

# **ATTACHMENT 15**

HydroLynx Systems, Inc.  
Documentation/Specifications

## MODEL 5073NS-5 NovaStar5 Software

### General Description

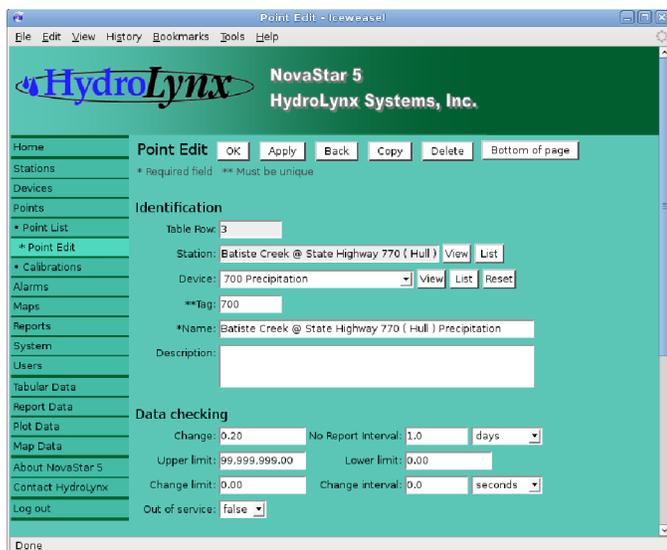
NovaStar5 Software from HydroLynx is a real-time data collection, alarm monitoring and control system. NovaStar5 runs under the Linux operating system. The Linux operating system is stable, non-proprietary, well known, and trusted by IT managers.

The NovaStar5 database uses Postgresql. This is a powerful, open source, non-proprietary, SQL database. This ODBC SQL database allows remote access to the data from third party software. The database tables can be viewed and modified with a graphical user interface administrative tool.

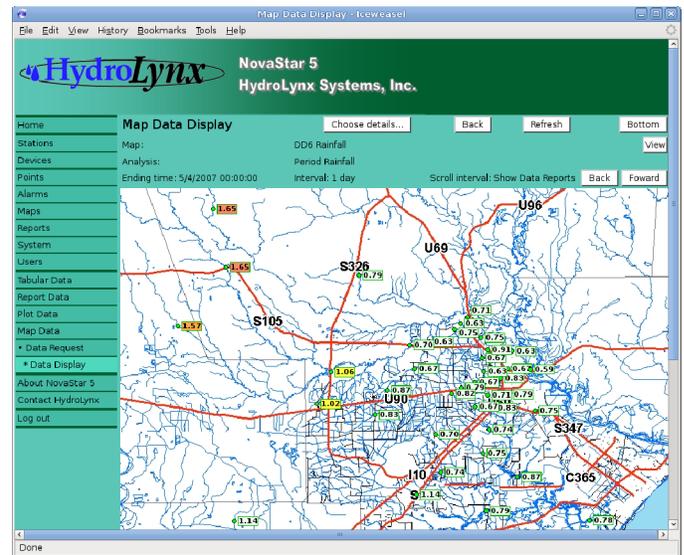
The NovaStar5 database can be mirrored over a local area network, LAN, on a hot backup server. A LAN failover system maintains redundant databases on two NovaStar5 servers and does automatic failover if the primary system fails.

The NovaStar5 user interface uses web pages to simplify user access to the database and system operations. The web page user interface is client based and runs on any internet browser. Local access on the NovaStar5 server, office intranet access, and remote internet access is supported.

Security is essential on systems that must stay operational 24 hours a day, provide information for public protection, and hold years of invaluable data in its database. NovaStar5 provides 3 levels of encrypted password protected security. The lowest level allows data viewing only; no changes to the database or system are allowed. The middle level allows database change, setup, and maintenance. The highest level allows database and system setup and administration. The web page user interface only shows activities allowed for the user's security level.



Model 5073NS-5 NovaStar5 Database setup screen



Model 5073NS-5 NovaStar 5 Software – Map with data overlay

NovaStar5 supports real-time data collection of self reporting data, remote station interrogation, data import and export. Self reporting data can use the ALERT1 and ALERT2 protocols. Remote station interrogation pulls data from stations over telephone lines, two-way radio, satellite, and the internet. Station interrogations schedules can be manual and automated. Data imports read data values from data logger download files and files pushed or pulled from the network. Data exports push data in files over the network.

