

APPLICATION NOTES CATALOGUE

UNIDATA ENVIRONMENTAL MONITORING AND INDUSTRIAL MEASUREMENT



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IRRIGATION CHANNEL MEASUREMENT AND CONTROL



APPLICATION BACKGROUND

Open-channel irrigation water intakes can be monitored for water level / flow and they can be optionally controlled by opening and closing a gate to deliver programmed flow.

This technology can save water and cost of water and can eliminate the hands on requirements of a manual system.

Such systems enable irrigators to monitor and control the water they are allowed to take from rivers and streams for irrigation. These range from basic monitoring-only to an automated and tele metered solution, where irrigators can access their system remotely via the internet using a smartphone, as if they were at the site.

APPLICATION DETAIL

The simplest option is monitoring-only. However many clients opt for full automation - with automatic gate control - which reduces the need to carry out manual tasks such as adjusting gates and downloading data.

A typical system is comprised of these interlinked parts:

- A flow measurement section, a weir/flume fitted with a water sensing structure.
- A Neon Remote Logger for logging data and transmitting it.
- An optional inlet gate structure with gate control system.

In the basic monitoring system, the abstracted flow is measured and recorded by 6541 Precision Water Level Instrument. This option may be sufficient where there is no gate control or when an irrigator is happy to control the flow with a manually-operated gate and periodically download flow data.

In an automatic monitoring system, a control gate automatically adjusts its position to maintain the flow within a user programmed target range. The gate controller receives flow rate information from the flow measurement instrument and compares it with the target.

If the flow is lower than the target the controller increases the gate opening to increase the flow and vice versa. The gate controller adjusts the gate to keep the flow on target.

Because the Neon system is Internet-capable it also enables you to monitor the site and allows you make changes to the flow target, without having to visit the site. It allows you to view activity, data and to change flow settings via the Internet, saving time and reducing operational costs. Telemetry of data, between the site and the Neon server, is possible anywhere there's cellular or satellite coverage at the site.

Neon provides a window on your irrigation monitoring system. You can check it remotely at any time, or change flow targets (for sites with flow control gates), by viewing secure data from your telemetered sites over the internet. And you don't have to do this from your desktop computer. Your smartphone can provide a mobile view of flow and gate control status, wherever there's cellular coverage. If your site has a control gate, you can also use your phone to change the flow.

If 'out-of-range' flows or other malfunctions should occur, with telemetered sites, you can receive programmed alarms via text or email.

Any required flows can be programmed allowing irrigators to set exact flow requirements. The weir is usually hydraulically coupled to the stilling well. The Neon Remote Logger converts water level from the sensor to flow rate. It also provides feedback for the gate controller and can be accessed by a standard web browser.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument
Water Level Instrument	6541C-11	WLI with 500mm Pulley & Alk Batt Metric
Float	6541F-115	WLI Float Assembly - Cylinder 115mm (other options available)
Float Line	6541D-M	WLI Beaded Float line Metric

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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SOIL MOISTURE MONITORING



APPLICATION BACKGROUND

Soil Moisture Monitoring is used in agricultural water management applications such as irrigated fields, and in the turf industry for large grassed areas such as sports playing fields and market gardens to optimise the use of reticulation / irrigation system water usage. There is also a very large installed base in the viticulture industry.

These systems may employ a range of different soil moisture sensors. The simple approach is to measure soil moisture directly and then decide on the best settings for a reticulation / irrigation system.

A more complex and more detailed approach is to measure Evapotranspiration (ET). ET is the most significant indicator

to measure water movement for agriculture. ET refers to two processes: water loss from surfaces such as soil (evaporation) and water loss from the leaves of crops (transpiration).

The weather affects ET like solar radiation, air temperature, air humidity and wind speed. But ET also depends on the nature of the crop, how it changes with time and soil moisture levels.

Evaporation and transpiration occur simultaneously and dependently, so are treated as one process. When a crop is first planted, the soil is exposed to the sun and most of the water loss initially is through evaporation. But as the crop grows and starts to shade the soil, evaporation decreases and transpiration increases.



APPLICATION DETAIL

For the simple approach single soil moisture sensors can be an older style of gypsum block, measuring resistance across that block or a modern sensor using Time Domain Reflectometry (TDR) techniques to send out a pulse and measure the return echo to determine the water / moisture content of the soil.

The soil moisture sensor is connected to a Neon Remote Logger and a scheme / program is set up to measure, store, and optionally display soil measurement data locally, or routinely send that data via the internet to a Neon Server, so it can be viewed on a standard web browser.

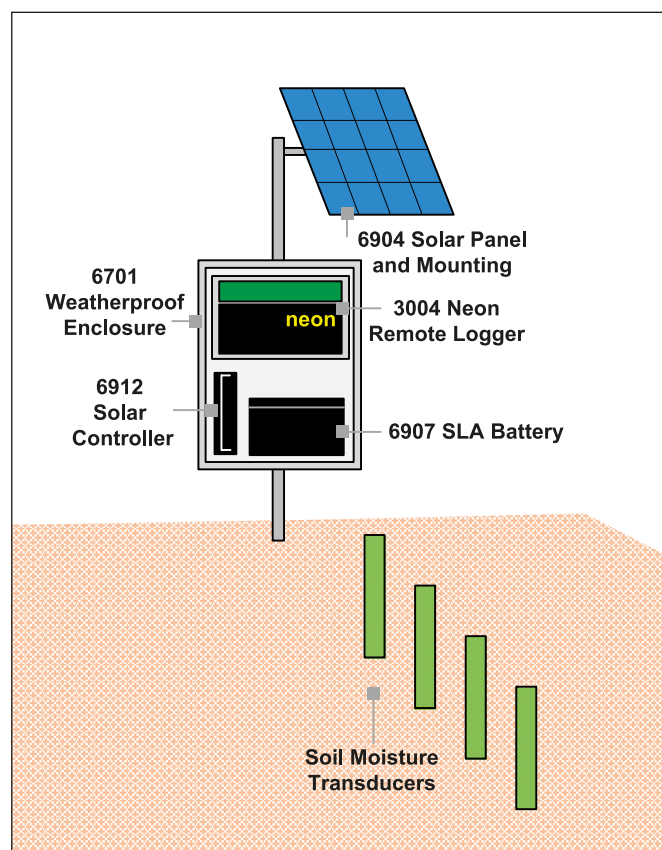
The Neon Remote Logger can also be programmed to react to certain events. For example, if it has rained and the soil is very moist, the data logger could be programmed to signal an irrigation system that it did not need to run at that time.

The turf industry, especially those that operate on sandy soil areas has been slow to take up soil moisture monitoring. With recent advances in technology and communications, however, soil moisture monitoring is now a real option.



Modern soil moisture probes are reliable and affordable. Telemetry options, like mobile phone or satellite network modems are becoming more and more affordable as well. Moving data from the field to the website as well as access to this data through either, mobile web browsers or specialised mobile apps, makes it easy for turf manager and irrigators to check soil moisture readings whenever they need.

The Unidata partner, Future Turf, produces a complete system. This turf irrigation tracker system is easy to install and there is minimal disruption to the sports oval playing surface. The user gets instant





collection and transfer of data through its “plug and play” nature and soil moisture data is well presented on easy to understand graphs either on an iPad or Laptop. It is also easy to relocate the probe if needed.

The Irrigation Tracker generates important information for irrigation managers, such as confirmation of the amount of irrigation applied, monitoring irrigation depth, monitoring the soil moisture status of the root zone, monitoring root zone salinity and monitoring root zone soil temperature.

The Irrigation Tracker components are securely housed in a standard valve box or buried below the turf surface. A 40cm sub-surface probe with four sensors measures soil moisture, salinity and temperature at 10, 20, 30 & 40cm depths. The Neon Remote Logger stores data collected from the probe and sends that data back to a Neon Server daily. With a daily reporting period a battery pack can power the entire system for 2 years.

For the more complex and detailed approach to measure ET we can estimate ET from meteorological data, but a far more direct, accurate and defensible measurement uses the ‘Eddy Covariance’ (EC) method. Instruments on the EC tower continuously and rapidly



sample the turbulent airflow that transports water vapor, heat and carbon dioxide used, or given off, by plants during photosynthesis or respiration. This method is accurate, but complex and to get good results, we pay detailed attention to specifics.

The EC tower uses the following sensors to telemeter several parameters needed to accurately calculate ET:

- a sonic anemometer to rapidly and continuously measure turbulence in the air
- a sensor/analyser to continuously measure the concentration of carbon dioxide and water vapor in the air next to the anemometer
- a net radiometer to measure the difference between incoming solar radiation and radiation reflected back to the sky
- a quantum radiometer to measure only that part of solar radiation that the plants use for photosynthesis, when they use carbon dioxide and water to grow
- a pyranometer to measure radiation from sun and sky
- an air temperature/humidity sensor a heat flux sensor to measure heat flow into and out of the ground.

Water passing through the soil can be measured using lysimeters located near EC towers. Sites need careful preparation and require a significant amount of excavation to create two underground bunkers where the measurement equipment is housed.

Containment vessels or barrels can be used to isolate a cylindrical core of the crop along with the soil it grows in.

Barrels like this are then positioned in the field, with the lysimeter opening at the ground level, so it shares the same environmental conditions as the rest of the crop, in this case pasture.

You can measure the amount of water leaching through the contained soil by piping it out the bottom of the barrel to a rain-gauge located below it in the underground bunker. You can then compare the amount of water that flows through the lysimeter (water out) with the rainfall or irrigation (water in) that we measure in another rain-gauge at the same location.

To get a continuous representative vertical soil moisture profile, more than one lysimeter should be used at the same site to measure soil moisture at different depths.

TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Moisture and Temperature Probes	EP100GL-04 / 08 / 12	4, 8 or 12 sensor moisture and temperature probe
WXT536 measures barometric pressure, humidity, precipitation, temperature, wind speed & direction	6501V-H	Vaisala Weather Transmitter RS232 / 422 / 485 SDI-12
Rain Gauge	6506C	Rain Gauge / Tipping Bucket

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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WATER TANK MONITORING



APPLICATION BACKGROUND

Remote water tanks have, for hundreds of years, been checked by staff riding or driving to the tank location to check if there is water available for livestock to drink.

With an automated tank monitoring system, the need to visit each tank to check the water level is no longer necessary. When the

automated system indicates a fault, staff can visit the specific locations to rectify the problem rather than visiting all of the tank locations.

APPLICATION DETAIL

Water is usually pumped from groundwater bores by either a diesel engine or a windmill and is then stored in a large on site tank. The water is usually gravity fed into concrete stock drinking troughs. The drinking troughs usually have float operated cistern like water input systems, where the lowering float operates a valve to allow more water to enter the troughs.

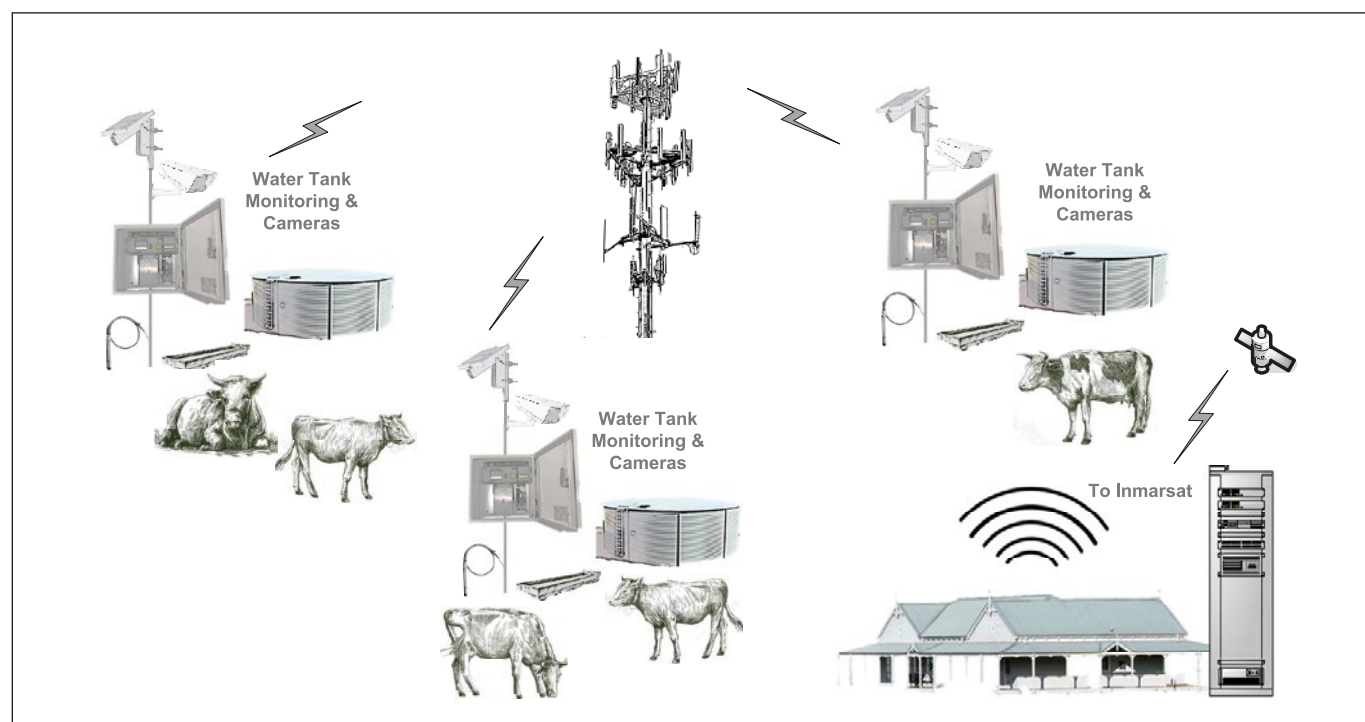
Simple float switches can also be installed so it operates if the trough has more than a certain level. Perhaps three float switches can be installed to indicate different levels within the trough, for example, a high level, a medium level and a low level. Readings from the trough limit switches will allow the staff to know how much water is in the trough.

Likewise float limit switches can be installed inside the main water storage tank, which will indicate the reserve of water remaining in the tank.

If there is a windmill on site, a small proximity switch can be mounted on the windmill rotating shaft and the rotations can be measured to indicate the speed of the windmill at each hour of the day. The number of pulses per hour indicates the speed of the windmill and the pumping capacity of the windmill per hour / per day / per week.

Each float switch is wired back to the Neon Metering Logger which is set up to detect when there is a switch closure. The Neon Metering Logger alarm can be activated based on the specified water level condition and then sent to the Neon server via cell phone, satellite or local WiFi networks. The Neon Server processes the alarm and sends emails and / or text messages to alert operators of that out of limit and potential overflow condition.

The Neon Metering Logger would also record locally all the changes to the switches continuously, including the switch changes based on the proximity switch on the windmill mechanism, storing this data locally every 5 minutes. This routine data would then be sent off to





the Neon Server every few hours / ever day to provide the detailed status of the tank and troughs and the speed of the windmill, or status of a local diesel pump.

Consideration should also be given to adding a low resolution camera to the system, pointed towards the tank and troughs and setting up the camera to take a low resolution photo perhaps three times a day to observe stock movement around the troughs.

A power budget should be performed by Unidata engineers to decide the best power method, usually a small solar panel and sealed lead acid battery.

When considering the best telemetry method, it is expected that cell phone technology will be used where available as this is the most economical method. For very remote locations satellite technology will be needed, and a very low bandwidth system, such as the Inmarsat Regional beam system will most likely be sufficient for this very low bandwidth application.

While other water level sensor types could be used, for example a hydrostatic depth gauge inside or attached to the outlet pipe of the water storage tank, the application is so simple that it is more economical to use simple float switches which can be purchased for just a few dollars.



When this system is set up, staff can view the water levels using a web browser on a computer, tablet or smartphone connected to the internet. The system can be set up with a schematic Node on Neon which displays a mimic diagram the actual levels in the tank and the speed of the windmill.

The low resolution regular photos can also be displayed using the web browser on the Neon Server interface.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Mechanical Limit Switches	Custom Part	Various Industrial Switches
RS232 Camera with 3G/4G NRT	2502E-3E-L	Neon Camera System with 3G / 4G NRT
Ethernet Camera	2502B / C / F	Various IP Cameras
Hydrostatic Water Depth Probes	6542D-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
Hydrostatic Water Depth Probes Titanium	6542D-T-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
4-20mA Pressure Transmitter	6548A-B / C	Submersible Pressure Transmitter 4-20mA 5m or 10m

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

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Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
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Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
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AIR QUALITY AND DUST MONITORING



APPLICATION BACKGROUND

Environmental compliance obligations to limit dust and monitor air quality are becoming more stringent.

Weather Stations which monitor temperature, rainfall, humidity etc are common. Weather authorities provide public information on these parameters. A local Tier 2 weather stations can be set up to specifically monitor specific industrial areas.

There is also a need to monitor air quality and dust levels as well as weather parameters in industrial areas.

Factories and industrial plants need to monitor dust levels on an immediate needs basis, to close down operations when levels exceed the regulatory limits. Local authorities themselves may also need to monitor air quality generally to alert local residents of any immediate unsafe conditions.

These organizations also need to complete weekly / monthly / quarterly reports on environmental compliance generally, and to determine longer term trends.

APPLICATION DETAIL

There are several brands of dust / particulate monitoring instruments and systems. One such brand is the Dust Track monitor, which provides an automated, regular dust measurement.

Typical systems would be set up on the site, perhaps at central and perimeter locations within the industrial area with a solar panel and battery to make the installation easier and to ensure there is a battery backed up power supply, so measurements are maintained in the event of a primary power failure.

Combining a Dust Monitor Instrument and a Neon Remote Logger allows factories and industrial plants to maintain dust compliance and to alert operators of any out of limit dust condition.

There may also be a requirement to monitor the weather in the area using Tier 2 weather station equipment to record the ambient conditions, especially wind speed and direction, so there is good knowledge of the general wind conditions to make sure dust and other emissions from the plant are not being carried by the wind to areas of population, such as a local town or city.

There may be the need for one Tier 2 to be installed at the plant and at each perimeter fence of the facility to get a good reading for the local area.

These systems are usually enclosed in a rugged housing, and mounted on a pole with a solar / battery power source and a Neon



Remote Logger to obtain readings from the Dust Track and routinely (5, 10, 15 minutes) send that data to a central Neon Server.

Alarms can be set up to immediately notify authority by email or text of any out of limit condition.

Long term routine data can also be examined to determine any long term trends with dust conditions at the site, and to also provide for a long term store of the routine data, to assist with environmental compliance requirements.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
WXT536 measures barometric pressure, humidity, precipitation, temperature, wind speed & direction	6501V-H	Vaisala Weather Transmitter RS232 / 422 / 485 SDI-12
Dusttrack II Aerosol Monitor 8530	-	Dusttrack™ II Aerosol Monitor 8530

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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AQUACULTURE MONITORING



APPLICATION BACKGROUND

The aquaculture industry needs to monitor the water quality as well as other water and weather parameters for large fish farms, oyster beds, mussel farms and the like.

If ambient conditions are not ideal, if the water becomes too hot, too shallow or too salty, damage to the crop will result.

Fish farms may be in regions which are difficult to access, so a telemetry system to measure the conditions on the fish farm and report those conditions on a regular basis is important.

There may also be compliance issues, where the fish farm needs to report to the local authorities, that the water parameters remained within safe limits throughout the growth of the fish crop.

APPLICATION DETAIL

Fish farms can install pole mounted systems to measure the Electro Conductivity of the water, to make sure it remains within safe limits. If a measuring system is being set up, a hydrostatic depth gauge and a temperature gauge may also be added to the monitoring system.

Typical systems may have a measurement station every 250 meters, in a grid, throughout the farm and have these measurement stations mounted on a pole in the water or floating on a buoy. Appropriate size solar panel and battery should be added to provide power for the system. Choice of telemetry solution, cell phone, LoRa or satellite, will depend on coverage available.

A fish farm seawater crop expects seawater to be typically 50,000 micro siemens per centimeter. Rivers flowing close by may dilute the seawater to a fresh water environment, typically 1000 micro siemens per centimeter, which could damage or kill the fish crop.

