![HS HYQUEST SOLUTIONS logo]

iRIS 350FX Composite Sampler Control Program

1   Overview

The customised IRIS 350FX sampler program has been designed to provide flexible and comprehensive control of a sampler. This includes the ability to have multiple samples per bottle (sampler hardware dependent).

Once the initial trigger on water level or turbidity is reached, the program does the following:

- Resets the flow accumulator.
- Event logs the sensor values with 80 added to the sensor array id. E.g. 81/0 for water level. (See event logging array section below)
- Moves the program logic state to "RUN".
- If the context is level or time and the first setpoint in the table is zero, the system will just use the single setpoint for the context. E.g. time. Otherwise it will load the first setpoint from the table. For accumulated flow the single setpoint is the only one supported.

The program will then take samples whenever the working setpoint in the current context is reached and there are still empty bottles available. When the level goes below the reset level the sampler system will return to idle.

The system context can be one of the three types:

1. Absolute Level. Every time a level threshold is crossed, a new sample is taken. The program automatically determines whether the water level is to be tested as rising or falling based on the relative value of the preceding setpoint. Up to 24 individual setpoints are provided, potentially allowing a completely level-driven acquisition cycle of a full 24 bottle sampler to be achieved. As soon as a zero setpoint is detected the level trigger sequence will stop.

2. Flow Accumulation. If a non-zero flow setpoint is configured, the program will initiate a sample whenever an accumulated flow total is reached. This is calculated using a rating table in the logger to derive flow from the water level. In this mode the user setpoints are ignored and the single accumulated flow setpoint is the only one used.

3. Elapsed Time. If a non-zero time setpoint is configured, the program will initiate a sample whenever the time has elapsed. As with the level mode, to 24 individual setpoints are provided, potentially allowing a completely level-driven acquisition cycle of a full 24 bottle sampler to be achieved. As soon as a zero time setpoint is detected, the time based trigger sequence will stop.
NOTE: If the first time setpoint (1) is zero, then the single time setpoint entry is used for all samples, otherwise this parameter is ignored.

If more than one trigger method is configured the first to occur will initiate a sample and the other trigger methods are reset (i.e. flow total zeroed and timer reloaded with the time setpoint).

If the level drops below the reset level, the system is returned to IDLE and all control ceases.
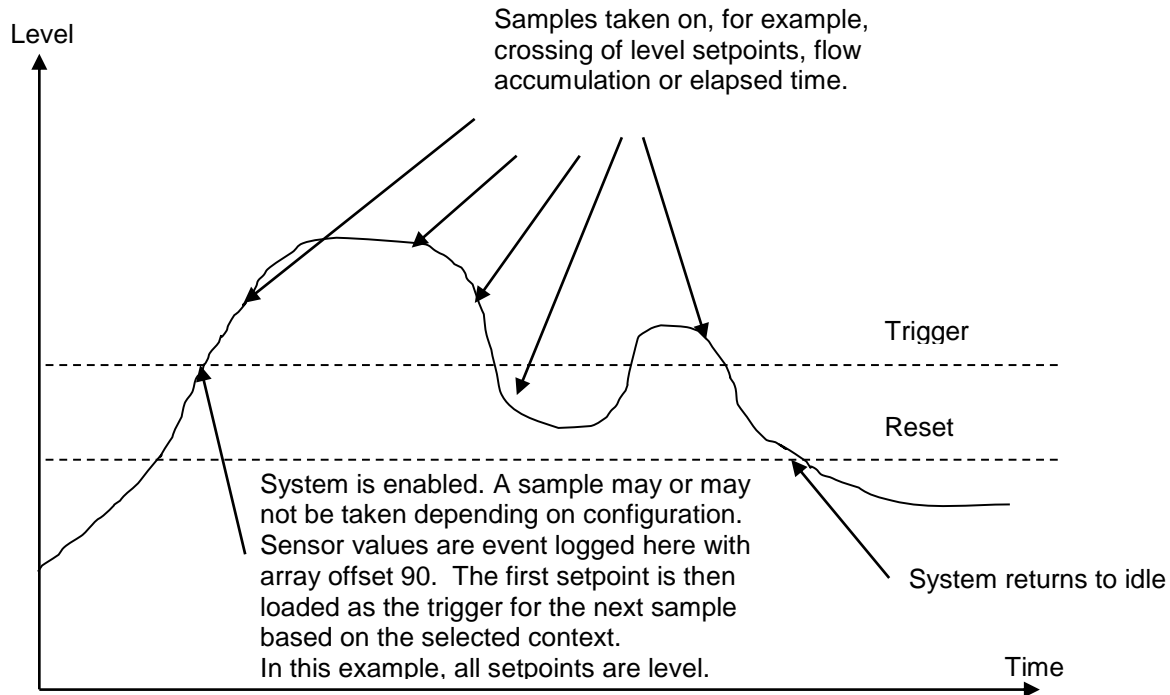
The IRIS 350FX configuration makes use of five mandatory sensors and one optional sensor (turbidity). These are:

- **Sensor 1** - Water Level. This may be obtained from any source (analogue, SDI-12 etc).

- **Sensor 2** - Flow Rate. Even if flow is not used, this sensor must be configured. However, logging is typically disabled as it is unnecessary to actually log this.

- **Sensor 3** - Accumulated Flow. Even if flow is not used, this sensor must be configured.

- **Sensor 4** – Current Bottle. This maintains a record of bottles used and can be used in HydroTel to trigger an alarm when on-site attention is needed.

- **Sensor 5** – Sub Sample. This maintains a record of actual samples taken and can be correlated against the bottle count for composite sampling.

- **Sensor 6** - Turbidity. This is optional and will only be checked if the turbidity setpoint is non-zero.

2 Event Logging Array IDs

The system logs the sensor values on an event basis at certain points in the sequence. To identify the actual event that caused the log, an offset is added to the array id.

+0   Normal (timed) logging. E.g. Level = 1/0.
+80   On the taking of a composite sample. E.g. Level = 81/0.
+90   On initial triggering of the system.   E.g. Level = 91/0.
+100   On the taking of the last sample for a particular bottle. E.g. Level = 101/0.
+110   On the change to the next bottle. E.g. Level = 111/0.

Sampler Activation
Digital I/O channel 4 (DIO4) configured as an output on the iRIS 350FX is used to trigger the sampler. When it activates, a switched 12V supply is provided from the terminal block. The digital output must be enabled and its mode set to 2 ("Remote"). The time that the relay is on for (typically 5 seconds) is defined by the "Duration" setting.

This output will typically be used to activate a small relay to provide a volt-free contact closure to drive the sampler. Using the relay allows the sampler to be fully isolated from the logger to prevent electrical problems. The sampler may be connected to the NO (normally open) or NC (normally closed) contact depending on the configuration. The default method is to wire the trigger across COM and NO for samplers requiring a contact closure to activate.

Maintaining Bottles
The current bottle can be reinitialised to 1 by either pressing the right-hand "Enter" key three times from the LCD Sampler Page 2 or by activating the second digital input (DIO2) for three seconds. This action will also set the sub-sample variable to 1.

Manual Sampling
A manual sample may be taken from the logger by pressing the left hand "Alt" key three times from the LCD Sampler Page 2 or by sending a manual sample request from HydroTel. The bottle count will increment and the inhibit timeout will commence. After the inhibit time has expired, the control program will either resume testing against the trigger setpoints or return to idle if the water level is at or below the reset setpoint.

3 LCD Screens

Four sampler screens are provided. These can be accessed by selecting Sampler from the Main Menu screen. Using the + and - keys will step up and down between the LCD screens respectively.