Data collected is validated by programmable data checking limits: change between reports, change over an interval, upper and lower limits; before it is stored in the SQL database. The data validation flag is stored with the data for user viewing.

Validated data can trigger alarm actions when alarm trigger limits are met. Alarm triggers are: change over an interval; upper, lower, and at limit; or no data reported. Alarms actions include audible and visual alarm, telephone or email paging, voice dial-out, map display interface, and set a hydrologic threat score.

Rating tables compute discharge or other data units from collected data. Unlimited time based, multiple rating table assignment, and multiple shift assignment are supported. Rating table data computation is triggered by the real-time data collection. A user request can also compute the rating table data over a time period.

Real-time equations create new data point values from one or more data collection points and statistical analysis. Predefined equations include basin rainfall average; dewpoint and wet bulb temperature; vapor pressure; and evapotranspiration demand. Equation data computation is triggered by the real-time data collection. A user request can also compute the equation data over a time period.

Collected data, rating table data, and equation data can be displayed in tables, group reports, time series plots, and overlaid on map backgrounds. The data displayed can be the data report or a statistical analysis of the data over an interval.

Data values displayed are highlighted with background colors based on the hydrologic threat score. The user can select a time interval for the automatic refresh of a data display. Data displays can be scheduled for unattended printing or distribution.

Date and Time	Data Report	Raw Data	Quality	Score	Add
05/03/2007 18:43:09	17.72	450	V	1	Edit
05/03/2007 18:23:22	17.68	449	V	1	Edit
05/03/2007 17:57:46	17.64	448	V	1	Edit
05/03/2007 17:42:27	17.60	447	V	1	Edit
05/03/2007 17:38:42	17.56	446	V	1	Edit
05/03/2007 17:27:39	17.52	445	V	1	Edit
05/03/2007 17:12:26	17.48	444	V	1	Edit
05/03/2007 17:04:16	17.44	443	V	1	Edit
05/03/2007 16:56:58	17.40	442	V	1	Edit
05/03/2007 16:44:34	17.36	441	V	1	Edit
05/03/2007 16:39:03	17.32	440	V	1	Edit
05/03/2007 14:07:34	17.28	439	V	1	Edit
05/03/2007 04:1:00	17.28	439	V	1	Edit
05/03/2007 03:46:24	17.24	438	V	1	Edit
05/03/2007 03:09:53	17.20	437	V	1	Edit
05/03/2007 02:55:26	17.17	436	V	1	Edit
05/03/2007 02:48:54	17.13	435	V	1	Edit
05/03/2007 02:45:35	17.09	434	V	1	Edit
05/03/2007 02:43:18	17.05	433	V	1	Edit

Model 5073NS-5 NovaStar5 Tabular data display

The statistical analyses include last report in period, maximum, minimum, mean, variance, standard deviation, skew, coefficient of skew, difference, sum, period rainfall, storm rainfall, rainfall intensity, rate of change, runtime, volume computation, and count of reports in period.

Custom report creation allows the user to select data collection points, data analysis, and display intervals. Report data can be organized with data collection points or display intervals in rows. Both even and uneven display intervals are supported.

Time series plots display data values over time of single or overlaid data collection points. Plots can show curves, filled areas, histograms. Left and right scales are used to show different types of data. Scales are programmable and adjustable.