The water parameters, particularly the electro conductivity would be measured every 5 minutes, and stored locally, before being sent up to a central server each hour.

A water depth and temperature sensor could be added so there is a regular check of level and temperature.

The Neon Server would be set up to check each reading coming in from the measurement stations and to generate an alarm if there was an out of limits condition.

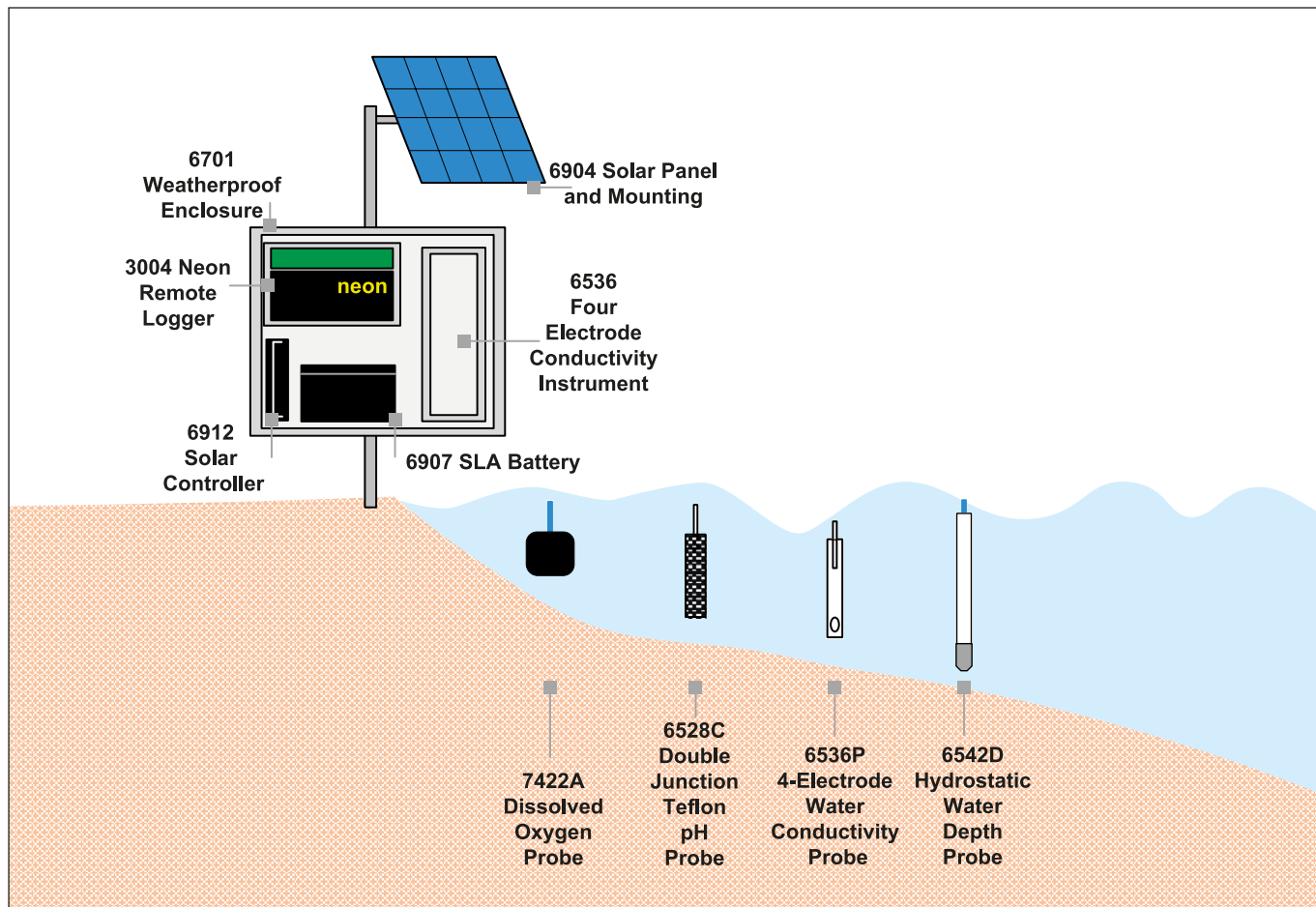


The alarm could be sent by text to the fish farm manager so remedial action could be taken.

Regular monthly reports of the parameters' levels could also be assembled and sent to compliance authorities to maintain licenses and the like.

Fish production / quantities could also be optimised based on long term data from the fish farm environment.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Water Electroconductivity Instrument	6536E	Water EC Instrument with Batt, 512K CMOS memory
Four Electrode Water Conductivity Probe	6536P-2-10 / 20 / 30 / 50	4EL Water Conductivity Probe - 10m, 20m, 30m or 50m
Hydrostatic Water Depth Probes	6542D-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
4-20mA Pressure Transmitter	6548A-B / C	Submersible Pressure Transmitter 4-20mA 5m or 10m

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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EVAPORATION MONITORING



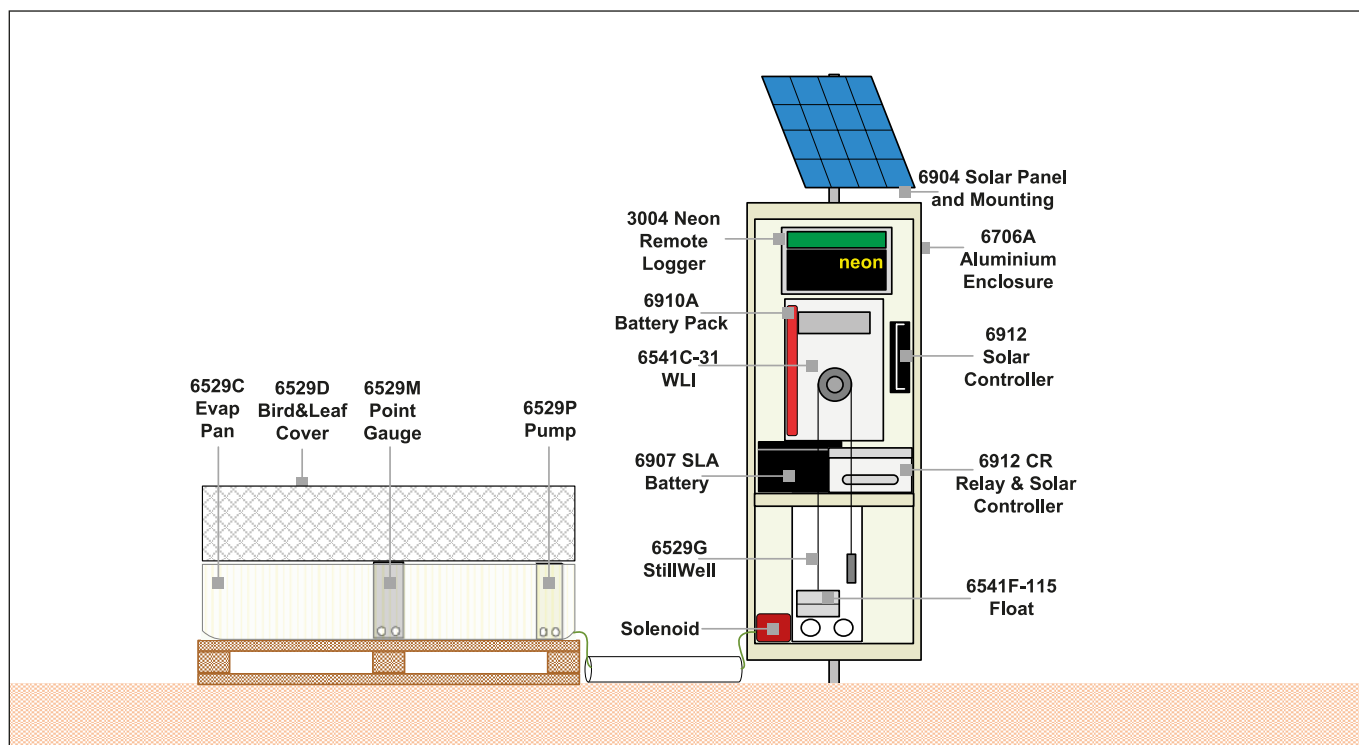
APPLICATION BACKGROUND

The rate of evaporation is defined as the amount of water evaporated from a unit surface area per unit of time. This parameter is an important indicator of the need for water of agricultural area's and also for hydrologists to monitor the water balance of an area.

Measuring the level of evaporation is especially important in mine sites to determine the rate of improvement in water quality.

All Unidata's evaporation systems measure how much water evaporates from a US Class A evaporation pan by measuring the water level in an adjoining still well.

In agriculture people rather talk of evapotranspiration, meaning the combined evaporation of the soil and the transpiration of plants.



APPLICATION DETAIL

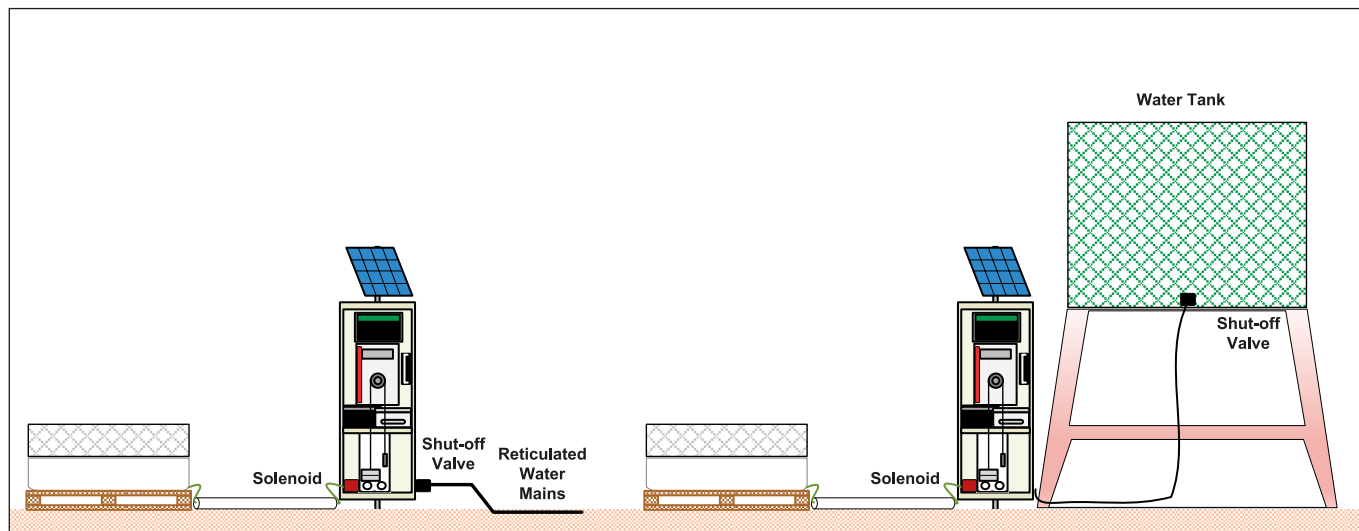
Unidata supplies three models of evaporation system that cover nearly all evaporation measurement applications. Typically these systems are able to be used in dams and other water bodies, mines and remote installations, farms and pastoral leases, salt producers, fresh water producers and irrigation systems. The simplest model is a manually operated unit while the most sophisticated is automated to the point where it requires only infrequent intervention by an operator.

The more complex evapotranspiration monitoring can be performed on a site if weather parameters such as wind, relative humidity, temperature and solar radiation are available. When these parameters are analysed as well, evapotranspiration can be determined by formulae such as Penman / Monteith.

Using a stillwell 6529G reduces the impact of fluctuations in the pan's water level caused by wind. The water level in the stillwell is measured using a modified 6541 Water Level Instrument. This arrangement delivers measurements with a resolution of 0.2mm. An optional thermistor probe float assembly can be purchased separately. This assembly floats on the surface of the water in the evaporation pan to obtain a surface temperature reading.

The simplest model, known as the 6529-1 Evaporation Monitoring System, comprises of an evaporation pan with a bird and leaf cover and a manual measurement system.

These systems need a water supply which may be from a water tap or from a tank on a tank stand.





If an underground tank / water supply is used then water needs to be pumped from that supply to the system.

The 6529-2 Evaporation Recording System is similar to the 6529-1 but includes a precision water level instrument complete with a logger and an LCD display that shows the current depth of the evaporation pan. The addition of the logger means that you can record evaporation measurements over time and have access to its other features such as SDI-12 communications, intelligent battery supervision, telemetry and all the programmability found in loggers.

The 6529-3 is a fully automated system designed to operate for long periods without maintenance. In addition to the features of the 6529-2, it has the ability to automatically refill and discharge water from the evaporation pan. This enables you to manage a water source such as storing and recycling rainwater.



A water temperature sensor and a range of weather sensors can be added to help identify the relationship between evaporation and other site conditions. Typically these are required for evaporation and evapotranspiration studies and modeling.

You can also connect a Neon telemetry system to the system so you can monitor data acquisition, reprogram the unit, check the health of the site, all from a remote location. Cellular, LoRa and satellite communication links are supported. Using a Neon telemetry system decreases the need for time consuming site visits. Remember that when you use one of the telemetry options you will probably need to provide external power such as a solar panel, external battery, and regulator and use a larger enclosure.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Evaporation Recording System Manual	6529-1	Manual Evaporation Recording System
Evaporation Recording System Semi-Automatic	6529-2	Semi-Automatic Evaporation Recording System
Evaporation Recording System Automatic	6529-3	Automatic Evaporation Recording System

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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FLOOD MONITORING / FLOOD ALERTS



APPLICATION BACKGROUND

Early warning of flood conditions is vital to avoid any personal safety incidents and to mitigate damage to crops and infrastructure generally.

Careful measurement of upstream river levels assists with predicting flood levels and the timing of flood peaks. Alarm systems which alert key staff allows for better planning and reduces the impact of flood events.

A resilient, and redundant telemetry system is crucial for such systems. In flood events local power and local cell tower infrastructure may also be damaged by the flood event. The telemetry systems using satellite infrastructure and systems with independent power systems are the best to ensure the measurement stations survive the flood event.



APPLICATION DETAIL

River level monitoring is routine and can be achieved through various methods, the most common being on a float and pulley / shaft encoder instrument at a convenient point inside a stilling well. Unidata's 6541C is an appropriate instrument for this purpose.

A Neon Remote Logger can be used at each level monitoring station to read and transmit the river level data to a Neon Server routinely, typically every 5, 10 or 30 minutes. When the data arrives at the Neon Server, it can be viewed on a standard web browser. The data can be checked automatically for any out of limit / any high river level readings and an appropriate alarm action can be set up. Typically a high level could cause an email or a text message to be sent to key staff, and the messages can be set up with escalation processes, if the operation does not acknowledge the alarm. In these circumstances, the alarm will be sent to other staff on a hierarchy basis until one person acknowledges the alarm.

Monitoring stations may also include a camera, either low definition image, high definition image or low frame rate video to provide further feedback as to the river conditions.





In flood conditions, primary power often fails, so the river level monitoring instrument and the Neon Remote Logger should have an independent power source, typically this would be a solar panel and battery, and perhaps a lithium emergency battery as a further power backup.

Consideration should be also given to the choice of communications channel for the Neon Remote Logger. In flood conditions, cell towers are also at risk of failure. If a cell tower fails in a region, its failure could cause several measurement stations using that cell tower to fail also. A satellite based system eliminates this risk and should be considered for some river measurement stations.

A river measurement station could also be set up for a Neon Remote Logger to use the cell tower as the primary communications channel and another satellite based channel could be available as a backup to make the system more resilient.

During flood conditions, it is often important to illuminate warning lights / warning signs and or audible alarms. The Neon Remote Logger can be configured to provide such control functions on local alarm and / or on a command from the Neon Server.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Water Level Instrument	6541C-11	WLI with 500mm Pulley & Alk Batt Metric
Float	6541F-115	WLI Float Assembly - Cylinder 115mm (other options available)
Float Line	6541D-M	WLI Beaded Float line Metric

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CLO / 3008A-CLO	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-COI / 3008A-COI	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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GROUNDWATER / BORE HOLE MONITORING



APPLICATION BACKGROUND

Groundwater depth measurements (often called bore hole monitoring) help in the management of the important groundwater resource on which we depend for many purposes. In particular groundwater resources may be used up through agriculture or mining operations.

Instruments can easily measure the amount of water that resides in our groundwater so we can manage the resource better.

Measurements can deepen our understanding of the factors that influence groundwater recharge and lead to more effective water management.

APPLICATION DETAIL

Groundwater depth is measured with a small diameter sensor deep in an observation bore hole. Water depth can be measured with a pressure sensor lowered down the bore hole and immersed in the water. This is called hydrostatic depth method.

Alternatively a standard float-and-pulley sensor system with a small (50mm or 100mm) float and a pulley at the top of the bore hole can also be used to measure depth.

The hydrostatic depth method is widely used as it is convenient to install, however all pressure sensors have some drift which needs to be considered. The float and pulley method is less convenient, especially in narrow diameter bore holes of 100mm, however it is very accurate and is not subject to drift.

Unidata offers the 6542 Hydrostatic Water Depth and Temperature Probe which uses the hydrostatic pressure of water to measure water depths in various environments.

These systems are typically installed in existing bores, perhaps with a diameter of 100 to 200mm and a depth of 5 to 50 meters, with a bore head cap, often in a valve box / enclosure or some other form of bore head arrangement.

A data logger / RTU / NRL needs to be added at the top of the bore for data to be recorded and telemetered to a central location on a regular, perhaps 4 hourly basis.

There are generally two types of customers for these systems:

- A government authority which measures the groundwater levels for water table history generally.
- A mining or oil and gas company which has some mining or drilling activity in the area and has a need to ensure there is no change to the groundwater during their mining or drilling processes for compliance reasons.

The data collected can then be viewed, limits checked and alarms set in the event of a sudden change in the ground water level.

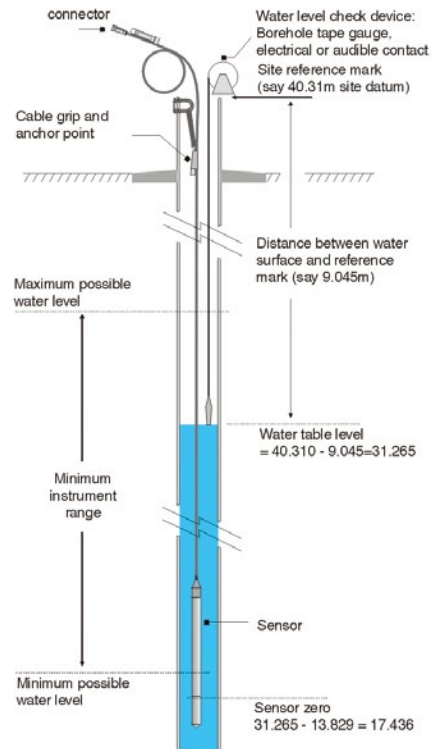
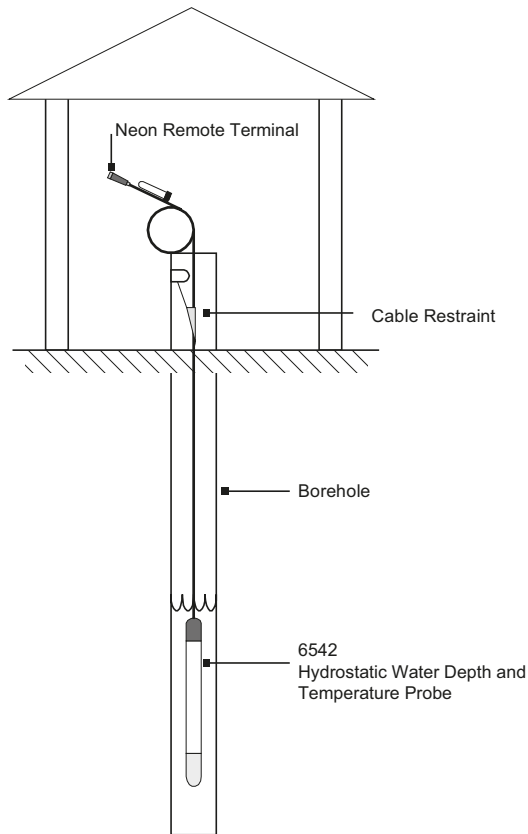
The data can then be passed to a statistical groundwater analysis software package for groundwater modeling purposes.

