

# ADFM<sup>®</sup> Pro20 Velocity Profiler for Large Pipes and Open Channels

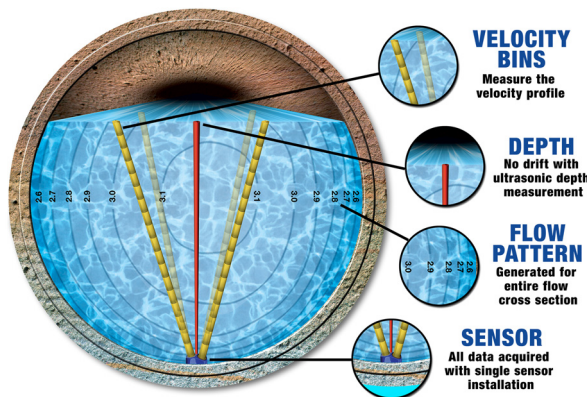
The ADFM<sup>®</sup> Pro20 flow meter brings unparalleled flow rate measurement accuracy to a traditionally difficult measurement environment: large pipes and channels. The Pro20 measures flow rate to within 2% of actual value, in flow depths up to 20 feet (6 m).

ADFM pulse-Doppler velocity profiling technology measures the velocity distribution within the flow, delivering advanced flow measurement performance, making the most suitable choice for metering sites at large pipes and open channels, particularly those with non-uniform, rapidly changing, backwatered, near zero, zero, or reverse flow conditions.

## Principles of Operation

Four (4) piezoelectric ceramics in the sensor emit short pulses along narrow acoustic beams pointing in different directions to measure velocity. A fifth ceramic mounted in the center of the sensor assembly, and aimed vertically, is used to measure the depth.

Each acoustic beam measures velocity at multiple points, or “bins”, within the water column. The measured velocity data within each bin are very precise – to within 0.01 ft/s. The measurements are then used to determine the flow pattern over the entire flow cross-section. Since the flow pattern and measured velocity distribution are dependent on each other, the Pro20’s advanced flow algorithms automatically adapt to changing hydraulic conditions. This removes the need for in-situ calibration and insures accurate flow rate measurement over a host of different measurement environments and hydraulic conditions.



The ADFM electronics unit houses the signal processing, data logging, and data output electronics. It is available as a NEMA 4X box enclosure – suitable for wall or console mounting in permanent applications – or a NEMA 6P cylindrical enclosure – for use in manholes or other “wet” environments.

## Applications

- ◆ Wastewater collection systems
- ◆ Combined sewer systems and outfalls
- ◆ Wastewater treatment facilities
- ◆ Irrigation canals and channels
- ◆ Industrial process and discharges
- ◆ Stormwater conveyance and outfalls

## Standard Features

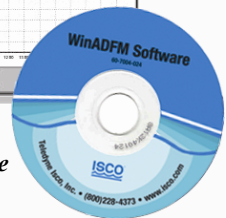
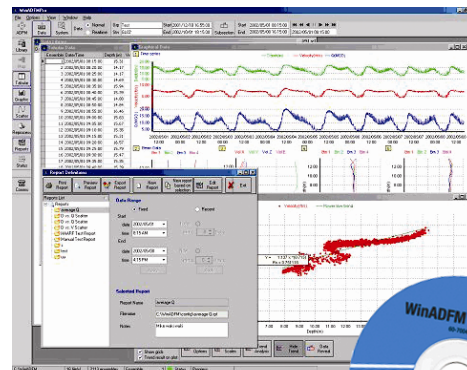
- ◆ Pulse-Doppler velocity profiling technology
- ◆ Quad-redundant velocity sensors and depth sensor combined in a single, compact housing
- ◆ Upward looking sensor mounts on a stainless steel band and is positioned in the channel invert
- ◆ Data quality verification information (signal strength and correlation)
- ◆ In-situ calibration never required
- ◆ Real-time data output
- ◆ Industry standard communications protocol interfaces (optional)