Screen 1

*From this screen, use the **+** key to go to Sampler Page 2 or the **−** key to go back to the Main Menu screen.*

```
SAMPLER PAGE 1
Status: DISABLED
Smp: 1  Bot: 1
Alt:ManSmp Ent:Rset

```

Sampler control is disabled and no action will be taken.

```
SAMPLER PAGE 1
Status: IDLE
Smp: 1 Bot: 1
Alt:ManSmp Ent:Rset
Temp:    21.6°C
```

The sampler logic is idle and awaiting a trigger on water level rising through setpoint 1 or turbidity value reaching or exceeding the turbidity setpoint.

```
SAMPLER PAGE 1
Status: IDLE
Smp: 6  Bot: 1
Alt:ManSmp Ent:Rset
Temp:    21.6°C
```

The sampler logic has been triggered and is now checking all enabled trigger sources. Five samples have already been put into the first bottle. The next sample to be taken will be sample 6.

```
SAMPLER PAGE 1
Status: INHIBIT 37
Smp: 3 Bot: 1
Alt:ManSmp Ent:Rset
Temp:    21.6°C
```

The program is waiting until the sampler inhibit time has expired before resuming normal run mode operation. There are 37 seconds remaining. The next sample to be taken will be sample 3 into bottle 1.

Screen 2

From this screen, use the ＋ key to go to Sampler Page 3 or the ─ key to go back to Sampler Page 1.

```
SAMPLER PAGE 2
Mode: LEVEL
Level:   1753mm
Rst: 1000 Trg: 2000
```

The second screen shows the basic level values. The operating mode is on the first line, the actual level on the second line and reset and initial trigger values are on the bottom line.

Screen 3

From this screen, use the ＋ key to go to Sampler Page 4 or the ─ key to go back to Sampler Page 2.

```
SAMPLER PAGE 3
Vol SP: 2000   m3
Total:     0   m3
```

The third screen shows the flow and time trigger settings. The setpoint and actual values are displayed.
The flow trigger will occur when the accumulated flow reaches the setpoint.

Screen 4

From this screen, use the ＋ key to go to Sampler Page 5 or the ─ key to go back to Sampler Page 3.

```
SAMPLER PAGE 4
Time SP:   45 mins
Timer:  00:26:00
```

The fourth screen shows the time mode trigger settings. The setpoint and actual values are displayed.
The time trigger will occur when the time decrements to 00:00:00. It is displayed as a down counter.

Screen 5

From this screen, use the ─ key to go back to Sampler Page 4.

```
SAMPLER PAGE 5
Turbid SP: 1000 NTU
Turbid:  25.6 NTU

```

The fifth and final screen shows the turbidity mode trigger settings. The setpoint and actual values are displayed.

4 HydroTel Interface

The HydSampler plug-in graphic is no longer used for the iRIS350FX, instead all configuration is performed through the standard device configuration in the loggers form.

A manual sample may be taken by using the "Sample Now" button. Note however that if the sampler is in an inhibited state having just taken a sample, the manual request will be rejected at the logger.