Unidata offers the 3001M Borehole Logger that is designed for use in boreholes of 100mm internal diameter and above. It can be configured to use either Cellular, LoRa, Iridium or Microsatellite networks as its method of sending sensor data from the field to the Neon Server. A wide range of sensor types are supported, for example, analog sensors, frequency counters, digital inputs as well as Modbus and SDI-12.

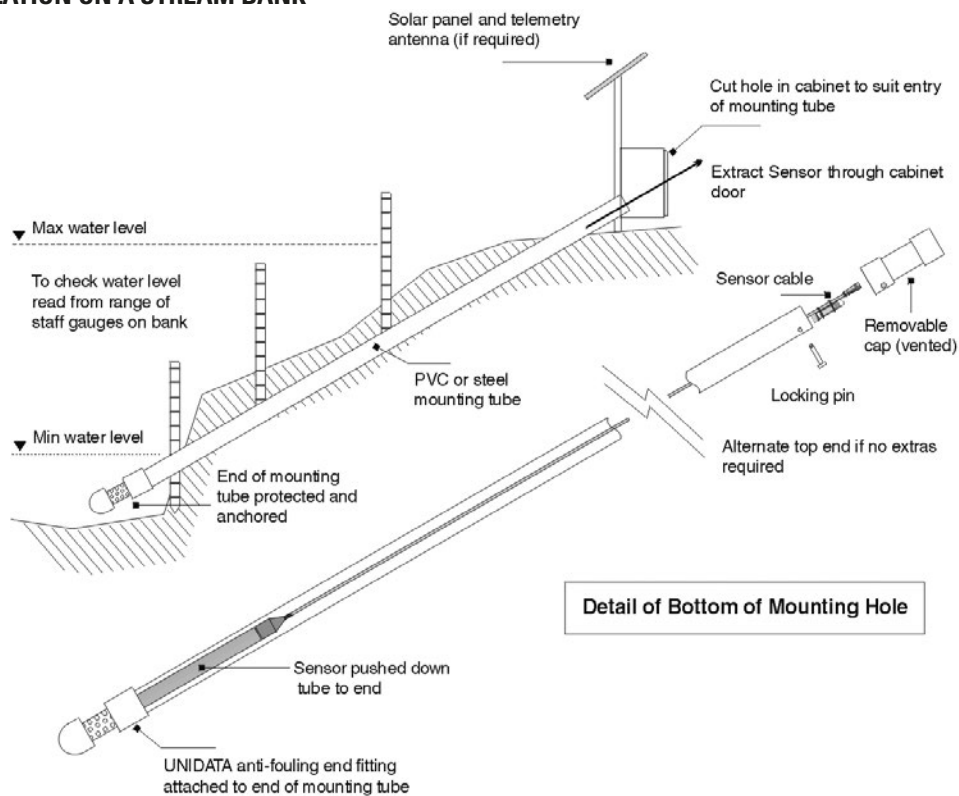
Sensors are connected to the logger via pluggable terminal blocks, SQL connector or a custom specified connector, allowing for easy removal of the logger if servicing is required.



TYPICAL INSTALLATION



TYPICAL INSTALLATION ON A STREAM BANK



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Borehole Neon Remote Logger	3001B-MC / L / I / H	Cellular, LoRa, Iridium or Microsatellite
Hydrostatic Water Depth Probes	6542D-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
Hydrostatic Water Depth Probes Titanium	6542D-T-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
4-20mA Pressure Transmitter	6548A-B / C	Submersible Pressure Transmitter 4-20mA 5m or 10m

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

AVAILABLE FROM: **Unidata Pty Ltd** | 40 Ladner Street, O'Connor, 6163 Western Australia | Tel: +61 8 9331 8600 | info@unidata.com.au | www.unidata.com.au

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MINE SITE ENVIRONMENTAL MONITORING



APPLICATION BACKGROUND

Planning, operating and decommissioning mine sites require detailed long term environmental monitoring and evaluation.

Generally a new mine will not be approved without a detailed environmental monitoring plan, which would be approved by government authorities with an overall objective being that the environment is not changed in any way as a result of the mining operations. As mines may operate for several years, there would be a need to monitor the different stages.

Firstly there will be the need to monitor environmental parameters before any operations commence to determine a baseline for the

local environment. Secondly, when the mine is operating, there will be environmental parameter limits which must not be exceeded during the operations. These parameters need to be monitored and recorded. Furthermore, alarms for out of limits conditions should be set up and out of limits occurrences recorder and analysed.

Finally, when the mining operations have been completed, there is a need to rehabilitate the mine site and restore the mine area to it's original condition.

It is important to monitor the mine site for a period of years to make sure that the site is recovering as predicted.

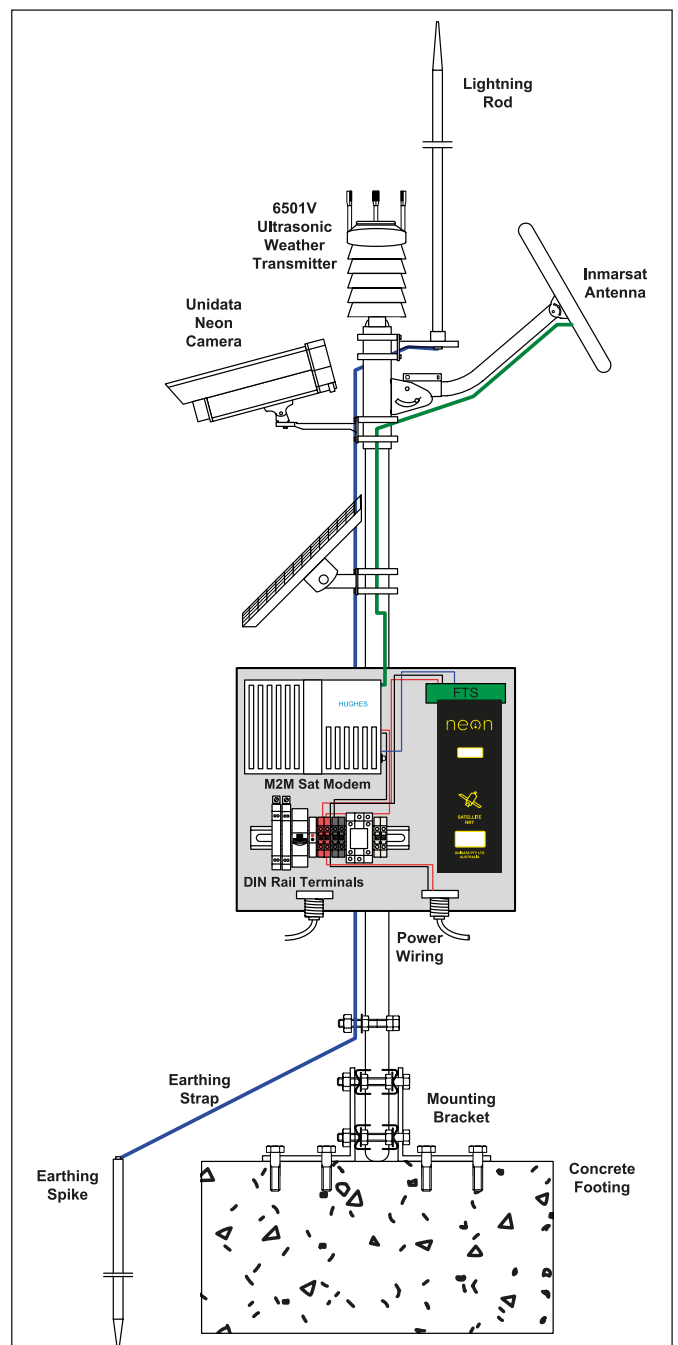
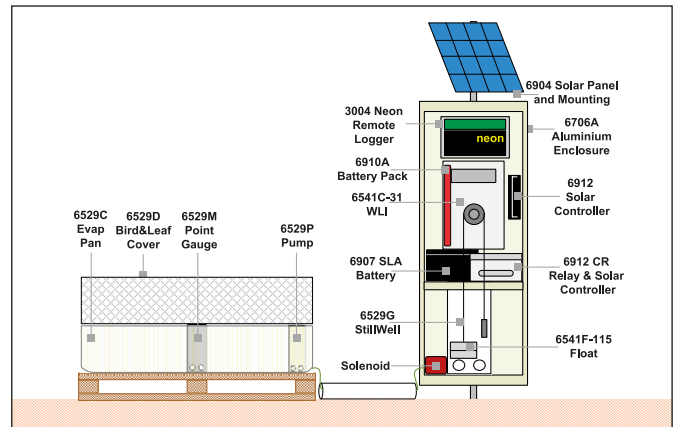
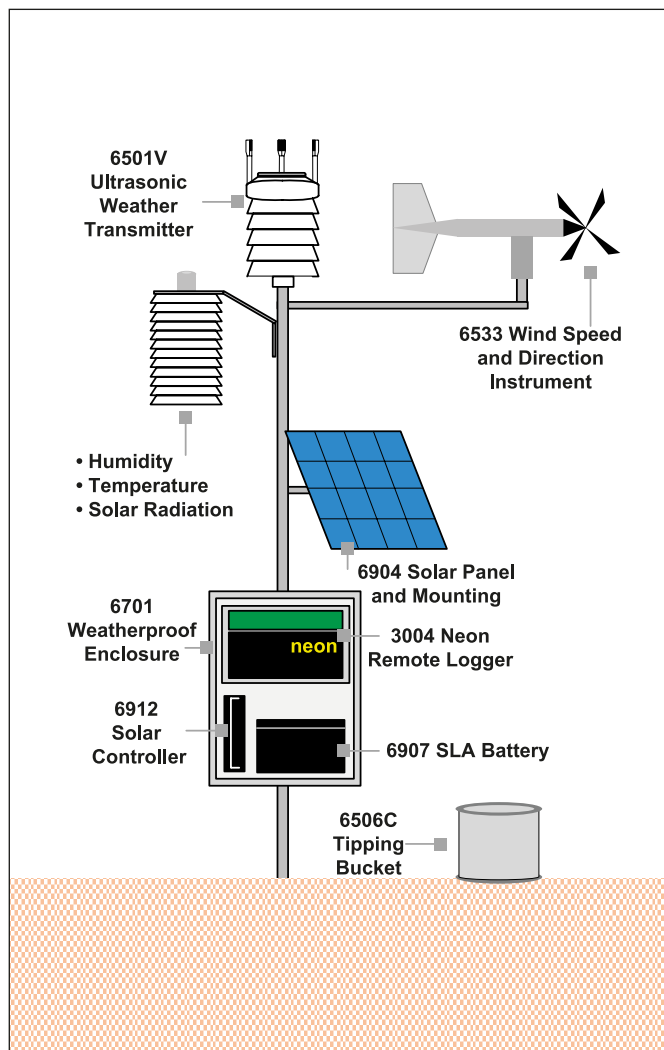
APPLICATION DETAIL

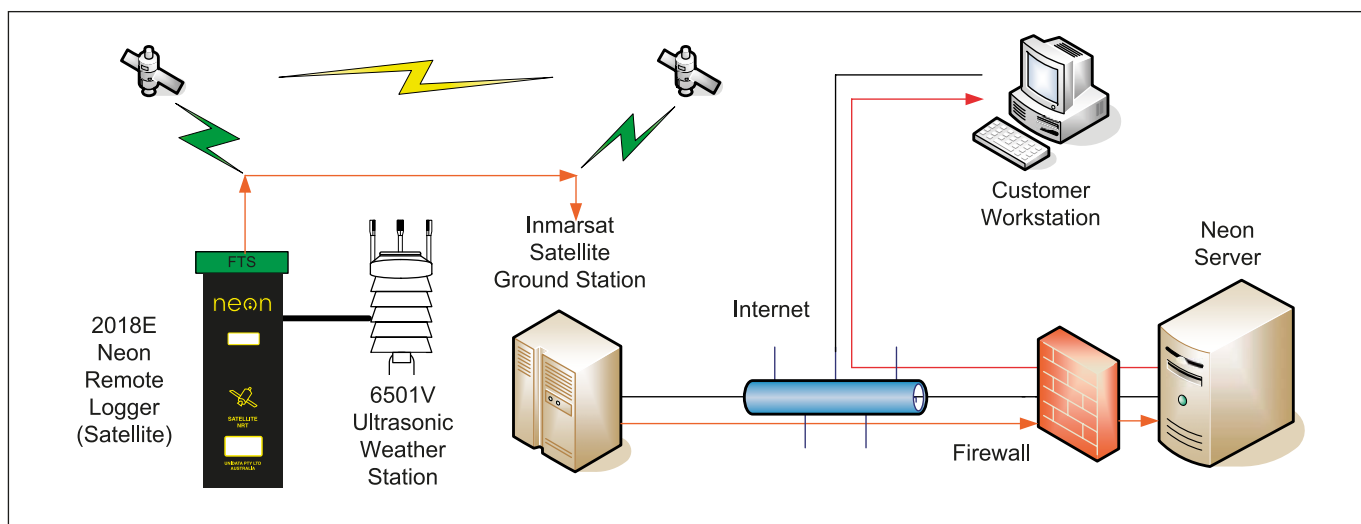
Mostly, there will be a requirement to monitor the weather in the area. For example, weather station tier 2 can be used to record the ambient conditions, like wind speed and direction, humidity and temperature and solar radiation. Collected data helps establish general wind conditions around the mine. This analysis then assists in creating processes that should prevent mine emissions to be carried, by the wind, to areas of population, such as a local town or city.

To get good readings for the local area, there may be the need for multiple weather stations to be installed, for instance, one at the plant and one at each perimeter fence of the facility.

Unidata supplies various weather station instruments, either a multifunction ultrasonic weather transmitter, which is very convenient to install, or a separate discrete weather instruments. For this application, the multifunction ultrasonic weather transmitter would be the best choice.

As well as weather, there may be a need to monitor evaporation, especially important in uranium mines. All Unidata's evaporation systems measure how much water evaporates from a US Class A evaporation pan by measuring the water level in an adjoining still well.





The simplest model, known as the 6529-1 Evaporation Monitoring System, comprises of an evaporation pan with a bird and leaf cover and a manual measurement system.

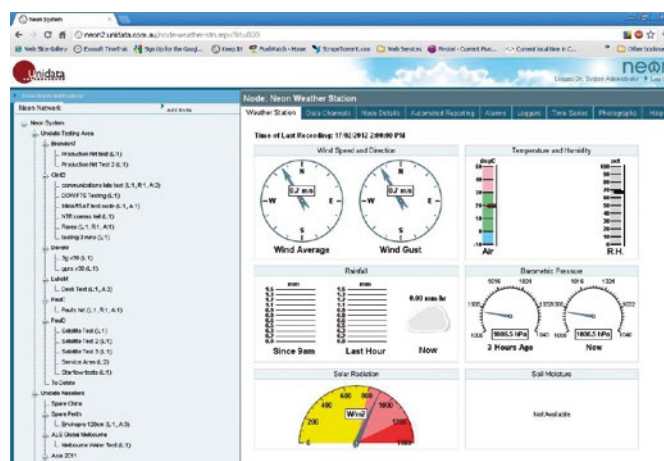
Furthermore, there may be a requirement to add additional instruments to measure the presence of noxious gases and dust. There are many manufacturers of gas monitoring equipment. One such manufacturer is Draeger that offers sensors that measure noxious gases such as CO, CO₂, NO, H₂S, SO₂, as well as O₂ and N. These instruments typically provide a 4-20mA analog or a Modbus output which can be read by Neon Remote Logger routinely, perhaps every minute and then routinely send the data to the Neon Server every 15 minutes.

Monitoring of the water table (Groundwater) in the area will also be needed. Groundwater depth (often called bore hole monitoring) is measured with a small diameter sensor deep in an observation bore hole. Water depth can be measured with a pressure sensor lowered down the bore hole and immersed in the water. This is called hydrostatic depth method. Alternatively a standard float-and-pulley sensor system with a small float and a pulley at the top of the bore hole can also be used to measure depth. These systems are typically installed in existing bores, perhaps with a diameter of 100 to 200mm and a depth of 5 to 50 meters.

Water quality measurements for any local streams or mine site process outflows is important. To comply with environmental protection laws, water quality monitoring instruments should be used for regular water quality audits of any outflows.

These instruments can also be connected with a Neon Remote Logger to scan the instruments inputs, perhaps every few seconds and immediately alert a central Neon Server if there are any out of limits conditions. Logger can send routine data to the Neon Server, utilising either cell phone, satellite or plant Ethernet or WiFi network.

Finally, all of the environmental measurements would be recorded on the central Neon Server system, which is web based, so the data can be accessed from anywhere on the internet. The data could also be exported, via several methods, perhaps each minute, or each hour, or each day to any central environmental monitoring compliance system as required.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
WXT536 measures barometric pressure, humidity, precipitation, temperature, wind speed & direction	6501V-H	Vaisala Weather Transmitter RS232 / 422 / 485 SDI-12
Evaporation Recording System Automatic	6529-3	Automatic Evaporation Recording System
Dräger Gas detection Instrument	Dräger MiniWarn	CO ₂ / CO Gas Monitor
Water Electroconductivity Instrument	6536E	Water EC Instrument with Batt, 512K CMOS memory
Four Electrode water Conductivity Probe	6536P-2-10 / 20 / 30 / 50	4EL Water Conductivity Probe - 10m, 20m, 30m or 50m
Hydrostatic Water Depth Probes	6542D-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
Hydrostatic Water Depth Probes Titanium	6542D-T-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
4-20mA Pressure Transmitter	6548A-B / C	Submersible Pressure Transmitter 4-20mA 5m or 10m

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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RIVERS AND STREAMS MONITORING

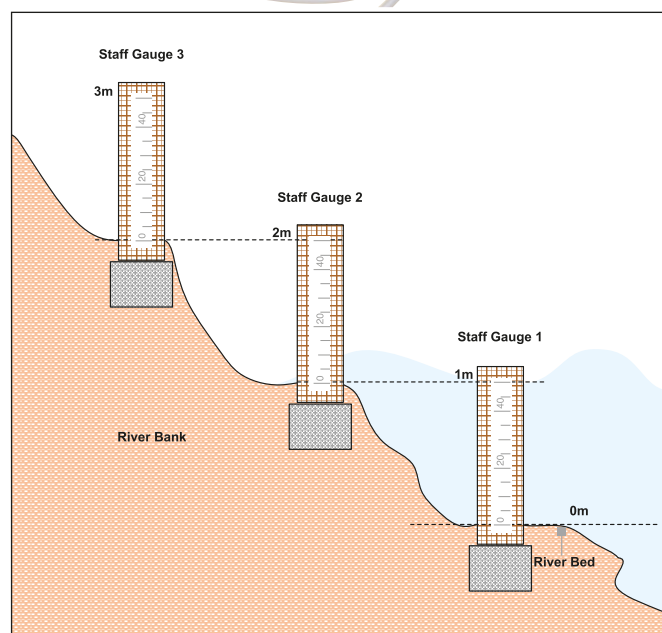


APPLICATION BACKGROUND

Careful measurement and monitoring of streams and rivers is vital to manage water resources throughout the world. Rivers also flood so the careful measurement of river levels can help mitigate damage caused by floods.

River flow measurements are calculated by hydrographers and are analysed by hydrologists and other scientists. To calculate flow, the river level is measured accurately at a certain point in the river, typically at a flume or weir which has known dimensions / has been constructed to a known standard. There are different types for different conditions, for example a flume type generally passes sediment more easily, while a V notch type is not suitable for use in waters with lots of sediment.

The water level above the low point of the flume / weir is measured and the flow is calculated based on measurement results and the shape and size of the flume / weir. For measuring flow of large / wide rivers, manual river gauging process is undertaken. Hydrographers record level and velocity at different depths along the slope of the river bank. From these measurements a set of relationships is determined such that the flow at the certain point in the river can be determined based on the water level at a certain point in the river, so called stage to flow relationship.