# Specifications

| ADFM® Pro20 Velocity Profiler |   |
|-------------------------------|---|
| Measurement Performance       |   |
| <b>Flow Rate</b>              |   |
| Flow Accuracy:                | 1-2% of reading   |
| <b>Velocity</b>               |   |
| Maximum Velocity:             | ±30.0 ft/s (±9 m/s)   |
| Velocity Bin Size:            | 2 to 12 inches (50 to 300 mm) - user selectable   |
| Vertical Profiling Range:     | 9 inches to 20 feet (230 mm to 6 m) nominal, for particle concentrations of 50-1000 ppm |
| Accuracy:                     | 0.5% of reading ± 0.01 ft/sec (3.0 mm/s)  |
| <b>Water Level</b>            |   |
| Measurement Range:            | 4.5 inches to 20 feet (110 mm to 6 m)   |
| Accuracy:                     | 0.5% of reading ± 0.2 in (0.5 mm)   |
| <b>Acoustic Frequency</b>     |   |
| Frequency:                    | 1.23 MHz  |
| Physical                      |   |
| <b>Electronics unit</b>       |   |
| Electronics Unit Enclosures:  | Cylindrical canister or wall-mount box  |
| Operating Temperature:        | -15 to 125° F (-26 to 52° C)  |
| Storage Temperature:          | -65 to 160° F (-54 to 71° C)  |
| Packaging:                    | NEMA 6P (IP 68) for canister<br>NEMA 4X for box   |
| Dimensions:                   | Canister - 28.5x10 in. (724 x 254 mm)<br>Box - 17.5x14.8x6.7 in (445x375x170 mm)        |
| Weight:                       | Canister Housing 36 lbs (16 kg)<br>Box Housing 24 lbs (11 kg)                           |
| <b>ADFM Pro20 Sensor</b>      |   |
| Operating Temperature:        | 23 to 95°F (-5 to 35°C)   |
| Housing Material:             | Urethane  |
| Static Pressure:              | 250 psi Nominal   |
| Dimensions:                   | 8 x 3 x 1.5 inches (200 x 75 x 40 mm)   |
| Weight:                       | 3.2 lbs (1.5 kg)  |
| <b>Sensor Signal Cable</b>    |   |
| Operating Temperature:        | -40 to 125°F (-40 to 52°C)  |
| Material:                     | Polyethylene jacket   |
| Length:                       | 50 ft (15 m) std. 100ft (30 m) and 150 ft length (45 m) available.                      |
| Minimum Bend Radius:          | 6 in (150 mm)   |
| Outer Diameter:               | 0.5 in (13 mm) nominal  |

- ◆ Secondary depth sensor (optional), pressure or ultrasonic

| Data Management                               |  |
|---|--|
| <b>ADFM Pro20 Data Types</b>                  |  |
| Q, V, D:                                      | Discharge, average velocity, depth   |
| Velocity:                                     | Velocity profile data (relative to acoustic beam directions) per beam and bin                      |
| Echo Intensity:                               | Echo intensity data (relative backscatter intensity) per beam and bin                              |
| Data Quality:                                 | Profile data quality indicators (Correlation magnitude, % - Good) per beam and bin                 |
| Temperature:                                  | Transducer temperature output, range 20 to 125°F (-7 to 52°C)                                      |
| Sound Speed:                                  | One output for speed of sound data   |
| Leader:                                       | Output of general leader information (time, data, record number, etc.), and for vertical beam data |
| <b>Data Storage and I/O</b>                   |  |
| Data Storage Capacity:                        | 32 MB std. (300,000 measurements); up to 440 MB optional   |
| Data I/O interface:                           | RS-232 standard. Multiple industry-standard analog and digital protocols optionally available.     |
| Data Transfer Rate:                           | Configurable to 57,600 bps   |
| <b>Power</b>                                  |  |
| Internal Battery Voltage:                     | 24 VDC nominal   |
| Internal Battery Capacity:                    | 26 Ah at 75° F – Alkaline. Battery life 22 weeks at 15 minute sampling interval                    |
| External DC:                                  | 12 to 36 VDC; 10 VDC absolute minimum; 36 VDC absolute maximum                                     |
| <b>Software</b>                               |  |
| WinADFM Software for Windows 98, 2000, NT, XP |  |



*WinADFM Software is a comprehensive software package for ADFM Pro20 set-up, operation, data review, analysis, and data management..*



**Teledyne Isco, Inc.**  
 4700 Superior Street  
 Lincoln NE 68504 USA  
 Tel: (402) 464-0231  
 USA and Canada: (800) 228-4373  
 Fax: (402) 465-3022  
 E-Mail: [iscoinfo@teledyne.com](mailto:iscoinfo@teledyne.com)  
 Internet: [www.isco.com](http://www.isco.com)