Active Stormwater Runoff Monitoring

With remote sampler enable and reports
Application Note

Isco 2105C/G Cellular Interface Module

- Inputs: Modbus, SDI-12, Rain Gauge, 2100 Series flow modules, and more
- Data logging with unique variable data storage rate
- Outputs: Digital Pulse, Modbus, SMS, Sampler enable/pacing, and more
- CDMA or GSM cellular communication allows remote data collection via Flowlink 5.1 & remote system control.
- 1xRTT or GPRS communication enables data push to secure central server via Flowlink Pro client software.

6712 Sampler Benefits:

- Light weight, compact, and robust
- Environmentally sealed controller (IP67) w/ data logging
- Powerful peristaltic pump (8.3 m lift)
- Non-contact liquid detector ensures accurate volume
- SDI-12 connection and logging
- Versatile programming for unique applications
- Remote access via cellular modem
- Rain gauge input

Stormwater runoff is a major contributor to surface water pollution, perpetuating ever-increasing state and federal demands for stormwater runoff control and reporting. A wide range of flexible instrumentation enables Teledyne Isco to meet non-point source discharge monitoring requirements.

Regulating Stormwater Discharge

The National Pollutant Discharge Elimination System (NPDES) Stormwater Program regulates stormwater discharges from potential sources that include both point and non-point sources. Operators and managers of storm sewer systems, construction sites, croplands, industrial sectors, and urban areas may be required to obtain authorization to discharge stormwater, in accordance with both federal law, and often more stringent state and local regulations.

To meet these requirements, businesses, municipalities, and other organizations must develop comprehensive stormwater monitoring programs. These programs typically consist of several parts, including the collection and storage of storm event data on rainfall, flow, and measured pollutant levels, as well as taking water samples during the storm event for laboratory analysis. Representative sample collection is dependent upon crucial factors such as timing, flow volume, and water quality.

Rapidly changing storm conditions can present several challenges to accurate sample collection, monitoring of system status, program adjustment needs, and data retrieval. With instrumentation from Teledyne Isco, a site-specific system can provide precise automatic sampling with real-time data collection and flexible programming. All of this and more can be achieved from remote locations.

Remote Monitoring + Sampler Commands

The 2105C (CDMA) and 2105G (GSM) Cellular Interface Modules allow the user to remotely enable an Isco Model 6712 portable or Avalanche portable refrigerated wastewater sampler while simultaneously monitoring current site conditions, with flow and water quality data logged and transferred to a secure server database. Immediate access to data and the ability to send commands to a sampler from off-site can reduce labor and fuel costs. Additionally, the user can wait until a storm has passed to retrieve the samples, meaning safer working conditions.

System Configuration

For active stormwater runoff monitoring, Isco recommends the following system components:

- Model 674 Rain Gauge
- 2105C/G Cellular Interface Module
- 2150 Area Velocity Flow Module
- 6700 Series Portable Automatic Sampler
- Deep-Cycle Battery
- 40-Watt Solar Panel
- Multi-Parameter Sonde with SDI-12 or Modbus output
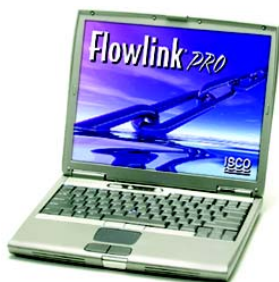- Flowlink® Pro Software

Avalanche® Sampler:
a portable refrigerated version of the **6712**

The Avalanche combines the small size, light weight, & mobility of the 6712 with active temperature control.

Battery operated, or A/C powered if available.

Flowlink Pro Software

- Supports large database, multiple users
- Pushed data
- Fast transfers, lower costs
- Web access
- Automated tasks
- Graphical and tabular reports of flow monitoring data
- Data editing

System Connections

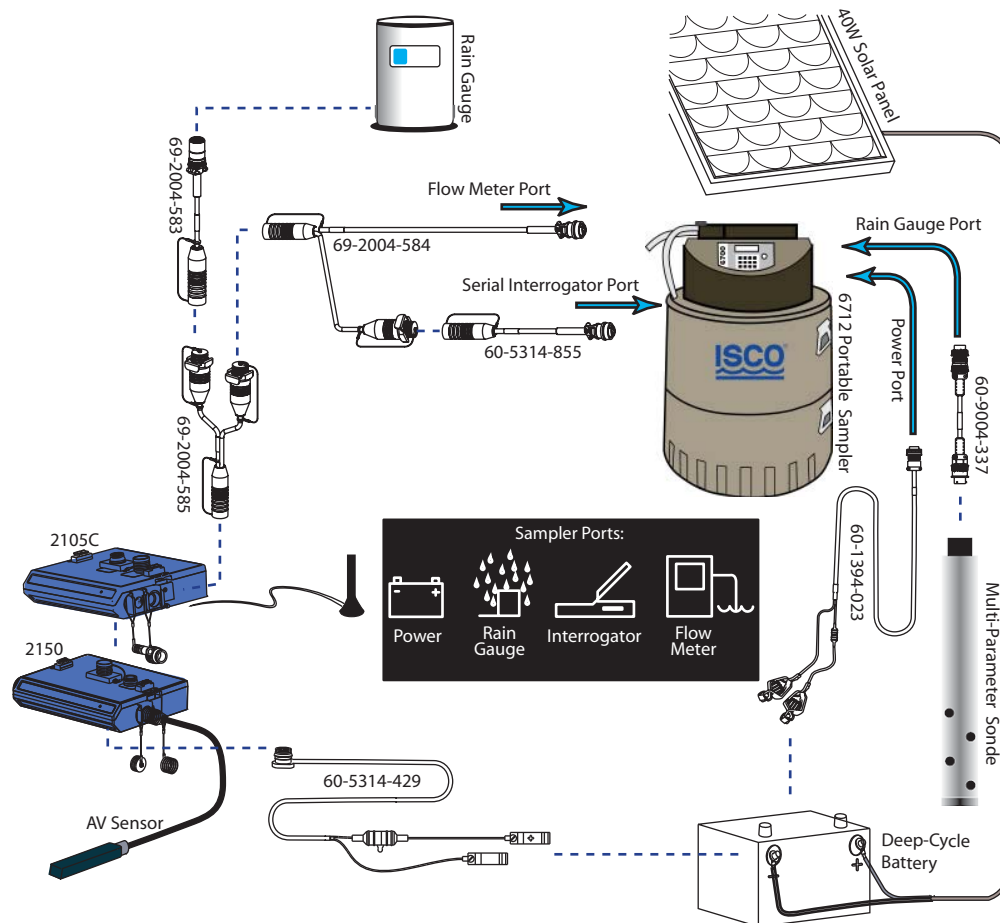A system connection diagram and actual setup are depicted in Figures 1 and 2.