No.	Name	15 minutes	30 minutes	1 hour	1 day
700	Batiste Creek @ State Highway 770 ( Hull )	0.04	0.04	0.51	1.10
800	Pine Island Bayou @ State Highway 105 ( Batson )	0.00	0.00	0.67	1.34
900	Little Pine Island Bayou @ State Highway 787	0.00	0.00	0.67	1.34
1000	Black Creek @ State Highway 326	0.00	0.00	0.12	0.47
1100	Cotton Creek [D-1100] @ Greyburg Rd. ( Nome )	0.00	0.00	0.00	0.82
1200	State Highway 326 @ Pine Island Bayou	0.00	0.00	0.04	0.78
1300	Pine Island Bayou @ State Highway 105 ( Bevil Oaks )	0.00	0.00	0.00	0.47
1400	Forest Trail @ Ditch 1202 ( Northwest Forest )	0.00	0.00	0.00	0.43
1500	Tram Rd. @ Ditch 1002	0.00	0.00	0.00	0.39
1600	Best Road. @ L.N.V.A Pump Station	0.00	0.00	0.00	0.47
1800	Tram Road @ Walker Ditch 1000	0.00	0.00	0.00	0.51
2000	Folsom Rd. @ Hillebrandt Bayou [D-100]	0.00	0.00	0.00	0.43

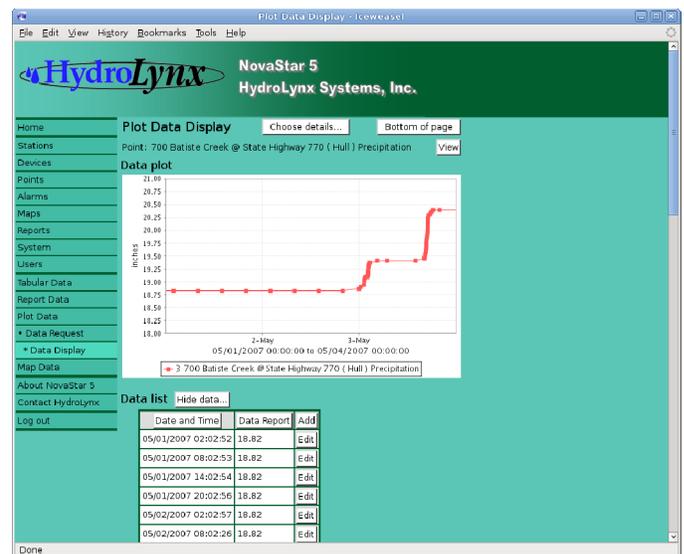
Model 5073NS-5 NovaStar5 Report display

Station ID	Name	Type	Latitude	Longitude	Add
50	Nome Repeater	HydroLynx 50386	30.03276	-94.4217	Edit
55	Tinity Bay Repeater	HydroLynx 50396	0.0	0.0	Edit
700	Batiste Creek @ State Highway 770 ( Hull )	HydroLynx 50396	30.16444	-94.6428	Edit
800	Pine Island Bayou @ State Highway 105 ( Batson )	HydroLynx 50396	30.25694	-94.5683	Edit
806	Hwy 105 @ Pine Island Bayou North	HydroLynx 50396	0.0	0.0	Edit
900	Little Pine Island Bayou @ State Highway 787	HydroLynx 50396	30.34861	-94.5881	Edit
1000	Black Creek @ State Highway 326	HydroLynx 50396	30.244	-94.36	Edit
1094	Grayburg Rd D-1300	HydroLynx 50396	0.0	0.0	Edit
1097	D-1100 @ GRAYBURG	HydroLynx 50396	0.0	0.0	Edit
1100	Cotton Creek [D-1100] @ Greyburg Rd. ( Nome )	HydroLynx 50396	30.04278	-94.425	Edit
1101	Grayburg Road	HydroLynx 50396	0.0	0.0	Edit
1102	GRAYBURG WEATHER	HydroLynx 50396	0.0	0.0	Edit
1200	State Highway 326 @ Pine Island Bayou	HydroLynx 50396	30.0925	-94.4028	Edit
1300	Pine Island Bayou @ State Highway 105 ( Bevil Oaks )	HydroLynx 50396	30.13528	-94.2794	Edit
1400	Forest Trail @ Ditch 1202 ( Northwest Forest )	HydroLynx 50396	30.14028	-94.2489	Edit
1500	Tram Rd. @ Ditch 1002	HydroLynx 50396	30.16917	-94.1997	Edit
1600	Best Road. @ L.N.V.A Pump Station	HydroLynx 50396	30.17886	-94.1892	Edit

Model 5073NS-5 NovaStar 5 Software – Station list

Graphical map or schematic backgrounds are imported by the user. The user can select the type of data, analysis, and display intervals to overlay on the background as data readouts. The data readout position is auto-located by station location or manually located by the user. Click on a data readout to display an action menu. The data readout actions include: data report display and editing, database setup and editing, remote station polling, and control actions.