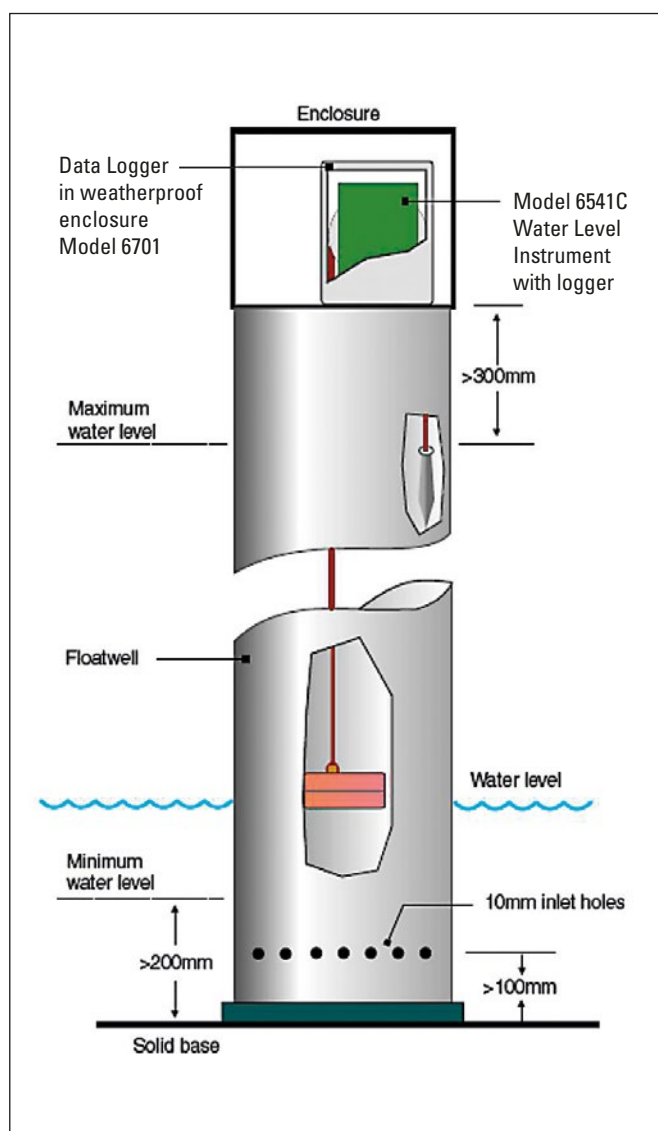
APPLICATION DETAIL

There are several different methods used to measure streams and rivers, and these methods will be summarized below. The measurement of rainfalls is often associated with river measurement stations as local rainfall is a key factor especially in hills or mountainous areas.

Regular reporting of river levels to a central server allows authorities to monitor stream and river flows across a country or region and to use that data immediately if required. For example: flood alerts / flood warnings as well as longer term analysis by hydrographers and hydrologists to manage the rivers / catchments in the long term.

The measurement methods include:

- **Method 1** - a still well or still pipe with a shaft encoder with a float and beaded float line system
- **Method 2** - a pressure sensor which is immersed into the stream or river
- **Method 3** - the more complex pressure bubbler system which allows for a small open tube to be immersed into the stream or river with a gas pump or gas cylinder to inject small bubbles into the open tube and measure water depth by measuring the back pressure required to force bubbles out of the tube in the water.
- **Method 4** - Measuring depth using Ultrasonics Doppler Instrument
- **Method 5** - Measuring depth using Radar





There are many measuring methods available, but still the most common method is shaft encoder float and wheel system.

This method requires a large well or a smaller pipe to be installed on the stream, river bank or on a bridge structure, to provide a stable, not disturbed by flow or wind, measurement environment.

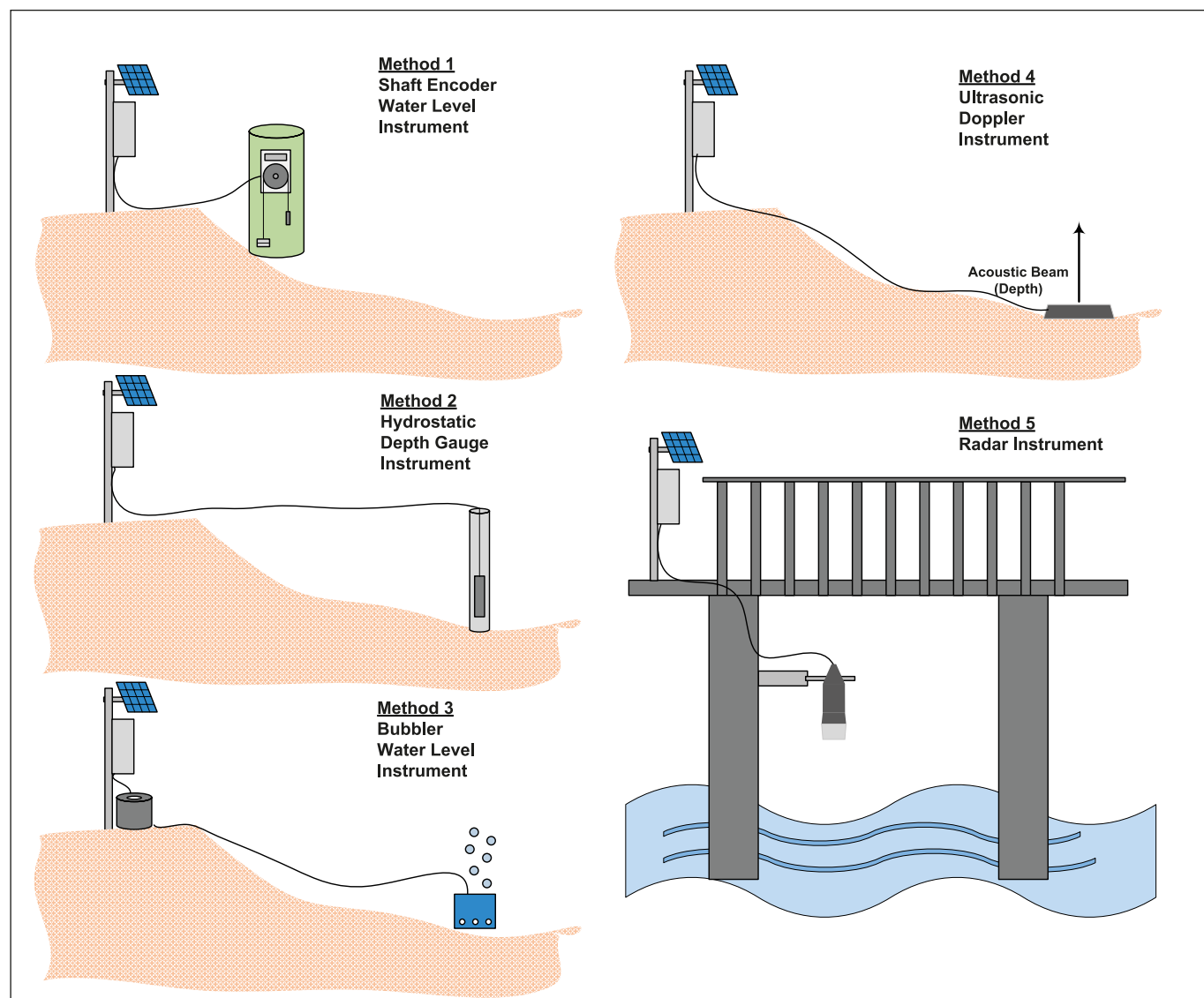
A small float, a float line and a counter weight system will respond to depth / level changes in stream or river. That response causes rotation of the shaft of a wheel. Shaft rotation is measured very accurately by optical encoder and the data is



simultaneously displayed and recorded in the data logger within the instrument.

The Unidata 6541 Precision Water Level Instrument is a very accurate shaft encoder instrument. 6541 integrates both an LED display for displaying water level instantaneously and a data logger for recording / storing water level readings as required.

When a Neon Remote Logger is added, the water level information can be transmitted over the internet to a central Neon server to allow authorities to view the data on the web in near real time.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument
Water Level Instrument	6541C-11	WLI with 500mm Pulley & Alk Batt Metric
Float	6541F-115	WLI Float Assembly - Cylinder 115mm (other options available)
Float Line	6541D-M	WLI Beaded Float line Metric

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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SURFACE WATER MONITORING



APPLICATION BACKGROUND

Local authorities often need to monitor surface water / surface flows which are captured and used to supplement irrigation water for a region.

Surface water monitoring systems provide local authorities with valuable information to help achieve water self-sufficiency. This

should lead to better designed storm water irrigation schemes to alleviate water loss, salinity and flooding problems.

Information would also assist local authorities and communities in minimising the use of scheme water to irrigate sporting facilities and other local parks and gardens.

APPLICATION DETAIL

Many areas suffer shortages of irrigation quality water because traditional surface water catchments are no longer reliable or groundwater sources have become saline.

Local authorities are increasingly turning to schemes which collect storm water from streets, roofs and hardstand areas. Water from these ready-made high yielding catchment areas can be harvested, stored and recycled for watering ovals or sports grounds.

Surface water monitoring systems provide a more accurate picture of yields and water qualities, and assist local authorities in planning for water shortfalls and future irrigation needs.

Such systems would include a measure of water depth, flow velocity, temperature, pH and electrical conductivity. When runoff events occur, these measurement systems can assess how much water flows along drains which collect water from streets, roofs and other hard surfaces found within towns.

The low salinity, low sediment runoff collected would be 'fit for purpose' water, meaning it was suitable to use, for example, as an irrigation supply. However, the water would not be fit for human consumption. Even if used only for watering the town sports grounds, parks and gardens, this would be of enormous benefit, as in many shires these areas generate the greatest demand for town water.





Surface water monitoring equipment measures surface water quality and quantity and transmits the information via cell phone or satellite to a central Neon Server where it can be analysed to make meaningful water management decisions.

Such systems may include instruments to measure water flow, water depth, water quality for example electro conductivity and pH in small open channels and storm water drains and channels. Surface water

movement may also be monitored into and out of small dams and ponds in agricultural areas.

For large pipes and small open channels, an ultrasonic velocity and depth meter can be used to measure occasional flows (during rain periods for example) and also test the water quality of such occasional flows.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument
Water Level Instrument	6541C-11	WLI with 500mm Pulley & Alk Batt Metric
Float	6541F-115	WLI Float Assembly - Cylinder 115mm (other options available)
Float Line	6541D-M	WLI Beaded Float line Metric

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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TSUNAMI EARLY WARNING SYSTEM



APPLICATION BACKGROUND

Natural disasters such as tsunamis often occur without warning to people living on or close to the coastline. In such circumstances, personal injury and death may occur. Any early warning of an approaching tsunami is very important.

Depending on the coastline, a tsunami may arrive at one location before arriving at another location; hence observation points along

the coastline can be equipped with a system to allow an observer to activate notice of an impending tsunami.

Often there will be a central authority which maintains contact with ocean based tsunami monitors and the staff at that central authority may also have knowledge of an approaching tsunami.





DART® real-time tsunami monitoring systems, developed by PMEL, are positioned at strategic locations throughout the ocean and play a critical role in tsunami forecasting.



APPLICATION DETAIL

Unidata equipment, primarily Neon Remote Loggers can be set up with cell phone or satellite internet connections to provide two specific early warning functions, local activation of an alarm and central activation of an alarm.

For local activation of an alarm on sighting of an approaching tsunami, a person can go to the Tsunami Early Warning Equipment (TEWE) located on or near the shore and operate a button which activates the local alarm siren, strobe light and communicates that alarm to the central Neon Server by cell phone or satellite.

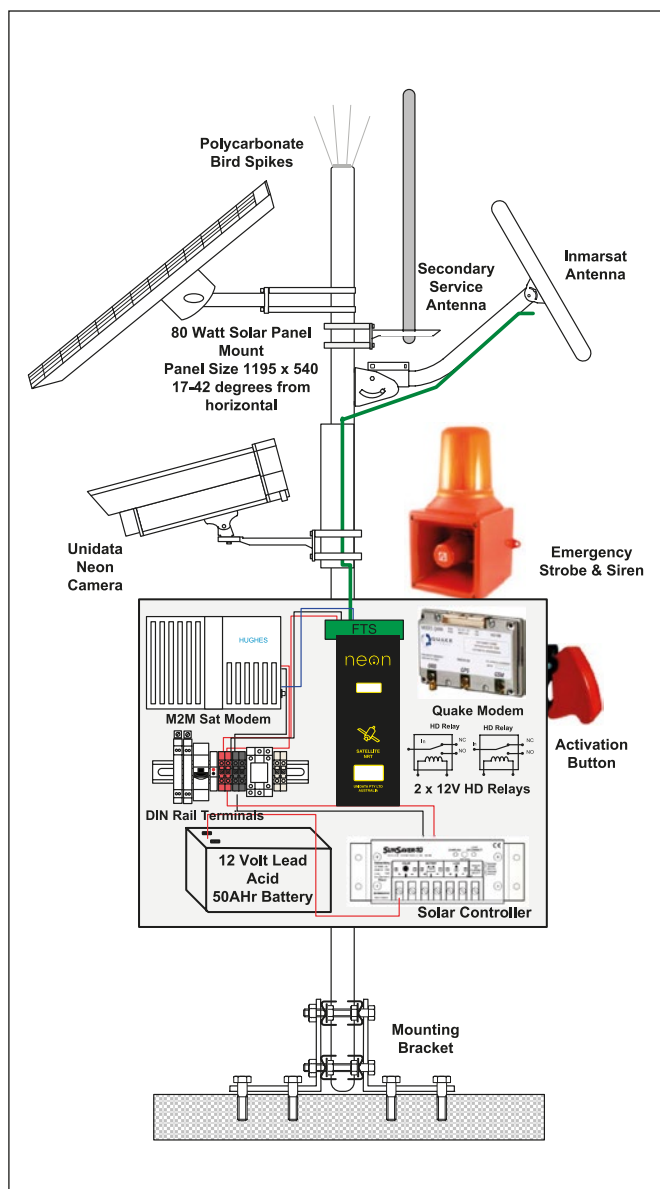
Upon receipt of the alarm at the central location, authorities can then choose to manually activate other TEWE at different locations, perhaps in the same region, to alert the people in the area of the approaching tsunami.

The centrally located system personnel may choose to activate all or a selected regional subset of the remotely located TEWE on advice from other local authorities or a central ocean Tsunami Warning Centre.

The TEWE includes a Neon Remote Logger, a small redundant solar charging system, a redundant battery system, a high power siren, capable of sending an audible warning signal more than 1km away and a high intensity strobe warning light capable of being seen up to 2km away.

The TEWE is a complete package, capable of being installed on or close to the coast.

The TEWE systems routinely communicate with the central Neon Server to confirm operational status on an hourly basis.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Strobes	Custom Part	As per customer requirements
Sirens	Custom Part	As per customer requirements

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

AVAILABLE FROM: **Unidata Pty Ltd** | 40 Ladner Street, O'Connor, 6163 Western Australia | Tel: +61 8 9331 8600 | info@unidata.com.au | www.unidata.com.au

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TSUNAMI MONITORING SYSTEM



APPLICATION BACKGROUND

Natural disasters such as tsunamis often occur without warning to people living on or close to the coastline.

In such circumstances, personal injury and death may occur. Any early warning of an approaching tsunami is very important. Wave height sensors can be installed on or under buoys to measure wave activity to determine tsunami events.

Often there will be a central authority which maintains a 24/7 tsunami warning centre on an ocean by ocean basis, so staff at that central authority can have knowledge of an approaching tsunami.

APPLICATION DETAIL

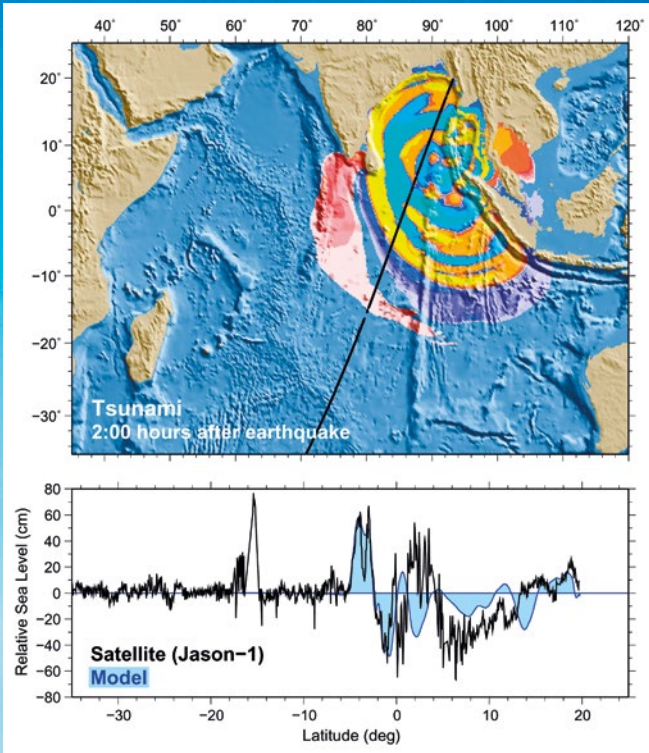
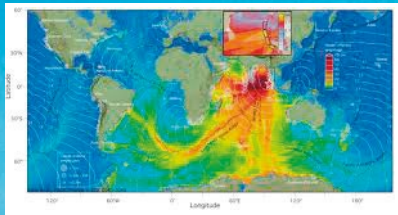
Unidata equipment, primarily Neon Remote Loggers, can be set up with cell phone or satellite internet connections to provide monitoring of wave activity and the real time / near real time transmission of that activity to a central tsunami warning centre for example the Pacific Tsunami Warning Centre (PTWC) in Hawaii.

Wave activity is measured at ocean / coastal buoys, with a submersible sensor typically at 2 meters below the surface of the water. An example is a submersible Druck PI sensor / PTX 1560.

The data collection rate is high, typically 10 times per second (10Hz) and a continuous data stream is sent from the measurement station to a central system, which analyses the spectral components of the depth / period of waves similar to the way seismic data is analysed. This data stream is commonly then sent to one of the ocean wide tsunami warning centres.

The measurement of the wave height is relatively straightforward, however it is challenging to collect this sensor data and also transmit the data out at 10Hz on a continual basis. A high capacity / high speed data logger or RTU is needed. A reasonably high bandwidth link, which is an always available channel, is needed. For close to shore buoys, a 3G cell based system could be used. For ocean buoys, an equatorial satellite system is needed.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Wave Monitoring Systems	Custom Part	As per customer requirements

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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WATER FLOW MONITORING



APPLICATION BACKGROUND

Simply recording water depth does not provide a reliable measure of water flow, for example, depth may vary while flow remains constant. In such cases it is essential to measure depth and velocity and then determine the flow measurement.

Unidata's Starflow Ultrasonic Doppler instrument is ideal for smaller open channel and pipe measurements as it is a complete hydrographic data collection system.

Starflow measures water velocity, depth, flow and temperature, enabling you to do a complete stream study with a single instrument.

Starflow operates in a wide range of water qualities from fresh streams to primary sewerage channels. It measures both forward and reverse flows, and is particularly useful at sites where a stable stage / velocity relationship does not exist.

For very small flow monitoring the Unidata Tipping Bucket Flow Gauge can be used.

APPLICATION DETAIL

Open channels, partly filled pipes, and natural streams have very complex velocity characteristics. Turbulence, waves, stream slope, bed and wall unevenness, rocks and debris, all combine to create an unpredictable velocity profile.

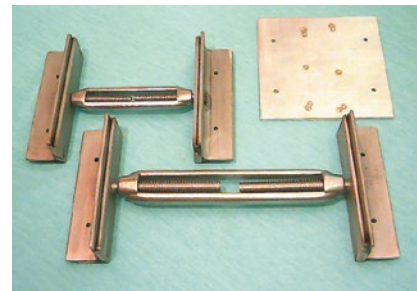
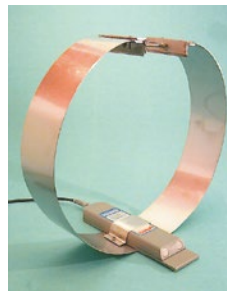
To account for these effects Starflow analyses up to one thousand separate velocity measurements and statistically determines the mean velocity. This approach provides a good “average velocity” even under difficult conditions.

