) Make sure the flat phone cord is not damaged during installation.

2) All tanks must have an atmospheric vent, which cannot trap any water or debris. The air pressure in the tank must be exactly the same as the atmospheric pressure on the outside of the tank; otherwise the system will read in error. Ensure that any anti-siphon plumbing or vents cannot trap water or in any way affect the internal pressure of the tank.

The most common calibration errors are:

1) Tank calibrated empty fine, but full calibration was done improperly. Keep it simple, calibrate empty only when the tank is in its normal empty position. Calibrate full only when the tank is in the normally full position. Always follow the written calibration procedures for doing empty and full calibration.

2) Tank capacities set incorrectly. By default, the capacities are set to 75 gallons each for the gray/black tanks and 100 gallons for the fresh. Make sure the gallons set in the Aladdin system match the tank capacities of the coach. Always follow the written calibration procedures for setting tank capacities.

• **Problem 3** - LP tank level always indicates, "FAIL" or reads higher than normal.
• **Solution** - Check for an open circuit between the module LP connector and the tank sensor. Disconnect the 2-pin connector from the TIM and ohm between the two wires. The resistance should be between 0 and 90 ohms. If not check the wiring and the tank sensor. Also ohm between the sensor wires and a good chassis ground, there should be no continuity (Open).

• **Problem 4** - Auto Fill overfills or under fills the fresh tank
• **Solution** - Full calibration on the Fresh Tank is incorrect, correct the calibration errors.

• **Problem 5** - Auto Fill does not work; manual mode may work.
• **Solution** - Set Auto Fill switch from AUTO to OFF and Back to AUTO. The Aladdin Tank display should indicate, "AF" next to Fresh Tank status line. See the following for the "AF" display definitions.

AF is not displayed - Auto Fill is disengaged (OFF). If incorrect, check wiring and switch(s).
AF is solid green - Auto Fill is engaged, tank level is between 80% and 100%, Fill valve is de-energized.
AF is blinking green - Auto Fill has energized the tank fill valve and is attempting to fill the tank.
AF is solid red - AN error has occurred while attempting to fill the tank, check water supply, wiring and Fill Valve.

Aladdin Tank Capacities

Model Year	Make	Model	Fresh Capacity (Gallons)	Gray Capacity (Gallons)	Black Capacity (Gallons)	Tot. LP Tank Capacity (Gallons)	Usable Diesel Capacity (Gallons)
2003	Beaver	Contessa	100	50	50		
2003	Beaver	Marquis	100	75	75		
2003	Beaver	Monterey	100	50	50		
2003	Beaver	Patriot	100	58	58		
2003	Monaco	Signature	100	56	40		
2003	Safari	Panther	100	56	56		
2004	Beaver	Marquis	100	58	58		
2004	Beaver	Monterey	100	58	58		
2004	Beaver	Patriot	100	58	58		
2004	HR	Imperial	95	60	40	55	127
2004	HR	Navigator	100	56	40		
2004	HR	Scepter	100	60	39	38	100
2004	Monaco	Camelot	100	60	39	38	100
2004	Monaco	Dynasty	100	56	56		
2004	Monaco	Executive	100	56	40		
2004	Monaco	Signature	100	56	40	32	150
2004	Monaco	Windsor	95	60	40	55	127
2004	Safari	Panther	100	56	56	38	130
2005	Beaver	Marquis	100	58	58	35	148
2005	Beaver	Patriot	100	58	58	35	148
2005	Beaver	Monterey	100	58	58	40	99/109
2005	HR	Imperial	100	62	40	55	130
2005	HR	Navigator	100	56	40	38	150
2005	HR	Scepter	100	62	40	55	130
2005	Monaco	Camelot	100	62	40	55	130
2005	Monaco	Dynasty	100	56	56	38	150
2005	Monaco	Executive	100	56	40	38	150
2005	Monaco	Signature	100	56	40	32	150
2005	Monaco	Windsor	100	62	40	55	130
2005	Safari	Gazelle	100	62	40	55	130
2005	Safari	Panther	100	56	56	38	130
2006	Beaver	Marquis	100	56	56	29	150
2006	Beaver	Patriot	100	56	56	29	150
2006	Beaver	Monterey	100	58	58	35	109
2006	HR	Imperial	100	62?	40?	55?	130?
2006	HR	Navigator	100	56	56	38	150
2006	Monaco	Dynasty	100	56	56	38	150
2006	Monaco	Executive	100	56	56	38	150
2006	Monaco	Signature	100	56	56?	25?	150
2006	Safari	Panther	100	56	56	38?	130?