Control commands are sent to remote station through the telemetry system. Control commands are executed by the user through the user interface or automatically using the NovaStar5 expert system software. The expert system is rule based decision making software that examines data from one or more data collection points.



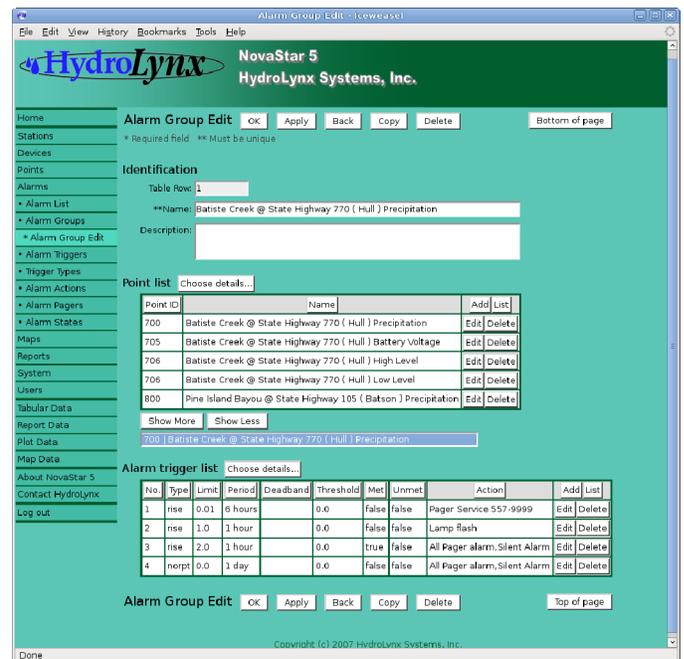
Model 5073NS-5 NovaStar 5 Software - Time Series Plot

## Features

- Linux operating system
- Postgresql ODBC SQL database
- Mirrored database on hot backup server
- Web page user interface
- Three levels of encrypted password protected security
- Manual and scheduled data collection
  - Real-time data collection of ALERT1/2 self reporting data
  - Remote station polling over telephone, radio, satellite
  - Data imports from data logger and network files
- Manual and scheduled data export to network files
- Automatic validation of collected data
  - Change between reports
  - Change over interval
  - High and low limits
- Alarm checking of validated data
  - High, low and at limit
  - Change over interval with threshold limit
  - No report
- Alarm actions
  - Audible and visual alarm
  - Telephone and email paging
  - Voice dial-out
  - Map display interface
  - Set a hydrologic threat score
- Rating tables compute discharge or other data
  - Unlimited time based table and shift assignment
- Real-time equations
  - Programmed statistical analysis
  - Predefined equations
    - § Basin rainfall average
    - § Dewpoint and wet bulb temperature
    - § Vapor pressure
    - § Evapotranspiration demand
- Data display
  - Tabular data
    - § Column select and sort
    - § Data report edit
  - Report groups
    - § Select data collection points
    - § Select data analysis and interval
    - § Rows of points
    - § Rows of display intervals
    - § Even and uneven display intervals
    - § Column sort
  - Time series plots display data values over time
    - § Plot single or overlaid data collection points
    - § Draw lines, filled areas, histograms
    - § Left and right scales for different data types
    - § Programmable and adjustable scales
- Map backgrounds with overlaid readout data
  - § Import graphical map or schematic backgrounds
  - § Select data collection points
  - § Select data analysis and interval
  - § Data readout position auto-located or user located
  - § Data readout hyperlink displays an action menu
    - Data report display and editing
    - Station setup display and editing
    - Remote station polling
    - Control action
- Data report or statistical analysis over an interval
- Highlight background for hydrologic threat score
- Automatic refresh of a data display
- Automated display schedule
- Statistical analyses include
  - Last and closest report
  - Maximum, minimum, mean
  - Variance, standard deviation, skew, coefficient of skew,
  - Difference, sum, count
  - Period rainfall, storm rainfall, rainfall intensity
  - Rate of change, runtime, volume
- Send control commands
  - Local control
  - Remote control through the telemetry system
  - Rule based decision making expert system software