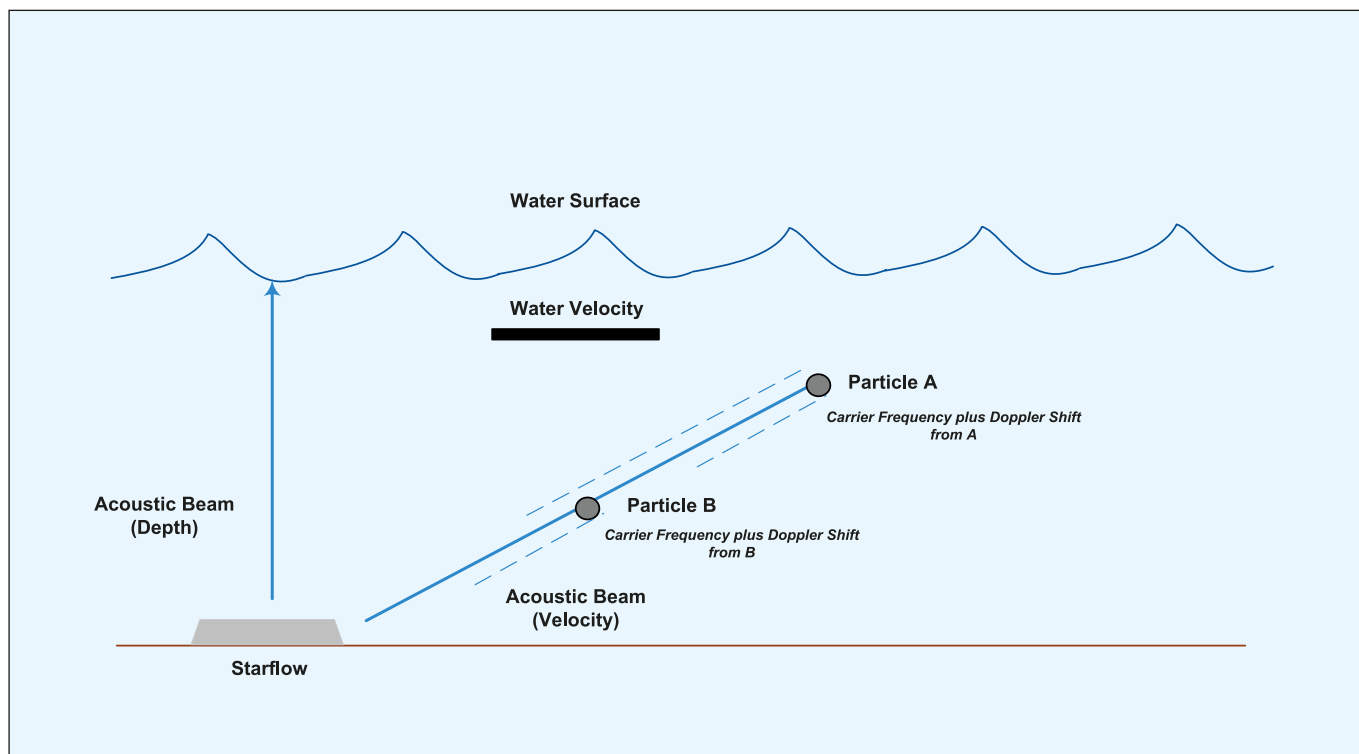
Note, however, that Starflow is not a “current profiler”, that is, it does not record a detailed velocity profile.

The Starlog companion software allows a user to define the stream, channel or pipe profile, so that the velocity and depth readings can be converted to a true flow reading.

Starflow contains an micrologger with 512kb of memory; enough for 250,000 measurements. It will acquire instantaneous, maximum, minimum and averaged readings. Starflow is equipped with the SDI-12 communications facility, intelligent battery supervision and an interface to a telemetry system, such as Neon.

Starflow Instrument can connect to an SDI-12 Data Recorder as a slave or it can act as an SDI-12 Data Recorder master to which other SDI-12 instruments can be connected. You will generally mount the Starflow on (or near to) the bottom of the stream, pipe or culvert where you are measuring flow, however you can also mount it on the side of larger channels.





A single cable connects the instrument to a 12VDC power source. The unit also provides a control output for initiating a water-sampling unit. The sampling control is fully programmable and can be based on flow, velocity, depth or a combination of these conditions. By connecting a rain gauge you can make a complete storm water monitoring system.

Starflow can be equipped with the 6256LCD Starflow Liquid Crystal Display Module to display the values obtained from the most recent scan on demand. The 6526LCD is packaged in a compact weatherproof polycarbonate enclosure, fitted with pre-wired SQL type connectors.

A Neon Remote logger can be connected with the Starflow Instrument in order to record and transmit measured perimeters to a Neon Server routinely. When the data arrives at the Neon Server, it can be viewed on a standard web browser. The data can be checked automatically for any out of limit readings and an appropriate alarm action can be issued.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument
Tipping Bucket Flow Gauge	6506G / 6506H	Flow Gauge 75ml / 130ml

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

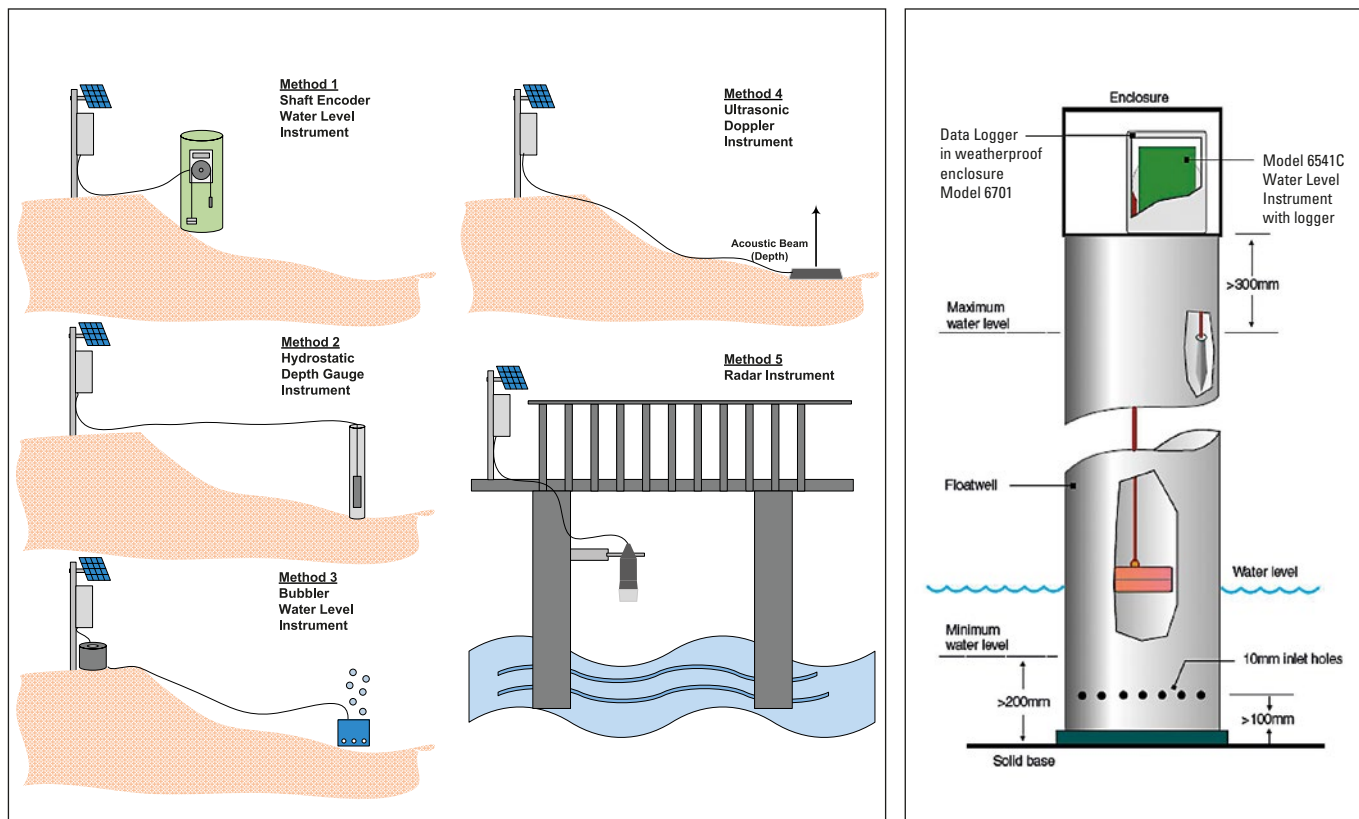
DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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WATER LEVEL MONITORING



APPLICATION BACKGROUND

Water level can be measured using any one of the methods below:

The measurement methods include:

- **Method 1** - a still well or still pipe with a shaft encoder with a float and beaded float line system.
- **Method 2** - a pressure sensor which is immersed into the stream or river.
- **Method 3** - the more complex pressure bubbler system which allows for a small open tube to be immersed into the stream or river with a gas pump or gas cylinder to inject small bubbles into the open tube and measure water depth by measuring the back pressure required to force bubbles out of the tube in the water.
- **Method 4** - Measuring depth using Ultrasonics Doppler Instrument 6527.
- **Method 5** - Measuring depth using Radar.

There are many measuring methods available, but still the most common method is a shaft encoder float and wheel system.

This method requires a large well or a smaller pipe to be installed on the stream, river bank or on a bridge structure, to provide a stable, not disturbed by flow or wind, measurement environment.

A small float, a float line and a counter weight system will respond to depth/level changes in stream or river. That response causes rotation of the shaft of a wheel. Shaft rotation is measured very accurately by optical encoder and the data is simultaneously displayed and recorded in the data logger within the instrument.

APPLICATION DETAIL

The Unidata Model 6541 Precision Water Level instrument can achieve operating accuracy and resolution of 0.2mm. This accuracy is maintained for the service life of the instrument without calibration or maintenance, apart from battery changes.

The 6541 instrument has the range to monitor surface and underground waters, and the precision to monitor rainfall and evaporation. The very low mechanical friction and inertia of the instrument means that it can produce data with high precision and accuracy. Unidata Precision Water Level Instruments have been installed at over 5000 sites.

The power consumption of this instrument is tiny, only a few micro amps is needed to operate it, so it can be run on a single battery pack for more than a year.

The 6541 instrument is normally "connected" to the water surface by a float system. On installation, the instrument is set to display the water level. An optical encoder is mounted on the input shaft so, as the water level changes, the input shaft and encoder rotate. The rotation of the encoder is continuously monitored so the instrument tracks water level changes. These changes update the LCD display.

Choice of encoding wheel diameter, length of float line and type of float will depend on the site conditions and measurement objectives.

A Water Level Instrument can be equipped with an internal micrologger that can store measured data or connected to a Neon Remote Logger to provide a temporary store of the data until it is transmitted to a central Neon sever on a regular basis.

When connected with a Neon Remote Logger you can monitor data recorded by the instrument and check the health of the site, all from a web browser on the internet.

This can be done over cellular or satellite communication links. Using telemetry decreases the need for time consuming site visits.

When you use one of the telemetry options you may need to provide external power such as a solar panel, external battery, and regulator.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Water Level Instrument	6541C-11	WLI with 500mm Pulley & Alk Batt Metric
Float	6541F-115	WLI Float Assembly - Cylinder 115mm (other options available)
Float Line	6541D-M	WLI Beaded Float line Metric

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CLO / 3008A-CLO	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-COI / 3008A-COI	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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WATER QUALITY MONITORING



APPLICATION BACKGROUND

Water quality measurements are performed for water in streams, rivers, lakes and in groundwater systems.

There are different parameters that can be measured and used as indicators of water quality, for example electro conductivity (EC), acidity or alkalinity of a solution (pH) or dissolved oxygen (DO).

Water depth, flow and temperature can add valuable insight into water quality. For that purpose 6542 hydrostatics depth probe or 6526 Starflow instrument can be added to a water quality measurement station.

APPLICATION DETAIL

Unidata supplies a wide range of water quality systems. In the example shown in the illustration, water conductivity, temperature, pH, dissolved oxygen and water depth are measured and data stored and wirelessly transmitted by a Neon Remote Logger.

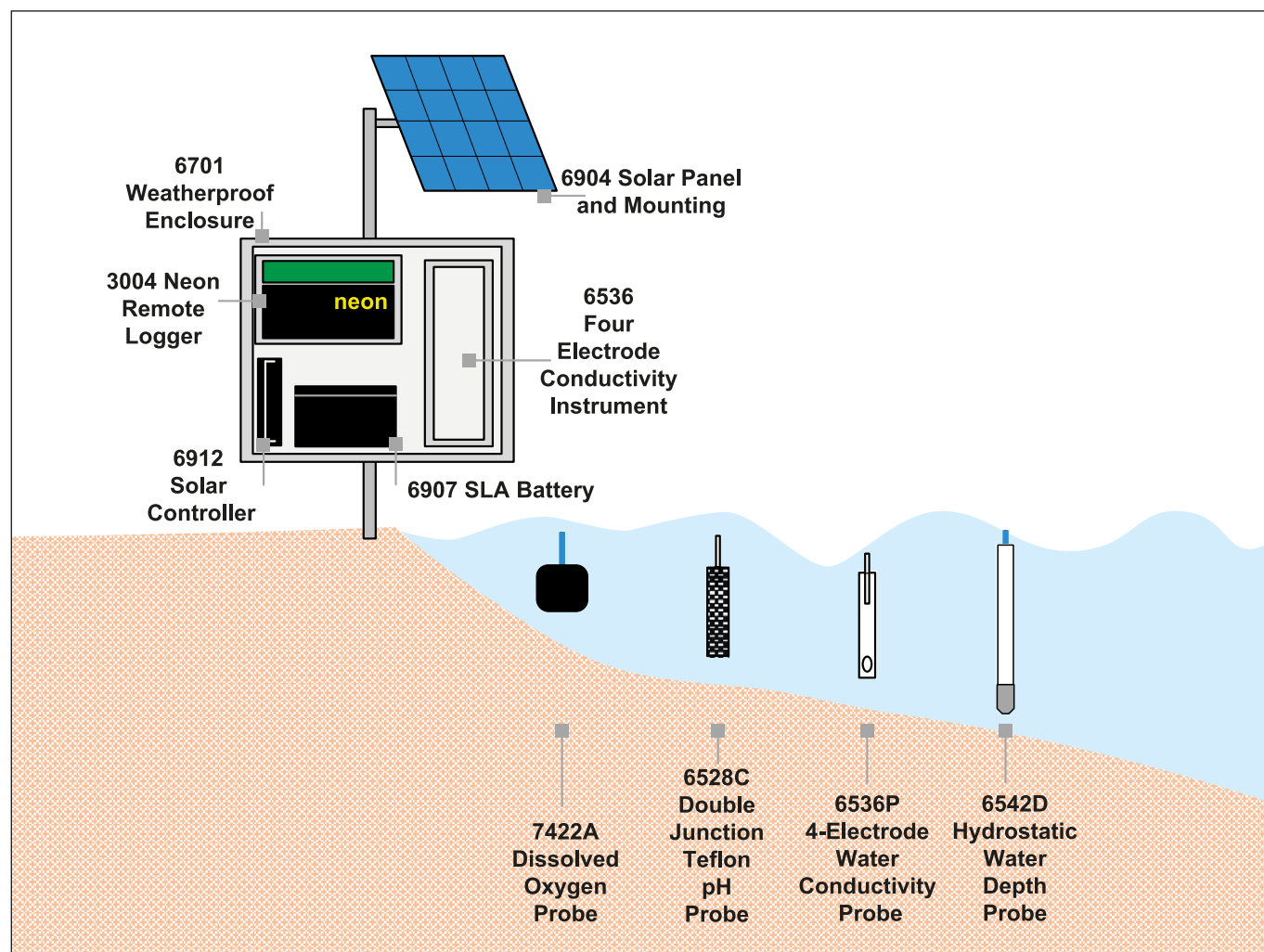
The water conductivity probe 6536P-2 is connected to the 6536E Water Electro Conductivity instrument via an SDI-12 bus. The 6536E Conductivity instrument runs local scheme to collect conductivity reading every 5 minutes. Neon Remote Logger is set up to collect / log readings from conductivity instrument, pH probe, dissolved oxygen probe and hydrostatic depth probe every hour and to transmit this data to central Neon server every 4 hours.

Ultra low-power consumption of this system set up is ideal for remote, unattended operation. These instruments and logger will operate for up to 2 years using a small lithium battery package. Installing the Neon Remote Logger enables you to monitor and modify / change data acquisition and check the health of the site, all from a remote location using a web browser anywhere in the world.

The choice of telemetry option would be based on cellular coverage in the measurement area and costs associated with reporting the data back. Satellite services for these applications have reduced in price over the last 5 years, so satellite services are a reasonable option for such measurement stations.

The systems can be powered using lithium battery packs, or a small solar panel and battery.

Like all Unidata systems you can connect many other sensors to the standard system. If water quality measurements are done in relatively shallow waters, 6542 hydrostatic water depth probe can be replaced by 6526 Starflow instrument. Starflow will measure depth of water as well as velocity and rate of flow.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Water Electroconductivity Instrument	6536E	Water EC Instrument with Batt, 512K CMOS memory
Four Electrode Water Conductivity Probe	6536P-2-10 / 20 / 30 / 50	4EL Water Conductivity Probe - 10m, 20m, 30m or 50m
Double Junction Teflon - pH Industrial Probe	6528C	pH Industrial Probe
Double Junction Gel - ORP Industrial Probe	6528B	ORP Industrial Probe
Dissolved oxygen probe	7422	O ₂ Probe

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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WEATHER MONITORING



APPLICATION BACKGROUND

The World Meteorological Organisation (WMO) guideline no.8 defines the measurement requirements for weather stations. The WMO also defines stringent measurement requirements for a standards compliance weather station, called a Tier 1 weather station. For example, the WMO specifies that all wind measurements must be made at a height of 10 metres, which makes the installation inconvenient.

General purpose weather stations, which do not fully comply with the WMO guidelines, are called Tier 2 weather stations. For Tier 2 weather stations some compromises were made for convenience. For instance, wind speed and direction may be measured at a height of 2 metres rather than specified 10 metres.

As a general rule, weather authorities may have a base set of Tier 1 weather stations which are quite expensive, and they also have a second set of Tier 2 weather stations to supplement measurements, or may be used on a short term / project by project basis. For special purposes, for example a mine site / port facility would typically install a Tier 2 weather station, rather than a fully compliant Tier 1 weather station.

There are also some consumer grade / hobby store weather stations which may provide interesting and inaccurate weather data to home users however these are usually not calibrated and the data cannot be relied on.