ALADDIN HOLDING TANK MEASUREMENTS

Model Year	Make	Model	Aladdin Controller Model	Fresh Sensor Height (Inches)	Gray Sensor Height (Inches)	Black Sensor Height (Inches)	Fresh Sensor Height (8ths)	Gray Sensor Height (8ths)	Black Sensor Height (8ths)	Fresh Sensor Height (mm)	Gray Sensor Height (mm)	Black Sensor Height (mm)
2003	Beaver	Contessa	100-AC	9.500	12.000	12.000	76	96	96			
2003	Beaver	Marquis	100	8.750	14.000	14.000	70	112	112			
2003	Beaver	Monterey	100-AC	9.500	12.000	12.000	76	96	96			
2003	Beaver	Patriot	100	8.750	13.000	13.000	70	104	104			
2003	Monaco	Signature	100-BC	12.000	12.000	12.000	96	96	96			
2003	Safari	Panther	100	12.000	12.000	12.000	96	96	96			
2004	Beaver	Marquis	431	8.750	13.000	13.000				222	330	330
2004	Beaver	Monterey	211	9.500	13.000	13.000				241	330	330
2004	Beaver	Patriot	413P	8.750	13.000	13.000				222	330	330
2004	HR	Imperial	100 or 413G	18.875	11.500	11.500	151	92	92	479	292	292
2004	HR	Navigator	100 or 400	12.000	12.500	12.500	96	100	100			
2004	HR	Scepter	100 or 413G	8.750	8.500	8.750	70	68	70	222	216	222
2004	HR	Scepter	w/400HP Diesel	16.500	8.500	8.750	132	68	70	419	216	222
2004	Monaco	Camelot	100 or 413G	8.750	8.500	8.750	70	68	70	222	216	222
2004	Monaco	Camelot	w/400HP Diesel	16.500	8.500	8.750	132	68	70	419	216	222
2004	Monaco	Dynasty	100	12.000	12.500	12.500	96	100	100			
2004	Monaco	Executive	100 or 400	12.000	12.500	12.500	96	100	100			
2004	Monaco	Signature	440	12.000	12.000	12.000				305	305	305
2004	Monaco	Windsor	100 or 413G	18.875	11.500	11.500	151	92	92	479	292	292
2004	Safari	Panther	100 or 413G	12.000	12.500	12.500	96	100	100	305	318	318
2005	Beaver	Marquis	431-05	26.125	13.000	13.000				664	330	330
2005	Beaver	Patriot	413-05/431-05	26.125	13.000	13.000				664	330	330
2005	Beaver	Monterey	413-05	18.500	13.000	13.000				470	330	330
2005	HR	Imperial	413-05/440-05	18.875	11.500	11.500				479	292	292
2005	HR	Navigator	413G/440	12.000	12.500	12.500				305	318	318
2005	HR	Scepter	413-05/440-05	18.875	11.500	11.500				479	292	292
2005	Monaco	Camelot	413-05/440-05	18.875	11.500	11.500				479	292	292
2005	Monaco	Dynasty	413G/440	12.000	12.500	12.500				305	318	318
2005	Monaco	Executive	413G/440	12.000	12.500	12.500				305	318	318
2005	Monaco	Signature	440-05	12.000	12.500	12.500				305	318	318
2005	Monaco	Windsor	413-05/440-05	18.875	11.500	11.500				479	292	292
2005	Safari	Gazelle	413-05	18.875	11.500	11.500				479	292	292
2005	Safari	Panther	413G/440	12.000	12.500	12.500				305	318	318
2006	Beaver	Marquis	431-06	9.750	11.250	11.250				248	286	286
2006	Beaver	Patriot	413-06/431-06	9.750	11.250	11.250				248	286	286
2006	Beaver	Monterey	413-06	18.500	13.000	13.000				470	330	330
2006	HR	Imperial	413-06C/440-06C	18.875	11.500	11.500	Measurements not Verified			479	292	292
2006	HR	Navigator	413-06C/440-06C	12.000	12.500	12.500				305	318	318
2006	Monaco	Dynasty	413-06C/440-06C	12.000	12.500	12.500				305	318	318
2006	Monaco	Executive	413-06C/440-06C	12.000	12.500	12.500				305	318	318
2006	Monaco	Signature	440-06C	12.000	12.500	12.500	Measurements not Verified			305	318	318
2006	Safari	Panther	413-06C/440-06C	12.000	12.500	12.500				305	318	318

The above measurements are from the center of the sensor to the top of the tank.
Remember to subtract 3/4" from the above measurements when performing the FULL calibration.
I.E. 3/4" = 6/8ths = 19mm
Use 8ths when performing calibration on a coach with a model 400 or model 100 Aladdin controller.
Use mm when performing calibration on a coach with a model 440, 431, 413 or model 211 Aladdin controller.