## Ordering Information

5073NS-5 ..... NovaStar 5 Software, with Manual  
 5073NS-5UP ..... NovaStar 4 to NovaStar 5 Version Upgrade



Model 5073NS-5 NovaStar 5 Software – Alarm setup screen

**MODEL 5096ES  
Emergency Status Sensor**

**General Description**

The Model 5096ES Emergency Status Sensor is designed to be used in conjunction with the Model 5096 Transmitter status input to transmit water level alarms. The Model 5096 Transmitter status input may be configured to transmit alarm data, once the alarm level is reached, for intervals as short as 20 seconds for as long as the alarm level is maintained. The Model 5096 Transmitter status input will accommodate up to eight emergency status sensors.

The switch is a magnetically actuated, normally closed, dry reed switch inside a stainless steel stem. The normally closed operation is standard for alarm applications.

The protective housing is made of perforated steel with a 1 in. pipe fitting.

Electrical connection is made via 24 in. 22 awg leads. The use of 22 awg buried cable for cable runs to the 5096 Transmitter is recommended.

**Specifications**

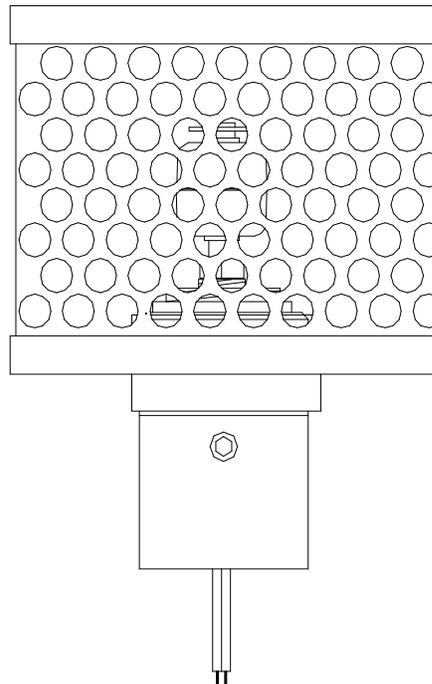
- Height: ..... 6 in.
- Diameter: ..... 5 in.
- Switch: ..... Dry reed, magnetically actuated.  
Normally closed is standard.
- Float: ..... Stainless-steel
- Cable: ..... 24 in. 22 awg leads
- Conduit: ..... 1 in.

**Ordering Information**

- 5096ES.....Emergency Status Sensor
- 5096ES10.....10 Pin Cable Connector for Interface to 5096 Transmitter (Round Canister Models)
- 5096ES-DBC.....Direct Burial Cable (22 awg), per foot



*Model 5096ES Emergency Status Sensor*



*Model 5096ES Emergency Status Sensor*

## MODEL DCU-11 Self-Contained Ultrasonic Level Sensor

### General Description

The Model DCU-11 Ultrasonic Level Sensor is a highly accurate distance sensor used to measure water level. Units with maximum measurement ranges of 35 ft. and 50 ft. are available. The self-contained feature eliminates the necessity for an external controller. The 4-20 mA and trip point outputs of the Model DCU-11 are programmable to anywhere within the sensing range.

The unit is contained in rugged PVC housing which is environmentally sealed and enables the sensor to provide reliable performance in harsh environments for extended periods of time.

A keypad is mounted on the back of the sensor and is opened for initial setup. The keypad is then sealed with an O-ring fitted cap to preserve the NEMA-4 rating while the sensor is in operation.

The Model DCU-11 is microprocessor controlled to enable total programmability and signal filtering capabilities. The AutoSense software provides automatic filtering of unwanted echoes received back from the perimeters of the ultrasonic beam pattern. This software also provides automatic adjustment of the sensitivity of the sensor. Temperature compensation is achieved by use of an internal thermistor which preserves the sensor accuracy over a wide range of temperatures.