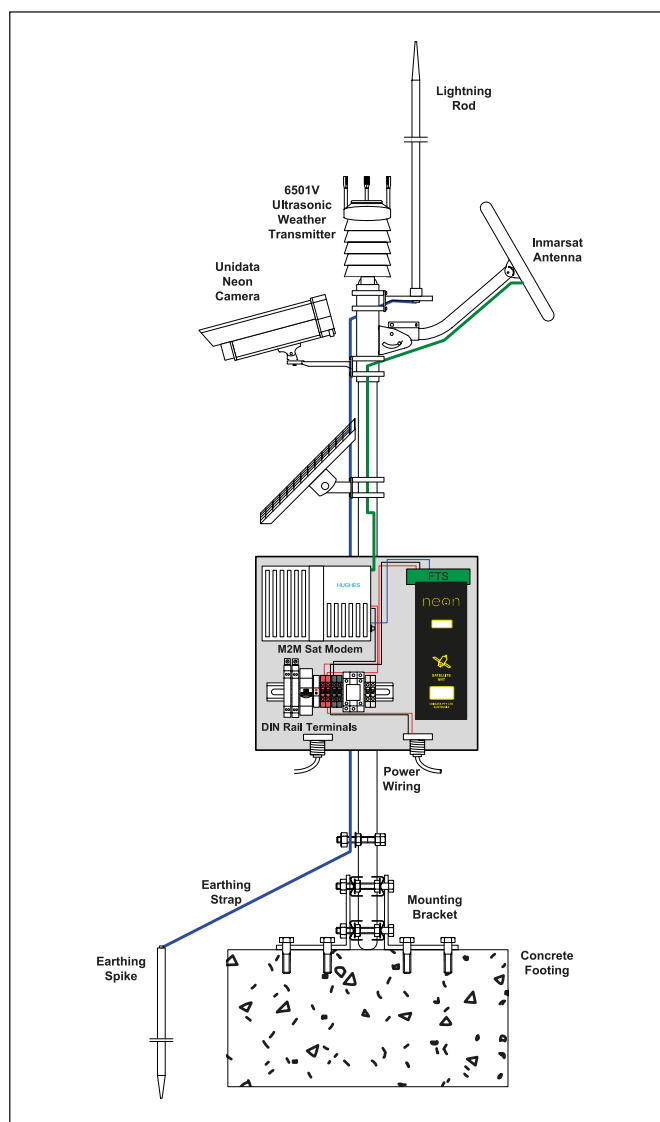
APPLICATION DETAIL

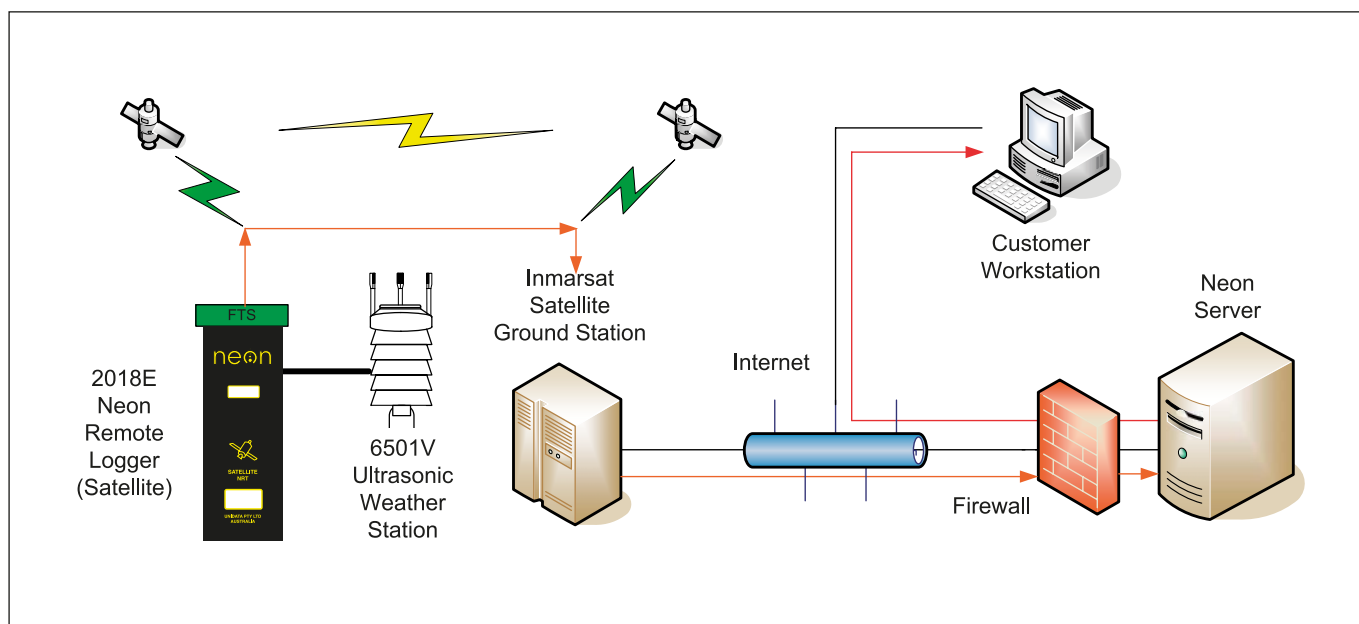
Unidata's Weather Stations have a broad range of applications depending on your choice of configuration and instruments.

When considering a weather station purchase, most customers will decide to set up a Tier 2 weather station. Customers then have the choice of using a specialised instrument for each measured parameter or a modern multi parameter instrument, like Vaisala WTX536 weather transmitter or Lufft WS800-UMB smart weather sensor.

Modern multi parameter weather stations use ultrasonic technology and are very convenient to install and maintain as they do not have moving parts. Please see a typical parameter list from the 6501V Vaisala Weather Transmitter below:

1. Wind Speed - Average
2. Wind Speed - Maximum (Gust)
3. Wind Speed - Minimum
4. Wind Direction - Average
5. Wind Direction - Maximum
6. Wind Direction - Minimum
7. Rainfall
8. Rain Duration
9. Rain Intensity
10. Hail
11. Hail Duration
12. Hail Intensity
13. Barometric Pressure
14. Air Temperature
15. Relative Humidity
- 16-23. Derived channels - e.g. running totals, min max average

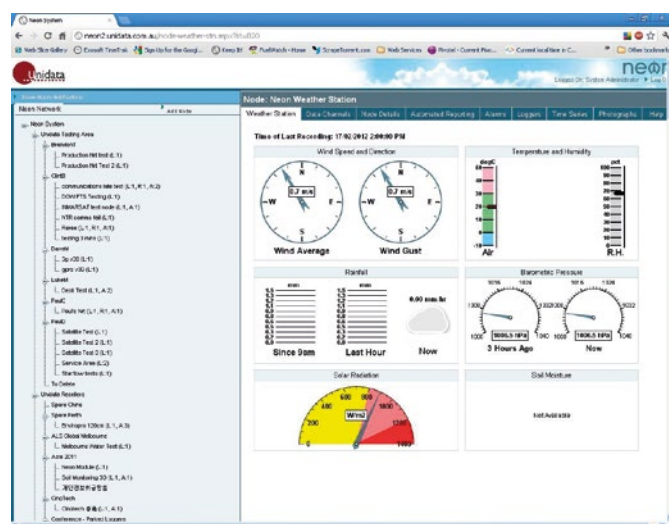




One of our simplest weather stations consists of a temperature and humidity sensor mounted in a double louvred radiation screen and connected to a Neon Remote Logger that is mounted in a weatherproof enclosure.

A weather station more often required, includes instruments that enable you to monitor and record temperature, relative humidity, global solar radiation, wind speed and direction. These instruments are then integrated with Neon Remote Logger. Neon Remote Logger will measure, store and transfer weather data using either cellular, LoRa or various satellite networks. Collected data is sent to a central Neon server to be analysed and displayed on a standard web browser.

Below are some examples of typical weather station screen displays from the Neon Application Software.



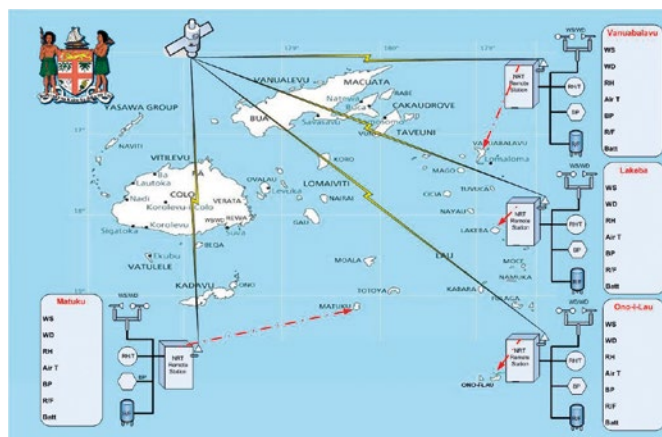
Installing telemetry enabled datalogger reduces the need for time consuming site visits and gives assurance that the weather station is continuing to operate correctly without the need for a site visit.

Other aspects to consider, when designing weather stations, are instrument enclosures, mounting and external power supply.

Unidata offers a wide range of weather proof, UV stable, IP67 or higher rated enclosures that come with weather proof connectors which allow for simple plug and play weather station installation.

Typically, our customers choose to mount weather station enclosure and instruments on a fixed pole but we can also supply a pole with a tripod base for installations that will not be permanent.

Remember that the instruments you add to weather stations increase the power burden. Solar panel, battery and solar regulator power system is regarded an essential part of Unidata weather stations. Any other form of external power that is available on the site can easily be integrated as well.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
WXT536 measures barometric pressure, humidity, precipitation, temperature, wind speed & direction	6501V-H	Vaisala Weather Transmitter RS232 / 422 / 485 SDI-12
Temperature Thermistor Probes	6507E	Red Thermistor Probe 3K@25 with requested cable lengths
Linear Temperature Probe	6535A	Temperature Probe LM34 with requested cable lengths
Humidity and Temperature Probe	6539B	Humidity & Temp Probe (5-18V)
Rain Gauge	6506C	Rain Gauge / Tipping Bucket
Mounting Arrangement for Temp Probes	6704A / B	Radiation Gill Screen & Mount
Radiation sensors	7241C-A	Pyranometer Sensor High Output - Apogee
Radiation sensors	7241C-E	Pyranometer Sensor High Output - EKO Instruments
Radiation sensors	7241B	Pyranometer Sensor - PAR sensor, 350 to 750nm
Mounting Arrangement for Pyranometers	7241M	Pyranometer Sensor Instrument Mounting & U Bolts

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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RUN OF RIVER HYDROELECTRIC POWER STATIONS



APPLICATION BACKGROUND

Run-of-the-river hydroelectric generation is a method of generating electricity from flowing rivers without making water storage or large dams.

Such plants are small and only divert a small amount of the river flow from the river for power generation, and then return that water flow back to the river a small distance downstream.

These smaller plants have less impact on the river, as they don't need to have a large dam to store water. However there is a strong regulatory requirement to ensure the river parameters are not changed during the diversion. The water parameters need to be measured very carefully at the in-flow to the power station and at the out-flow of the power station before water is returned to the river.

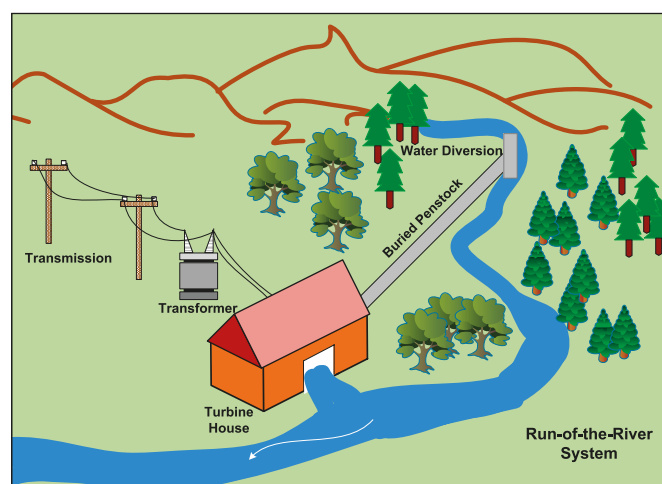
APPLICATION DETAIL

Water parameter measurement stations need to be installed at the intake and the outlet of the power station, and along the river at various points upstream and downstream from the power station. The measurements needed include water level, water flow, water quality / conductivity, and water temperature.

With reliable data at these points, the operator can ensure they remain within the regulatory requirements of the state or provincial authority responsible for river management. As with all river parameter measurement, a measurement method needs to be determined. Smaller and easier probes to install such as hydrostatic pressure probes are generally preferred as the terrain conditions are often challenging. Using a large stilling well is often not practical, and also may not be allowed as these structures impact the environment. Stilling wells may be affected by seasonal flood conditions.

Typically several instruments would be connected via one SDI-12 interface, as the application requires a very low power environment and the slower speed of SDI-12 is acceptable for the application. Example instruments would be the 6542D Hydrostatic Depth Probe, the 6526 Ultrasonic Doppler Flow Meter and temperature probes. The 6537 Starflow QSD SDI-12 Ultrasonic Doppler Instrument could be used to measure water depth, water velocity and conductivity / water quality.

As these installations are often in rugged mountain environments, cell phone coverage is usually not available and satellite based telemetry systems are needed. The Satellite Neon Remote Logger, either low earth orbit or equatorial earth orbit systems could



be chosen. The terrain also needs to be considered. As these installations are usually in deep valleys, the view towards the sky is less, and the high hills may block the view to the equatorial earth orbit satellite provider of your choice. If you choose a low earth orbit system (these systems transit the sky every hour or so) coverage would be available for the short period of time the low earth orbit satellite is visible from that location.

A review of the local conditions, especially the view of the sky is needed to determine the best choice. There are web based tools which provide the azimuth and elevation angles to different





(Source: Severn Wye Energy Agency)

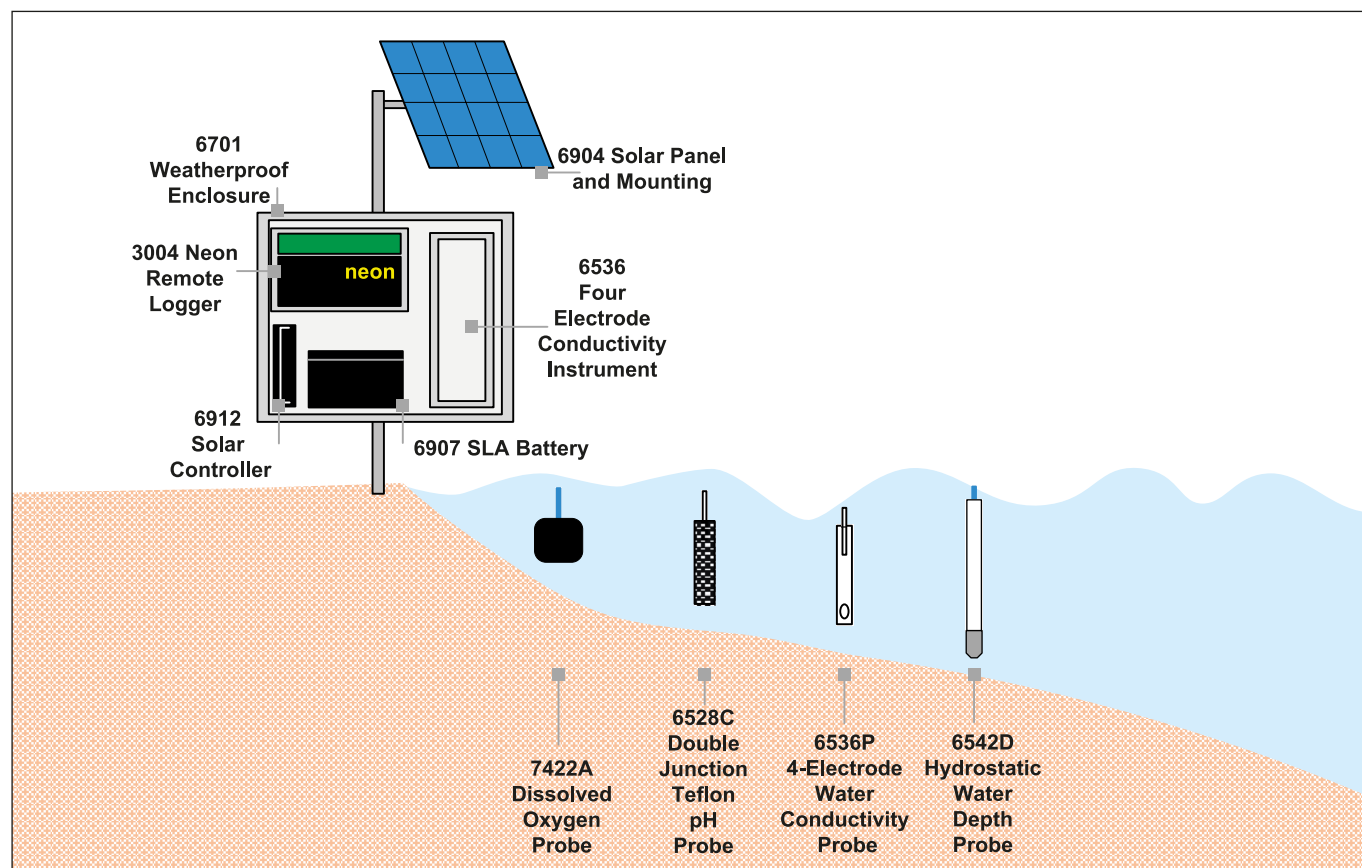
equatorial satellite providers based on the latitude and longitude of a particular location. With the azimuth and elevation angles, the site can be reviewed to determine if use of an equatorial elevation satellite provider is practical.

As these systems are remote, primary power is generally not available and solar panel and gel cell battery would be needed. Unidata engineers calculate a power budget, to determine size of the battery and solar panel needed for particular system. When calculating power budget, geographical location and number of associated sunny days during the winter time are taken into account. This is to make sure the system is operational even with an extended period of cloudy days. Also, it is common practice to only power up

the instruments when needed, for example the instruments would be powered up, perhaps one minute before the reading time, and then turned off after the reading, to conserve power.

The data collected at these measurement stations would be available to view on the Neon Server using a standard web browser, and anywhere on the web provided appropriate login credentials were set up on the Neon Server for this purpose.

Finally, we would expect for collected data to be passed on using Neon Server automatic reports, to a river monitoring / hydrographic analysis software package such as Aquarius or Hydstra for more detailed river hydrographic modeling and river gauging processes.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument
Water Electroconductivity Instrument	6536E	Water EC Instrument with Batt, 512K CMOS memory
Four Electrode Water Conductivity Probe	6536P-2-10 / 20 / 30 / 50	4EL Water Conductivity Probe - 10m, 20m, 30m or 50m
Hydrostatic Water Depth Probes	6542D-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
Hydrostatic Water Depth Probes Titanium	6542D-T-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
4-20mA Pressure Transmitter	6548A-B / C	Submersible Pressure Transmitter 4-20mA 5m or 10m

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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SEISMIC MONITORING



APPLICATION BACKGROUND

A Seismometer is an instrument which can record disturbances in the motion of the ground. These instruments can be installed on the ground, underground or under water. A Seismometer can also be installed on a major structure such as a dam wall to record disturbances in the structural integrity of that large structure.

A complete instrument package that records seismic signals is called a seismograph and there are many seismographs

continuously recording ground motions around the world to facilitate the monitoring of earthquakes and the like.

There are different seismic monitoring instruments for different applications as detailed on the next page, some being event recording instruments and some being continuous recording instruments and some are a combination of both.

APPLICATION DETAIL

CONTINUOUS RECORDING OR EVENT RECORDING

Continuous recording is where the accelerometer / seismometer is monitored at a high speed sampling rate, perhaps 2000Hz, and the data is transmitted in real time to a remote site then processed. Continuous recording and sending that data to a remote site for analysis by a high speed telecommunications link is by far the best solution, as all the data is available for complex mathematical analysis by a large scale computer system. The problem is that for remote areas, a dedicated high speed link may require the laying of very expensive optical fibre cables or the installation of a high speed satellite link which is expensive to install and very expensive to use on an ongoing basis.

Event recording is where the accelerometer/ seismometer is packaged with “intelligent instrument” electronics with a fast processor. Such systems allow for both the routine recording of the high speed sampling, perhaps storing the raw data onto a high capacity SD RAM module, as well as doing local analysis of the data. Such systems can also issue event data messages, for any seismic disturbances via an RS232 interface, which can then be sent via a telemetry link back to a central computer to provide a record of all the events and alarm threshold alerts. This event based operation makes it practical to have instruments in the field reporting back from very remote installations, via cell phone or Satellite, without incurring very high satellite airtime charges.

With an “intelligent instrument”, the raw data can continue to be stored on a small SD ram module, allowing a person to visit the site and then unplug the SD ram module and take that module back to the central location for more detailed analysis of any seismic disturbances. As a guide, perhaps an 8GB SD Ram module could record one year’s data at a 100Hz sampling rate. It also may be possible to set the system such that the data on the SD RAM chip could be retrieved across the satellite link, however that process is very expensive. It is most likely that satellite airtime charges for this process may be prohibitive, much more expensive than having a person retrieve the on-site data on a periodic basis.

