

# Cryogenic Liquid Level Instruments

## A Versatile Level Measurement System



### A Variety of Liquids

- Nitrogen
- Oxygen
- Hydrogen
- Carbon Dioxide
- Argon
- Kerosene
- Diesel
- LNG
- Water
- etc.

### Challenging Conditions

- Pressures to 4,000 psi
- Temperatures of -300°F to 500°F
- High Vibration Applications

### Remote Monitoring or Control

The Model 185 or 186 can be provided with an optional 0-10 volt DC signal on the rear panel of the instrument for use with a recorder. A 4-20 mA current loop option is available in lieu of the voltage signal. Computer interface options, including RS-232/RS-422 Serial Port/Data Logger or IEEE-488, are also available. LabVIEW® compatible drivers are included with these options but are not required to use them.

### Modem Compatible

Remote Check software is an easy to use interface compatible with Windows 98, or NT 4.0. Users can check the liquid levels in their system by connecting the instrument to an external modem or PC serial port. Remote Check also provides the ability to change the alarm and control band set points, fail safe time out setting, and display units.

Modem connections require a modem on both the host computer and the remote instrument equipped with the RS-232 option. Use of the Serial port with RS-232 does not require a phone line and gives users an effective remote monitoring range of 50 feet. By choosing the RS-422 option on an AMI instrument or using converters, effective range is approximately 4,000 feet.

Instruments in multiple locations can easily be monitored with a single host computer by simply selecting them from the user defined pull down menu.

### Capacitance-based level sensing

The system consists of a Liquid Level Instrument, sensor, oscillator/transmitter unit, and connecting cables. The instrument sensing element is a 3/8 inch (9.5 mm) OD cylindrical capacitor constructed of stainless steel which allows a cryogenic fluid to become the dielectric between the concentric plates. The instrument measures the sensor capacitance which is directly related to the percentage of the sensor immersed in the cryogenic fluid. The sensors are normally constructed in overall lengths of up to 50 feet (15.2 m). The sensor maximum active length is typically 7 inches less than the overall length.

### Simple calibration

The instrument allows the user to quickly and easily calibrate for various liquids with differing dielectrics. Once the instrument is calibrated using a common cryogenic liquid such as nitrogen, the dielectric constant ratio of other application liquids can be entered into the instrument. Also, the instrument has the capability to transform partial length sensor calibration into full length sensor calibration. This is extremely useful for long sensor applications where standard calibration procedures are impractical.

### Convenient display

The instrument is equipped with a 4-digit LED display which provides liquid level indication in inches, centimeters, or percent as selected by a front panel switch. A front panel switch allows the user to adjust the instrument's length setting quickly and easily for a specific active sensor length. The sensor active length can be entered in either inches or centimeters.



Rear view of Model 186 with IEEE-488 option installed.



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### Model 185 Liquid Level Instrument



Features Include:

- Capacitance-based level sensing
- Simple calibration
- Convenient display
- +High and low alarm functions

In addition to the basic features, the Model 185 adds independent "High" and "Low" alarm setpoints which activate front panel LED warning indicators and rear panel relay contacts in the event of an overflow or liquid loss condition. The "Low" level alarm also energizes an audible warning which can be silenced from the front panel. Alarm setpoints are front panel or remotely programmable from 0 to 100 percent of the active sensing length.

### Model 186 Liquid Level Controller



Features Include:

- Capacitance-based level sensing
- Simple calibration
- Convenient display
- High and low alarm functions
- +Automated fill functions

In addition to the features of the Model 185, the Model 186 provides fill control functions which are front panel or remotely programmable from 0 to 100 percent of the active sensing length.

Two independent control band setpoints, "A" and "B", activate a power receptacle on the rear panel. When the liquid level drops below the "B" setpoint, the power receptacle is energized and remains energized until the liquid level rises to the "A" setpoint. The Model 186 also provides a fail-safe timer feature that automatically de-energizes the power receptacle once a user-programmed maximum time interval of up to 600 minutes is reached. The Model 186 is ideal for unattended systems where automated fill is required.

### Liquid Level Sensors



The capacitance-based liquid level sensor, used in conjunction with the Model 185 and 186, is manufactured of stainless steel tubing. Upon request, special assembly techniques can be applied for sensors required for liquid oxygen or hydrogen measurement \_ including minimization of oils during construction and no use of epoxies. Sensors can be supplied in single-section over-all lengths of up to 19-1/2 feet. Multi-section lengths in excess of 19-1/2 feet are available upon request.

Three standard sensor mounting configurations are available. The typical configuration includes a hermetically sealed BNC connector with an adjustable 3/8" male NPT nylon feed-through. For higher pressure or vacuum applications, a welded stainless steel 3/8" male NPT fitting or conflat flange fitting is available. Twelve feet of connecting coaxial cable and in-line oscillator/transmitter are included with the sensor. With additional cable the sensor can be remotely mounted over 500 feet from the instrument without effecting performance.

