

Area-Velocity Flowmeter Installations in Denmark



Municipalities (Kommunes) throughout Denmark Measure Sewage and Stormwater Flow with Greyline Area-Velocity Flowmeters

[Area-Velocity Flow Meters](#) are designed to monitor flow rates in partially filled pipes and open channels *without* flumes or weirs. A sealed ultrasonic sensor is mounted on the bottom of the pipe or channel and connected to electronics through a watertight cable. The sensor measures both level and velocity and when calibrated with the pipe diameter or channel dimensions, the Greyline AVFM computes flow.

[Teletronic Denmark ApS](#) specializes in collecting data from measurement systems, including Greyline Area-Velocity Flow Meters, installed in sewers, channels and streams. Instruments are powered by batteries and recharged with photovoltaic solar panels. Measurement data is transmitted wirelessly through GSM modems or closed UHF radio systems. Teletronic's service includes rental, sales, installation and operation of complete monitoring systems. Web based software allows customers the access and monitor measurement data through the Internet.



Greyline AVFM Flowmeters and Ultrasonic Sensors Ready for Installation

A busy day's work is ahead for Teletronic Denmark as flowmeters and ultrasonic sensors are set out for deployment in municipal sewer applications.

Greyline AVFM flowmeters can monitor flow in channels of any shape but most municipal applications in Denmark are installed in manhole pipe entries ranging in size from 150 mm to 1 m diameter (6" to 40").



Flowmeter Electronics and Modem Repackaged in a Watertight Housing

Electronics are exposed to high humidity, condensate and rainwater in manhole installations.

Teletronic Denmark provides customers with repackaged systems including Greyline AVFM Area-Velocity Flow Meter electronics and Teletronic modems in sealed polycarbonate housings. Cable entries to the electronics are made through watertight glands so that the systems can operate reliably and without damage in wet conditions and during periods of accidental submersion.



Flowmeter Installations in Stainless Steel Panels

Away from roadways where manhole installation is unnecessary Teletronic Denmark provides Area-Velocity flowmeter electronics in a locked panel along with a modem and battery. A nearby antenna transmits periodic flow readings automatically to the municipality. The AVFM flowmeter's ultrasonic sensor is installed in a channel below.



Submersible Ultrasonic Sensor Installed in Sewer Pipe

Using stainless steel mounting hardware Teletronic Denmark installs a Greyline ultrasonic sensor on the invert of a concrete pipe. Stainless steel banding is formed to the pipe shape and screwed to the pipe. Sensor cable is tie-wrapped to the banding and then connected to AVFM flow meter electronics installed at the top of the access manhole.



AVFM Flowmeter Electronics Mounting at the Top of Manholes

Teletronic Denmark fabricates a stainless steel cross beam which clips to the manhole frame. The Greyline AVFM Flowmeter, battery, data logger, modem and other equipment can be set on top of or suspended from the cross beam.

Municipal staff have easy access to electronics just below the manhole cover and the whole assembly can be raised and removed from the manhole to allow access to personnel.



Influent Monitoring from Two Pipes

Sewage influent to this manhole is from 100 mm (4") and 150 mm (6") pipes. The municipality of Stevns needed to monitor flow from both sources so separate Greyline AVFM ultrasonic sensors are installed in both pipes.

A extension has been added to the 100 mm pipe to enable mounting of the flow sensor. It discharges to the 150 mm pipe below after influent to the 150 mm pipe has been measured separately.



Stormwater Flow Monitoring

Earthen channels change shape over time due to debris, settling and the scouring effects of high flow rates. In this installation temporary channel walls have been installed in a drainage ditch so that a rectangular channel shape can be defined for flow measurement.

Greyline AVFM flowmeter electronics and battery are protected under a temporary rain tight cover and powered by a solar photovoltaic charging system. After baseline flow data has been collected, the system is removed for deployment at another location.



Sediment Problem... Sensor Mounting Solution...

AVFM sensors should be installed at locations where flow is calm and sediment does not form. But some stormwater applications carry debris into sewer lines and over time the ultrasonic sensor can become buried in sediment.

Teletronic Denmark use Greyline's AVFM "level offset" calibration feature and raise the ultrasonic sensor above the invert of the pipe by mounting on an adapted stainless steel mounting bracket. Periodic flushing of the channel is still required but by installing the sensor above the sediment layer, the flowmeter continues to function reliably.



Resources

[Visit Teletronic Denmark ApS](#)

[Product Information - Greyline AVFM 5.0 Area-Velocity Flowmeter](#)

[How It Works](#)

[More Application Notes and Case Studies](#)

[Greyline Flow and Level Instruments](#)

[More Information from Greyline Instruments Inc.](#)



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