There are several high quality Seismometer Instrument manufacturers, and two examples of these are listed here.

Strong Motion Accelerograph Instrument example for Structural Monitoring

The Kelunji EchoPro SMA (strong motion accelerograph) is a system appropriate for monitoring structures such as Dam walls. This instrument is a continuous recorder and if it is combined with 100GB storage module it can store more than 5 years of continuous triaxial data sampled at 100Hz. This instrument is ideally suited to structural monitoring. Its sensors are not as sensitive as those used by seismologists for research into earthquakes; however they are more than sensitive enough to detect signals that are well below the level where you can expect damage to structures.





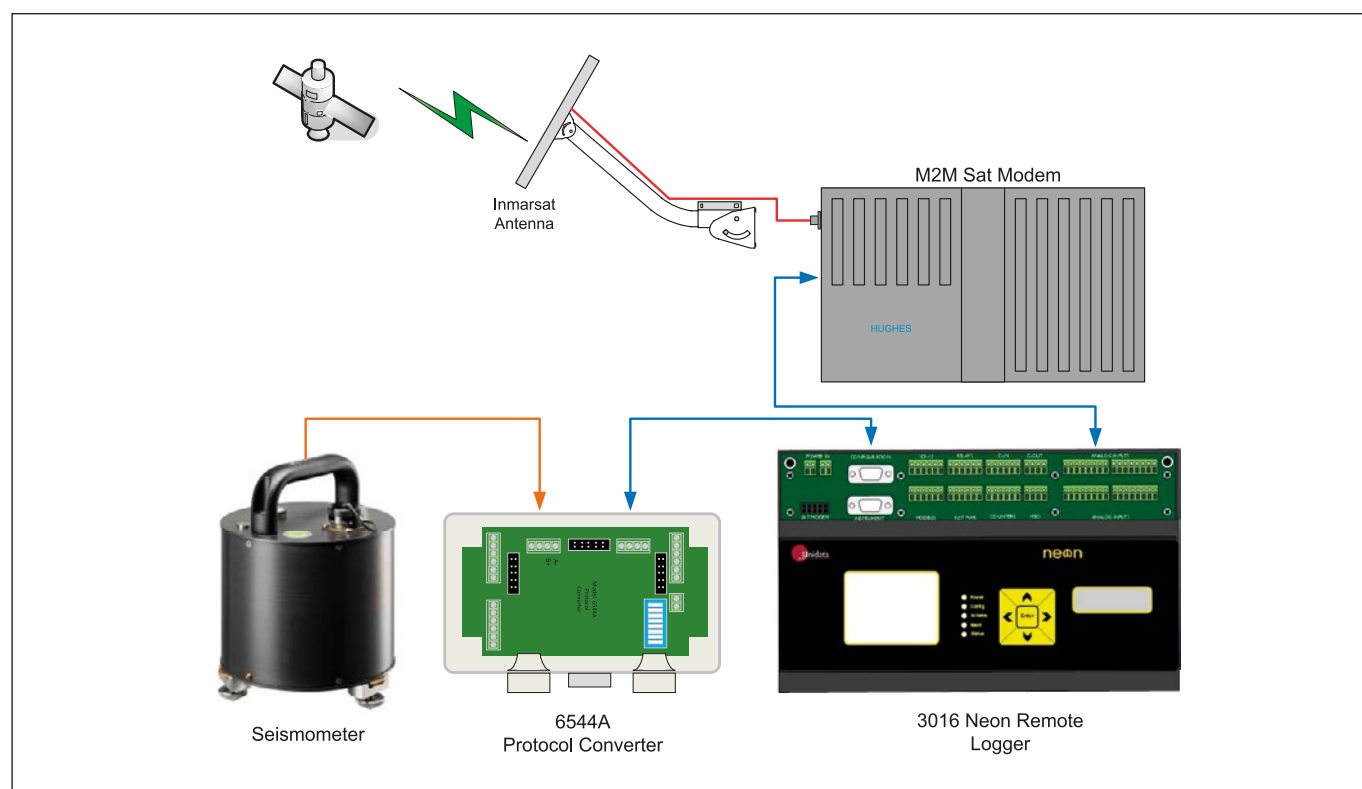
Short Period Seismometers

One of Guralp's range of short period seismometers (we call these "intelligent instruments") could be used for monitoring earthquakes in your local region, typically covering a region within about 500km of the sensor.

The closer you are to an earthquake, the more highfrequency signals you can see, so with a range of 1-100Hz, the CMG-6TD-1 is the ideal sensor for this application. The collected data (perhaps a 100Hz sampling rate) can be recorded for analysis onto the SD ram memory. At the same time local processing on the data is done within complex filters within the instrument and short event messages are prepared and sent out of the instrument via a serial interface. These messages are appropriate to be sent across a telemetry link to be displayed on a central computer system.

An approach using Neon

Neon Remote Loggers, either cell phone based or satellite based are ideal for this application, where an "intelligent instrument" is to be used. A local program or scheme within the Neon Remote Logger can be set up to collect the event messages and transmit them routinely to a central Neon Server, to be checked for event content, to be recorded in a time series database and to raise alerts via alarm activation, via sms or email in the event of an earthquake or other seismic event. If the authority managing the earthquake activity wishes, a person can be sent to the location of the instrument to unplug the SD ram card to retrieve the raw data for further analysis. This approach is especially appropriate for remote areas, where there is little or no infrastructure as the whole system can be set up to be powered by a small solar power system.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Seismic Monitoring Instrument	CMG-6TD-1	Guralp
Seismic Monitoring Instrument	Kelunji EchoPro	Kelunji EchoPro

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
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Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
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NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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CELL TOWER MONITORING



APPLICATION BACKGROUND

Cell towers are abundant worldwide and they are usually high and as such, can be a threat to low flying aircraft.

There are strict regulations which make sure the cell tower is clearly visible at all times to minimize any danger of collision.

In Australia regulatory requirements for tall structures and hazardous plume sources are managed by Airservices Australia in conjunction with Geoscience Australia. Any company/person that owns, controls or operates tall structures need to report:

- gaseous effluxes with a velocity of more than 4.3 m/s
- the construction, extension or dismantling of tall structures if the top is 100m or more above ground level

- structures that are 30m or more above ground level – within 30km of an aerodrome or 45m or more above ground level elsewhere

Further more, there are requirements to have appropriate lights, low intensity, medium intensity and high intensity lights, or a combination of such lights installed.

These regulations are the reason it is important to independently monitor cell towers.

APPLICATION DETAIL

Cell towers have antennae at the top or side of a structure and an enclosure for the communications equipment and primary or backup power supply. Depending on the tower height, cell towers can have flashing or steady, white or red, medium or high intensity lights installed.

As high intensity obstacle lights have a significant environmental impact on people and animals, it is necessary to consult with interested parties about their use.

A Neon Remote Logger complete with an independent power supply, typically a battery, small solar panel and solar controller can be set up to monitor important operational and regulation requirements.

While there is a communications channel available at the cell tower, often authorities consider using a different / independent communications system to keep the monitoring system completely independent from the actual cell phone network using the tower.

The Neon Remote Logger may have analog and digital inputs to monitor tower light states, communications equipment status and primary and backup power system status. Some more complex

equipment may also have Remote Terminal Units (RTUs) which have Modbus registers that can be read routinely and reported, perhaps every 5, 10 or 30 minutes to a Neon Server so that data on the overall status of the cell tower can be displayed on a standard web browser.

To maintain network diversity / network independence, it is better to report the status using a satellite communications channel, either geostationary or low earth orbit, so the monitoring does not rely on the actual cell tower being operational.

The status of the cell tower can be displayed on a Google Map display and a mimic diagram can provide an easy visual representation of the tower and the status of the key monitoring points.

The Neon Server Applications software can display each cell tower on a Google maps interface with a mimic icon colour based on operational status, green for normal and amber or red for set off alarm condition.

Alarms can be set up on key parameters. If an alarm condition is reached, an SMS alarm alert with escalation or an email is sent to key staff alerting them of a problem or failure.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Analogue Inputs / Modbus RTU	Custom part	Telco provided RTU / sensors

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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HIGH VOLTAGE TRANSMISSION TOWER MONITORING



APPLICATION BACKGROUND

Electricity utility companies need to monitor the high voltage transmission towers for several reasons.

There is often a need or desire to monitor the transmission voltages and currents to assist with the management of the transmission network.

There may also be a need to monitor the physical stability of the tower by using accelerometers or seismic instruments which measure earth tremors, strong winds or perhaps vandals damaging the structure.

There are some instances where vandals damaged the towers by removing / stealing parts of the structure to be sold as scrap metal.

As well as having monitoring sensors it may be desirable to have some level of video surveillance. Unidata has received many requests for enhanced remote monitoring with images for remote measurement industrial equipment. Such requests are driven by the need to see what is happening on the sites to confirm measurement instrument readings, and to have a regular, perhaps daily, image of the tower to check for any damage.

The ambient weather conditions can also be measured, like temperature, humidity, wind speed and direction. This can be achieved simply by using modern easily installed, all-in-one, ultrasonic weather transmitter.

APPLICATION DETAIL

The voltage and current monitoring is routinely performed and can be accomplished by directly connecting measurement instruments to conductors or indirectly, by measuring field effect surrounding a high voltage conductor.

There are many instruments designed to measure voltages directly, however installation of such devices requires special safety planning which may be difficult.

Simpler approach would be to use instruments that measure field strength in close proximity to conductors rather than directly connecting to them.

Electrical field strength is dependent on the voltage of the power line and remains relatively stable with the line energized.

The higher the voltage on the conductor - the stronger the electrical field around it. For example, a typical overhead distribution line at 11,000V (Volts) and 11m (meters) up in the air will produce average electric field strength beneath the line of (11,000V/11m) approximately 1000V/m.

There are other factors affecting measurement, like electrical field decrease with an increase in distance from the line, but example above is just to give general idea of the process involved.

The tower stability can be measured using any general purpose accelerometer, which detects small movements in the tower structure. If the tower is in a region prone to earthquakes, seismic instrument can be added to monitor earth movements.

For continuous monitoring of the site, a low resolution video camera or cameras can be added to take a photograph of the structure every hour as a permanent record of the structure. These images are available for engineers at a central location to be viewed and structure assessed for any possible damage.

All of the instruments can be used together to determine the stability of the structure, for example a brief disturbance in the structure would be recorded by the accelerometer and the data from all the sensors can be correlated to determine the likely cause. All of the instruments would be mounted on the tower structure, along with a small solar panel and backup battery so the power system remained independent.

Sensors can be connected to a Neon Remote Logger via SDI 12, Modbus, analog or digital inputs. Logger will scan / collect readings from the sensors on regular, custom specified or intervals. It will check for any unusual out of limits readings and routinely send data to a central Neon Server located at the electricity utility headquarters.

Logged data or alarms are sent using cell phone modem or satellite modem depending on network availability. Data is then displayed on a web browser to be viewed or could also be sent, perhaps once per minute, via web services or FTP to other processing systems for example to the main SCADA system used by the electricity utility.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
WXT536 measures barometric pressure, humidity, precipitation, temperature, wind speed & direction	6501V-H	Vaisala Weather Transmitter RS232 / 422 / 485 SDI-12
Field Effect Voltage sensors	Various	Analog or Digital outputs
Accelerometers	Various	Analog or Digital outputs
Small Power Monitor RTU	Various	Modbus output field Effect meters
Seismic instrument	Various	Analog or Digital outputs
RS232 Camera with 3G / 4G NRT	2502E-3E-L	Neon Camera System with 3G / 4G NRT
Ethernet Camera	2502B / C / F	Various IP Cameras

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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INDUSTRIAL OUTFLOW MONITORING



APPLICATION BACKGROUND

Manufacturing plants, public utilities, power stations, oil & gas processing facilities and sewerage plants all have some form of industrial outflow which needs to be monitored and reported on.

Hydro Power companies need to measure the volume, temperature and quality of water passed back into the river after it has passed through the turbines.

Traditional coal or gas power stations have cooling water discharges which need to be monitored, to ensure the temperature being returned to a lake or reservoir is not above acceptable limits.

Sewerage plants must measure and record any effluent from sewer treatment plants which is being discharged back into the environment.

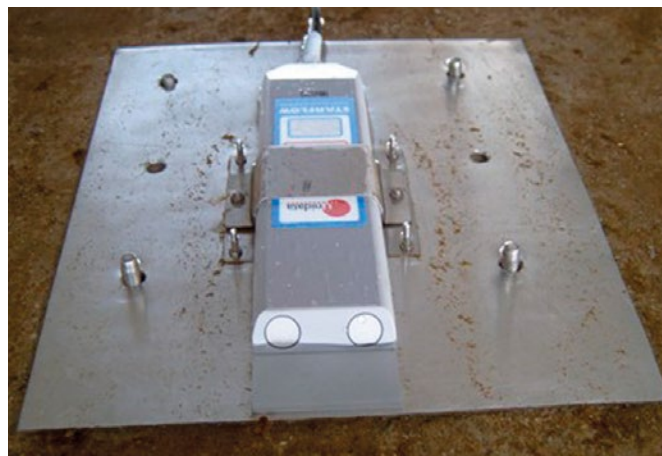
APPLICATION DETAIL

Typically measured parameters for industrial outflow are water temperature, flow, depth, acidity, alkalinity and salinity.

Monitoring instruments are generally deployed in outflow pipes or channels.

There are various methods to measure flow and depth. For example, water flow can be determined using mechanical flow measurement devices like piston flow meters, turbine flow meters, single or multiple jet flow meters. For measuring depth, hydrostatic depth probe or simple float and pulley system will give stable and accurate readings.

For this application Unidata offers all-in-one instrument Starflow 6526. Water velocity is measured by the ultrasonic Doppler principle which relies on suspended particles or small air bubbles in the water to reflect the ultrasonic detector signal. Water depth is gauged by a hydrostatic pressure sensor, referenced to atmospheric pressure through the vented power and signal cable. Starflow determines the actual flow mathematically based on the entered channel/pipe geometry and dimensions.



Starflow can be deployed in rivers and streams, open drainage channels and large pipes.

For measurement of other parameters, water temperature, water quality for example electro conductivity (EC), pH (PH), dissolved oxygen (DO) can be measured with separate instruments.

In some instances turbidity of the water / outflow may also be measured.

The 6526 Starflow instrument would typically be installed at the base of the outflow channel using a provided mounting bracket, the instrument cable would connect to a power source housed inside a small enclosure usually located at the side of the channel.

It is important to consider power requirements of the site. If primary power is available, only a small battery would be added to the system to act as a backup, in case primary power is disrupted. If primary power is not easily accessible, the system can be powered by a lithium battery pack or rechargeable solar power system.





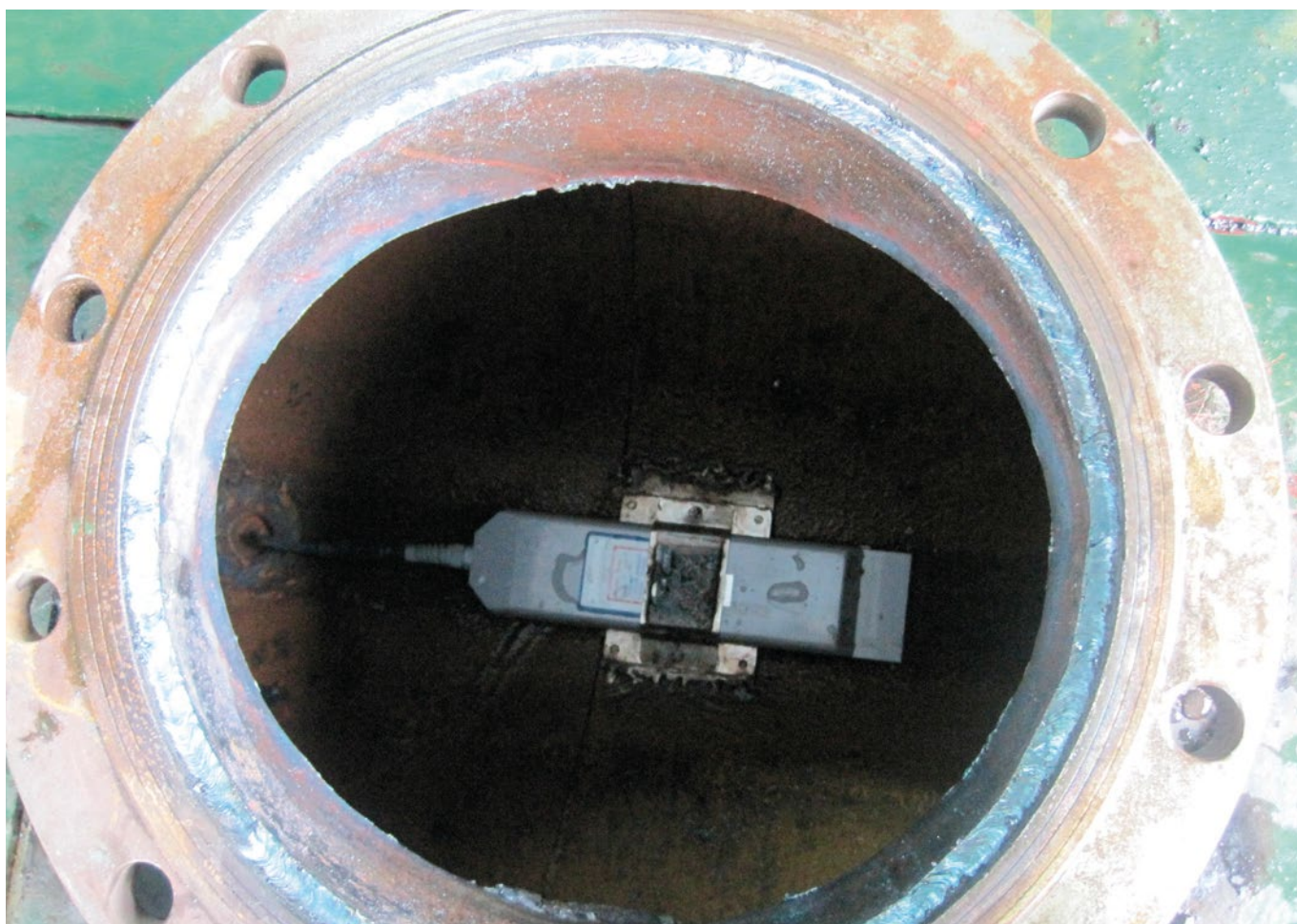
Depending on the instruments chosen, a lithium battery pack (non-rechargeable) can provide independent power source for up to 2 years.

A solar power system consists of a rechargeable lead acid sealed battery, a solar panel and solar controller. The solar power system should be properly rated for the instruments used and as such will provide a long-term power solution.

Starflow and other instruments can be connected to a Neon Remote Logger via SDI 12, analog or digital inputs. Logger will scan / collect

readings from the sensors on regular, custom specified, intervals. It will check for any unusual out of limits readings and send data to a central Neon Server or an email or sms message to the appropriate people to take action following an out of limit condition.

Logged data or alarms are sent using a cell phone modem or satellite modem depending on network availability. Data is then displayed on a web browser to be viewed or could also be sent, perhaps once per minute, via web services or FTP to other processing systems.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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OIL AND GAS PIPELINES / PRESSURE MONITORING AND METERING



APPLICATION BACKGROUND

Public gas distribution utilities have a need to monitor the performance of their pipe networks to ensure the correct delivery of gas, and to ensure pressures and flows are maintained for safety and other compliance reasons.

They also need to meter gas which is sold to customers.

Oil companies have very long pipelines which traverse often very remote regions. Pressures, temperature and other parameters along these pipelines need to be monitored regularly.