Figure 1: System connection diagram (Depending on the site, different configurations are possible.)

Basic Operation

The primary functions of the system are:

- Log real-time water quality and flow data
- Automatic sampler enabling by predetermined conditions
- Push data to secure server
- Remotely enable/pace sampler
- Retrieve sampling reports

Dialout Alarms

The 2105 can send SMS/ text alarms to a specified list of phone numbers when a user-defined condition becomes true, such as a rain event, threshold parameter, or combination of events.

Flowlink® Pro Software

Flowlink Pro, a corporate version of Isco's powerful Flowlink® 5.1 flow data management program, supports multiple users. The 2105C/G pushes real-time data to a secure server for hands-off data collection, and provides Internet access to the data.

Figure 2: Active monitoring installation example

Model 674 Rain Gauge

- Metric or English units
- 3-Point leveling & integral bubble level for easy alignment
- Spring-loaded sapphire jewel bearings resist damage
- All openings screen-protected
- Direct connection to Isco flow meters and samplers

The rain gauge should be installed where its top has unobstructed access to rainfall.

For the many customers who already use Flowlink Pro, remote sampler communication and water quality data retrieval can easily be integrated into an established monitoring system.

Figure 3: Basic configuration of Flowlink Pro server/client network
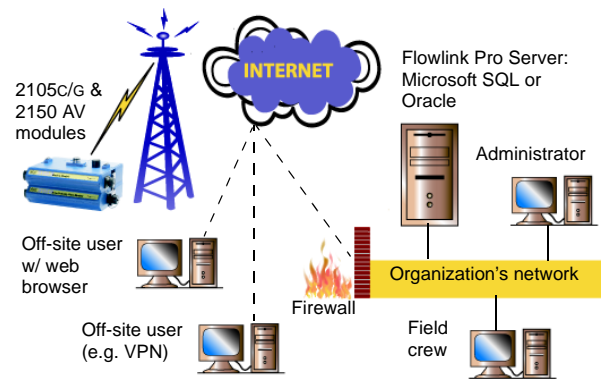
Sampler — The automatic sampler can be programmed days or even weeks ahead of a defined event such as a specific pH level, rainfall accumulation, or flow volume, that triggers a primary or secondary sampling protocol via the attached parameter sonde or remotely from the 2105C/G module.

6700 Series samplers can be programmed to take "first flush" samples at the start of a storm event. The same sampler can then place subsequent flow-weighted or parameter-based samples in a second group of bottles.

Measurement — Water quality parameters such as pH, DO, conductivity, temperature, turbidity, salinity, etc. can be measured by the sonde attached to the sampler controller. This data is transmitted using ASCII protocol from the sampler to the 2105C/G via the serial cable. The 2150 flow module with area velocity sensor measures flow using continuous wave Doppler technology. The 674 rain gauge uses a tipping bucket design for precision rainfall measurement, and transmits this data to the 2105C/G.

> ☑ *Note*
>
> The 2105C/G is also capable of being directly connected to the sonde, with data storage for each parameter configured in Flowlink.

Pushed Data — The 2105C/G module collects the data from all measurement devices in the system, and automatically sends data to a designated server runing Flowlink Pro software, using 1xRTT or GPRS packet-switched data transmission at user-specified intervals. A Microsoft® SQL, SQL Server Express, or Oracle® database is required for this function.

Reports and Commands — Remote commands are sent to the sampler via a pass-through function of the 2105C/G and serial cable, using the standard remote commands that are provided in your sampler operation guide. Sampling reports, including I/O status, can be retrieved from the sampler in the same manner.

Using a terminal emulator program such as HyperTerminal, call the 2105C/G module, then establish RS-232 serial communication with the sampler controller. Once you have remotely connected to the sampler, it is ready to receive remote commands. Detailed steps for HyperTerminal connection, as well as remote commands, can be found in the *Remote Operation* section of your sampler operation guide.

System Considerations

Text messaging and pushed data capabilities are available in any location with standard cellular services.

Pass-through remote sampler communication via the 2105C/G requires Circuit-Switched Data (CSD) service. Check with your local service provider for availability.