### Features

- Simple to use
- Low cost installation
- High accuracy
- Microprocessor controlled
- Self-contained rugged housing
- Low power
- 2 Adjustable solid state relay outputs
- 4-20 mA output
- Seven trip point configurations plus 27 programmable modes



Model DCU-11 Ultrasonic Level Sensor

### Specifications

Supply voltage: .....	12 to 30 Vdc
Operating temperature:.....	-30 to 60 °C
Outputs:.....	4 to 20
	2 solid state form A relays
	200 mA max.
Resolution:.....	0.1 in. (2.54 mm)
Accuracy:.....	0.25% of range with no temperature gradient
Total current drain: .....	180 mA max. at 24 Vdc
Sample rate: .....	1 to 8 Hz
Beam pattern: .....	9 degrees off axis
Diameter: .....	3.5 in. (89 mm)
Length:.....	13 in. (330 mm)
Cable: .....	6 ft. (1.8 m), 10 conductor 22 AWG with shield PVC jacketed with MS Connector
Weight: .....	8 lbs.
Shipping weight: .....	10 lbs.

### Ordering Information

DCU-11 .....	Ultrasonic Sensor
	Specify range: 1.5 to 35 ft. or 2 to 50 ft. range.
DCU-11-C .....	Additional Cable, per foot

## MODEL 5096 Real-Time Data Transmitter

### General Description

The Model 5096 Real-Time Data Transmitter collects, processes, and transmits analog and digital sensor data on events and timed intervals. The collection, processing, and transmission of sensor data is controlled by parameters that are easily programmed using a terminal or computer with standard communications software. Communications with the transmitter is through an RS-232 port.

The Model 5096 Data Transmitter features on-board data logging capabilities. Data is stored automatically in memory as backup to radio transmission or as a stand-alone data logger. The 24K memory capacity can store up to 4,000 event data points or more than 12,000 data points at uniform time intervals. Data can be downloaded using a portable computer during onsite visits.

The Model 5096 Data Transmitter is field-programmable, including a full set of commands for sensor setup and data logging. You can set and read sensors, access on-line help, and perform diagnostics at the remote site. Sensor parameters can be individually set, including transmission intervals, sample intervals, and starting values. Sensor data can be calibrated to report in engineering units. For firmware Versions 3.1 and later, no programming is required with default program setup for standard sensors.

The Model 5096 Data Transmitter logic board has up to 4 digital inputs, 7 analog inputs, and 8 digital status lines for a wide variety of sensor configurations. The battery voltage can be set to transmit at selected time intervals. Each sensor's default identification number is based on the setting of the 4 digit ID switch. Each sensor ID number can be programmed to any other unused number between 0 and 8191. The programmable ID feature helps avoid ID overlap when adding additional transmitters to an existing ALERT system.

The Model 5096 Data Transmitter includes a TEST button, LED indicators, and test points for diagnostic testing. The TEST function checks memory, both RAM and ROM, clock functions, and sensor values. Active sensors are read and their values are transmitted.

The Model 5096N is housed in a NEMA-4X fiberglass enclosure and is designed for outdoor mounting onto a panel or a mast as well as indoor wall-mounting. The 5096N can be equipped with a radio and used as part of a telemetry system, or it can be used as a stand alone data logger.



*Model 5096 Real-Time Data Transmitter*

### Model 5096 Firmware Upgrades

The newest 5096 Data Transmitter 9601-01 firmware release on January 30, 2006 is **Version 4.4.1**. This release contains all the features introduced in previous releases.

Some added firmware features include "Plug and Play" parameter sets for the Package Data Transmitters: 5096-54, 88, 90, 81 & 5096N. The SHOWALL command displays all active sensor parameter sets, current raw and calibrated readings, and station setup parameters. The rain gauge counters can be reset to zero on a programmed day of the year. A "Listen before Talk" radio feature waits for no radio carrier before transmitting data reports. Multiple level tests transmit all sensor data, transmit tone or no tone. The Enhanced IFLOWS protocol data format is supported. A dial-in modem connection allows telephone polling and data transmitter setup.

Contact HydroLynx to request a complete list of enhancements.