If the feature is enabled, HydroTel will initiate an immediate unload of logged data and a snap-shot read of the status after the write is complete.
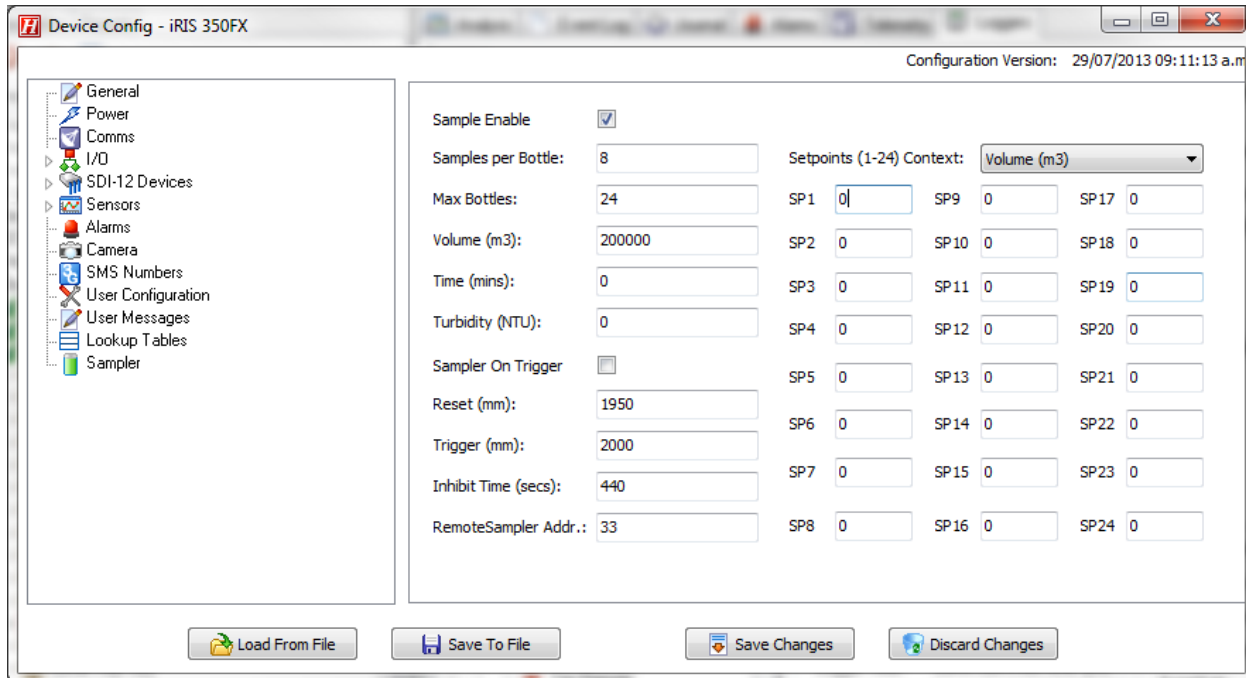
Example of the Sampler Plug-in view showing a range of settings
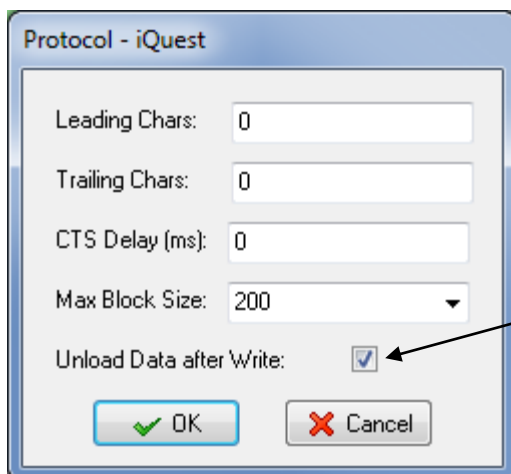
Enable this to initiate an immediate read of the logger status after a control write.

Example of the Logger's Protocol Plug-in view showing the "unload after write" enable checkbox.

Logger's Device Plug-in view showing the settings required for the write/read configuration.

Object configuration for manual remote Sample Now

Point configuration for manual remote Sample Now

Note: The identifier should be 0.0 for systems running HydroTel™ version 4.20 onwards

5 iRIS 350FX Logger Configuration.

Sampler Control Relay

This should be a 12V dc coil standard relay such as an Omron LY-1. The sampler control relay coil should be wired between the Digital Output 4 (DIO4) terminal and the DGND terminal on the iRIS 350FX I/O connector.

iRIS 350FX Digital output settings

The settings to enable the sampler control mode are shown in red. The duration setting determines the time the relay is activated:

6 iRIS 350FX Sensor Configuration Example

Sensor 01: Water Level

Sensor 02: Flow Rate

Sensor 03: Accumulated Flow

Sensor 04: Bottle

Sensor 05: Sub-Sample

Sensor 06: Turbidity

Sensor 07: Battery

7 Revision History

Issue	Date	Comment
Issue 1	05/07/2013	Initial draft release.
Issue 2	17/07/2014	Updated to incorporate FX parameters
Issue 3	19/06/2016	Changed company name references to HyQuest
Issue 4	23/01/2018	Correct Sample Now point identifier. Was 1 should now be 0.0

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