

# Model 7510+P Penstock Protection System



## About Accusonic

**Accusonic® Technologies, a division of ADS® LLC, designs and manufactures ultrasonic transit-time flow measurement systems that are renowned for their precise accuracy and reliability in difficult operating environments. Accusonic flowmeter systems can be found in hydroelectric plants, thermal power plants, water and wastewater treatment facilities, sewage collection systems, and other types of water flow conveyance pipelines and channels. With over 35 years of experience and over 3000 systems installed worldwide, Accusonic offers a full range of services including installation, system integration, turbine performance testing services, and field training.**

### SYSTEM DESCRIPTION

The Accusonic Model 7510+P Penstock Protection System is designed for the detection of leaks in large pipelines and penstocks. In its standard configuration, the system consists of two multiple path ultrasonic flowmeters, one at each end of the penstock. One is designated as the "Master", usually at the lower end, and the other is the "Slave", at the upper end. A digital communications link is used to synchronize the flow measurements at the two ends of the penstock, send data from the Slave to the Master, and enable operational control of the system in the Master unit.

The Model 7510+P employs the multiple chordal path transit-time technology to measure flows to within  $\pm 0.5\%$  of actual flowrate when installed according to Accusonic specifications.

Flow in pipe sizes of 1 to 40 feet (0.3 to 12 m) in diameter can be measured economically with this system. Transducers can be selected for a wide variety of applications, including:

- Exposed steel pipes
- Concrete pipes
- Buried or encased pipes
- Pipes with external access only
- Pipes that cannot be dewatered for installation

At the Master flowmeter, the flows at the two ends of the penstock are compared and alarm relays are set if the difference between the Master and Slave flows exceeds specified thresholds for longer than specified times. In addition, the system can be configured to provide independent determination of flow, analog outputs, and alarm relays for two separate and dissimilar penstocks.

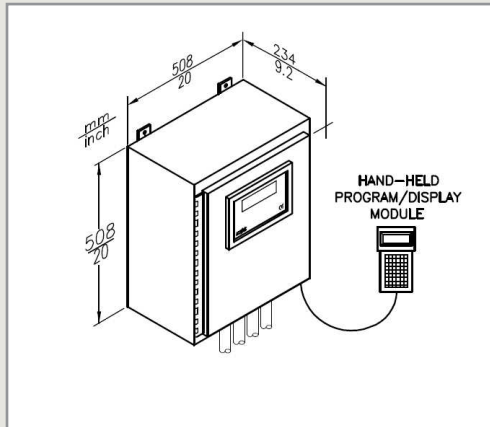
At the Master flowmeter, nine relays are provided for each penstock to indicate:

- Minor master section fault
- Master section failure
- Slave section failure
- Master flow exceeds first threshold
- Master flow exceeds second threshold
- Flow difference exceeds first threshold
- Flow difference exceeds second threshold
- Minor leak
- Command to close the butterfly valve

At the Slave flowmeter, five relays are provided for each penstock to indicate:

- Minor slave section fault
- Slave section failure
- Slave flow exceeds first threshold
- Slave flow exceeds second threshold
- Command to close the butterfly valve

## SYSTEM SPECIFICATIONS



### Measurement Options:

- Pipe Flowing Full

### Number of Acoustic Paths: 1 – 8

### Number of Pipes or Penstocks: 1 – 2

(The total number of acoustic paths in all pipes and channels cannot exceed 8 for a single console)

### Accuracy:

- $\pm 0.5\%$  Full Pipe Applications

### Repeatability:

- $\pm 0.2\%$  Full Pipe Applications

### Outputs:

- (4) Isolated 4 – 20 mA with 750 ohm max impedance load
- (9) Relay Outputs 7.0 A @ 110 VAC or 5.0 A @ 24 VDC (Master Unit)
- (5) Relay Outputs (Slave Unit)
- (1) RS-232 Port (to Hand-held or PC)

### Display Options:

- 2 line X 20 character LCD display
- Hand-held Program / Display Terminal

### Diagnostics:

- Signal Travel Times
- Sonic Velocity
- Signal Gains
- Signal to Noise Ratio
- Error Messages

### Power Requirement:

- 90 - 250 VAC, 47-65 HZ
- 100 - 300 VDC, 12, 24 VDC
- 26 to 35 watts power consumption (200 watts with optional heater)

### Enclosure:

- NEMA 4 (IP65) wall or post mounted

### Environmental Conditions:

- Storage: 0 to 150 deg. F (-18 to 65 deg. C)  
0 to 95% RH
- Operation: 15 to 140 deg. F (-10 to 60 deg. C)  
0 to 95% RH
- Operational range can be increased with optional heater to: -15 to 140 deg. F (-26 to 60 deg. C)

### Enclosure Dimensions:

- 20" h x 20" w x 9.2" d (508 x 508 x 234 mm)
- 60 lb. (27 kg)