Sensor options include:

1. Rugged service construction 1/2" or 3/4" OD
2. Radius bends up to 90°
3. Capacitance or RTD point sensing elements

Custom sensors are available from AMI to meet your individual application requirements.

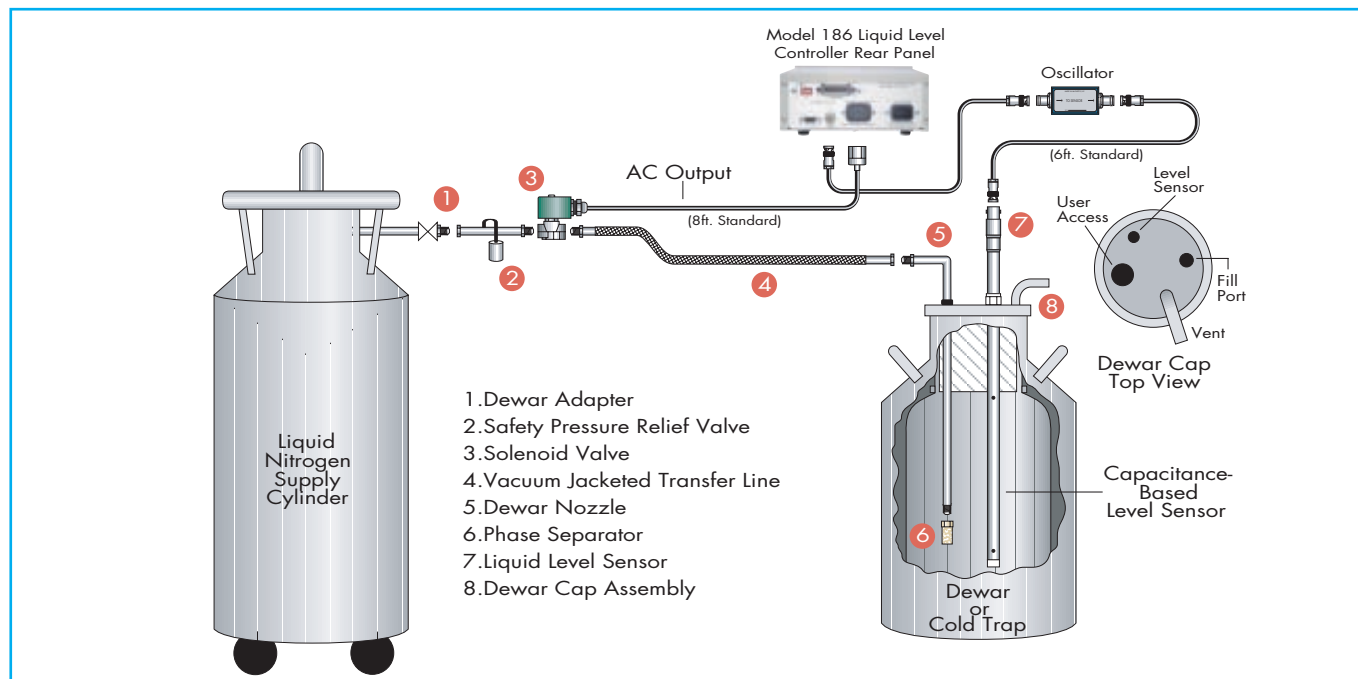


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### Auto Fill System Solutions



Specifications Liquid Level Instruments	Model 185	Model 186
Input Power	115/230 or 100/200 VAC ±10%, 50-60 Hz	115/230 or 100/200 VAC ±10%, 50-60 Hz
Accuracy	0.1%	0.1%
Linearity	0.1%	0.1%
Hi & Low Alarm Contact Ratings	10 VA @ 0.5 A max current (normally open)	10 VA @ 0.5 A max current (normally open)
Controller Relay Contact Rating	N/A	250 VA @ 2A max current
Dimensions	3.8" H x 8.4" W x 11.1" D, Standard 3.5" H x 19" W x 11.1" D, Rack Mount	3.8" H x 8.4" W x 11.1" D, Standard 3.5" H x 19" W x 11.1" D, Rack Mount
Weight	3.6 lbs. Standard; 4.3 lbs. Rack Mount	3.6 lbs. Standard; 4.3 lbs. Rack Mount
Operating Environment	15 – 50 °C non-condensing	15 – 50 °C non-condensing

Specifications Liquid Level Sensors	
Outside Diameter	0.75, 0.50, 0.375, and 0.25 inches
Active Length	Over 50 feet (15.2 m)
Overall Length	Up to 19-1/2 feet (longer multi-section lengths available upon request)
Mounting Fittings	Adjustable 3/8" male NPT nylon fitting • 3/8" male NPT welded stainless steel fitting • Stainless steel Conflat flang • Other standard commercial flanges
Special Features	Rugged Service Sensors for harsh environments • Radius bends up to 90 degrees LO <sub>x</sub> service construction • Conductive liquid sensors • <u>Point Sensing Elements</u>