APPLICATION DETAIL

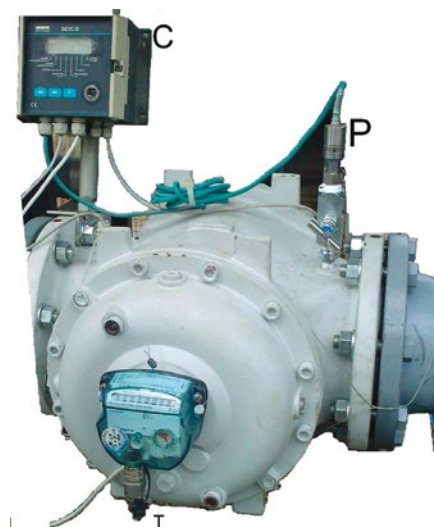
Gas networks operate different pressure and flow pipelines, in a similar way as electricity utilities have different levels of high voltage and lower voltage electricity towers and transmission systems.

Pressure sensors attached to pipelines typically have 0-5V or 4-20mA outputs. Sensor readings can be collected by Neon Remote Logger routinely, say every 5, 10 or 15 minutes and transmitted via the cell phone or a satellite network to a Neon server.

More complex flow meters / flow computers are often installed at various points in the network and these may have outputs and inputs using Modbus protocol. The system can be set up so that Neon Remote System acts as Modbus Master that collects and presents Modbus Slaves' (sensors) data or that it acts as Modbus Slave that collects and presents sensor data as Modbus TCP for SCADA Modbus Master ingestion.

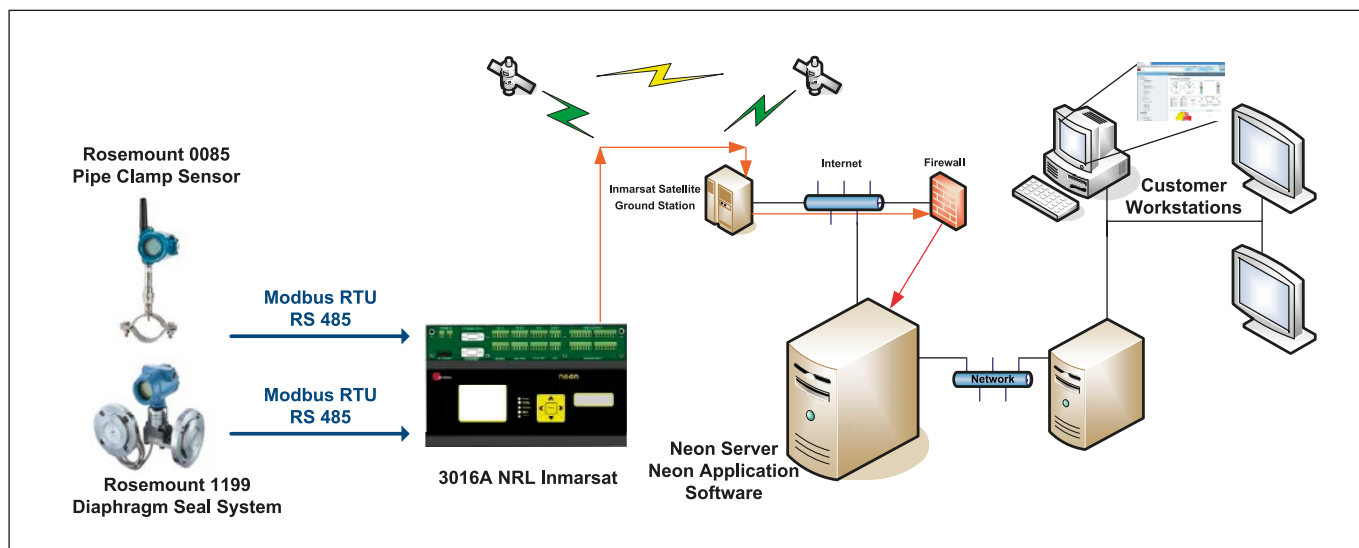
Metering information is also important to keep track of, especially for high use customers. While low use customers may have a manual gas meter read quarterly by a meter reading person, high use customers typically have larger meters with pulse outputs for every unit of gas delivered. In these circumstances, the metering pulses can be fed into a Neon Remote Logger and totaled up, so that total gas usage per day, total gas usage per hour and perhaps gas usage in peak and off peak times can be recorded. This data can be stored locally in the Neon Remote Logger and sent to the Neon Server, perhaps daily, so that that data can be used for billing purposes.

For very remote pipelines a Neon Remote Logger Satellite can be used to measure and report pressures at various points as it is unlikely that there would be any cellular coverage in remote areas. Such systems would be independently powered as there would be no mains power in remote areas.



Oil pipelines would typically have Rosemount or other brands of pressure and temperature sensors, at regular points, along pipelines. Very often oil pipelines have pumping stations that are strategically located to boost internal pipeline pressure and flow. Electrically driven pumping units are typically controlled by industrial RTUs utilising Modbus protocol. Neon Remote Logger can be set up to read Modbus registers regularly, perhaps every 5 minutes and to routinely transmit that data to a Neon Server every 10 or 15 minutes. The measured data for all of these applications would be shown on a Neon Application, using a web browser and is accessible from anywhere in the world.





Intrinsically Safe Barrier

Typically large corporations would have a SCADA system to control processes, directly interact with instruments (pumps, sensors) and record events. Having information, for example pump failure, available in real time helps alleviate system downtime. Immediately available as well as regularly collected data can be used for long term production analysis and production optimization.

Dynamic reporting system within the Neon Application, which provides output of any fresh data every minute, or custom application that directly interrogates the Neon Application SQL data base make the Neon system easy to integrate with the existing control system.

Consideration also needs to be given to hazardous area requirements. Typically oil and gas sensors need to be intrinsic safe (IS). Intrinsically safe equipment contains intrinsically safe circuits which means that any arc or spark produced under normal or specified fault conditions is not capable of igniting any flammable atmosphere that may be present.

Non-certified equipment, when connected to IS equipment, must be either:

- low energy device which is incapable of storing, generating or releasing energy greater than 1.5V, 100 mA, or 25 mW under normal or fault conditions.
- or
- connected to IS equipment using a safety barrier that provides energy limitation to field circuits.



Non-Intrinsically Safe Equipment



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Customised Pressure Sensors	Custom Part	Custom Pressure including Vacuum Sensors, Custom Output V, 4-20mA

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
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M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
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DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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OIL BEAM PUMP AND ESP PUMP MONITORING



APPLICATION BACKGROUND

Oil companies often have very remote oil pumps which are difficult to monitor using traditional Remote Terminal Unit (RTU) equipment because there is no hard wired communication channel available to connect to a central Supervisory Control and Data Acquisition (SCADA) system.

For long oil pipelines, oil companies have strategically located pumping stations that boost internal pipeline pressure and flow. In order to avoid disruptions in production and transportation it is important to have a pump's condition status information available in real time. Since such sites are quite often very remote telemetry data collection system is required.

APPLICATION DETAIL

A typical remote oil beam pump installation would have a pump, a pump engine (diesel) and a pump controller. The pump controller typically would have a small RTU with a Modbus interface and measurement sensors attached, usually 4-20mA analog temperature and pressure sensors.

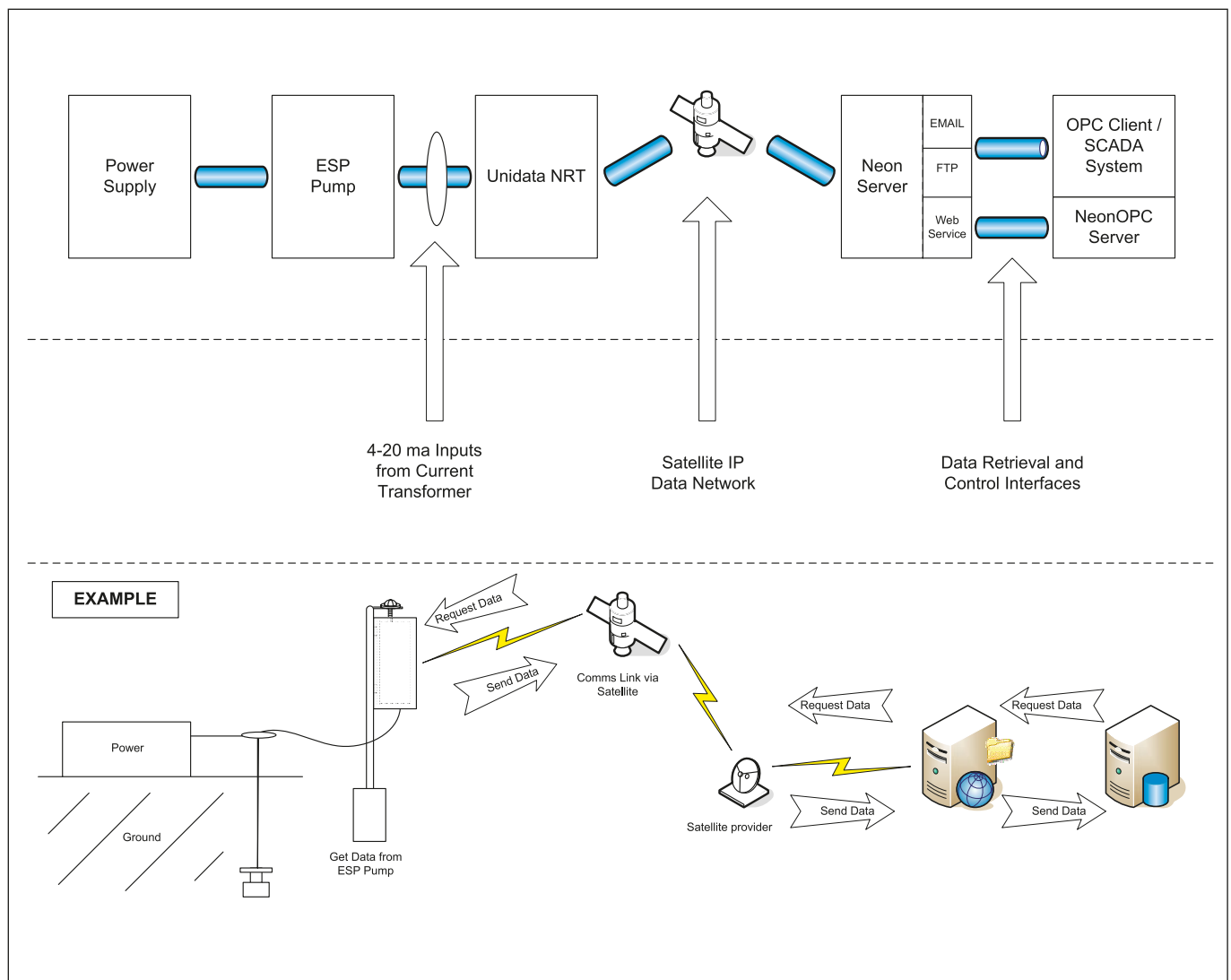
There are many different brands and types of oil pumps, for example there are beam pumps, jet pumps and electrically submersible pumps. All of these have some form of pump / engine controller. Some have individual sensors typically 4-20mA analog inputs and some have more complex Remote Terminal Unit (RTU) controllers with Modbus interfaces. Some also have control outputs, for example a control output to force a pump shutdown in an emergency.

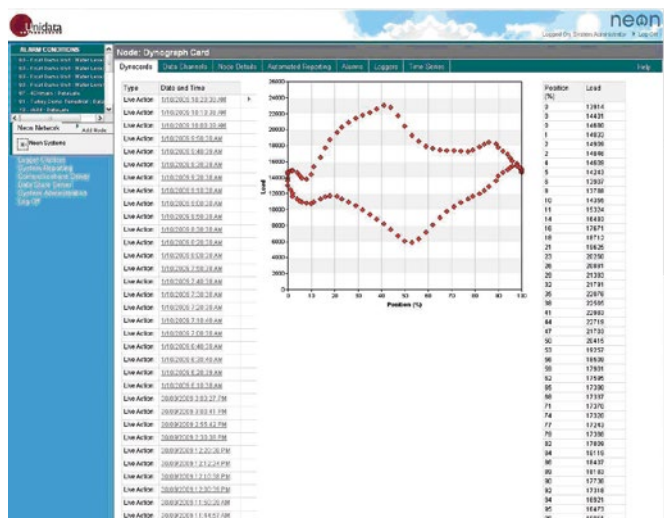
Unidata has worked with Weatherford EPIC, Lufkin SAM and smaller providers of such systems. All of these pump monitoring systems have Modbus parameters which can be collected and monitored remotely.

There may also be requirements to monitor older pumps without sophisticated controller systems. In these circumstances, the individual sensors would need to be installed and monitored. Instruments measuring pressure, temperature, fuel levels, voltages may be attached to analog and digital inputs of a Neon Remote Logger which will routinely collect data and report on it.

Perhaps there is an electrically submersible pump that needs to be monitored. This could be accomplished by adding a clamp on the current transformer of the pump power supply, so the pump power input can be monitored, across three phases. The measured data can indicate the pump load and working condition.

The Neon Remote Loggers can be set up to monitor the analog and digital sensors and store readings and operating parameters locally. In most cases, the data is sent on a regular (5,10 or 15 minutes) basis to a central Neon Server to be viewed on a web browser, and sent to associated systems within an organization responsible for managing the oil pumps.





Typically such organization would have an immediate need to display the data on their SCADA systems and they would have a longer term need to analyse the performance data to determine the long term efficiency of the well.

Dynacard graphs are very valuable indicator of beam pump operation and well condition. The Dynacard can be extracted from the Oil Pump controller, passed through the Neon Remote Logger and displayed on the neon Applications Software Web browser.

The data could also be scanned for any out of limit condition. The Neon Remote Logger will scan data for any out of limits conditions and, in an instance that any occur, the NRL will activate an alarm and send an email or a text message to the allocated people to take appropriate action.

It is important to consider the power requirements of the site. If primary power is available, only a small battery would be added to the system to act as a backup, in case the primary power is disrupted. If primary power is not easily accessible, the system can be powered by a lithium battery pack or a rechargeable solar power system.

Depending on the instruments chosen, the lithium battery pack (non-rechargeable) can provide independent power source for up to 2 years.

The Solar power system consists of a rechargeable lead acid sealed battery, a solar panel and a solar controller. Solar power systems should be properly rated for the instruments used and as such will provide long-term power solutions.

There needs to be some consideration on requirements for intrinsic safe instruments in this application. Any direct sensors connected to an oil pump would, most likely, need to be intrinsic safe. Furthermore, the wiring from them will need intrinsic safe barriers fitted as well. The specific requirements for each installation needs consideration, but generally, it is likely that the Neon Remote Logger system would be located just outside the zone for intrinsic safe equipment.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Customised Pressure Sensors	Custom Part	Custom Pressure inc Vacuum Sensors, Custom Output V, 4-20mA
Modbus RTU	Modbus RTU	

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

AVAILABLE FROM: **Unidata Pty Ltd** | 40 Ladner Street, O'Connor, 6163 Western Australia | Tel: +61 8 9331 8600 | info@unidata.com.au | www.unidata.com.au

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PIPELINE CATHODIC PROTECTION



APPLICATION BACKGROUND

Cathodic protection has been known about and applied to metal structures since last century.

Cathodic protection is a method for protecting metal structures from corrosion by making the structure, that needs protection, the “cathode” of an electrochemical cell. This can be achieved in two ways:

Passive Galvanic Cathodic Protection involves connecting a metal structure to a more electropositive “sacrificial” metal. Sacrificial metal acts as an anode of an electrochemical cell and corrodes instead of protected metal. Selection of “sacrificial material” will depend on the type of material that we are trying to protect. This method doesn’t require outside power source since materials themselves cause current to flow. The sacrificial material will eventually become totally corroded and will need replacement as the structure ages.

Small vessels use this approach to protect propellers from corrosion.

For larger structures like pipelines, the galvanic anode can’t deliver enough current to provide full protection so an additional current from an alternative source is needed to keep “electrochemical cell” process going. Impressed Current Cathodic Protection (ICCP) systems consist of anodes that are connected to a DC power source that provides a permanent source of electrical flow. ICCP systems constantly monitor the electrical potential at the pipe to soil interface and carefully adjusts the output to the anodes in relation to this. Therefore, the system is much more effective and reliable than the sacrificial anode systems where the level of protection is uncontrollable.

APPLICATION DETAIL

Many oil and gas pipelines traverse very remote regions and there is a need to make sure the cathodic protection systems remain in operation to maintain pipeline integrity. These systems typically have rectifier stations at various points along the pipeline which take primary alternating current power, perhaps from a local power supply of a local generator, and rectify it to provide a low voltage and high current to apply to an anode buried in the ground.

Through this method the pipeline is protected from corrosion, however there is a need to monitor the performance of these systems as follows:

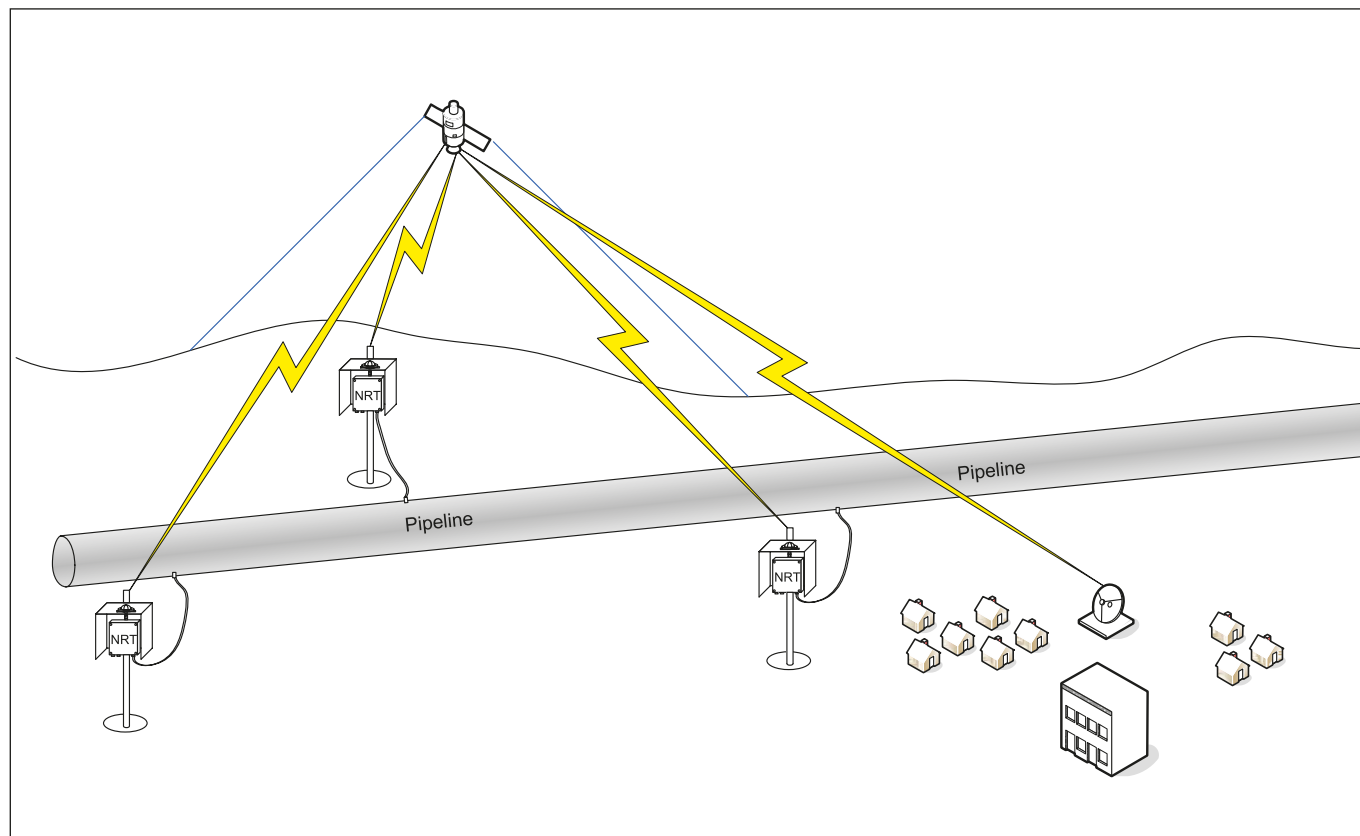
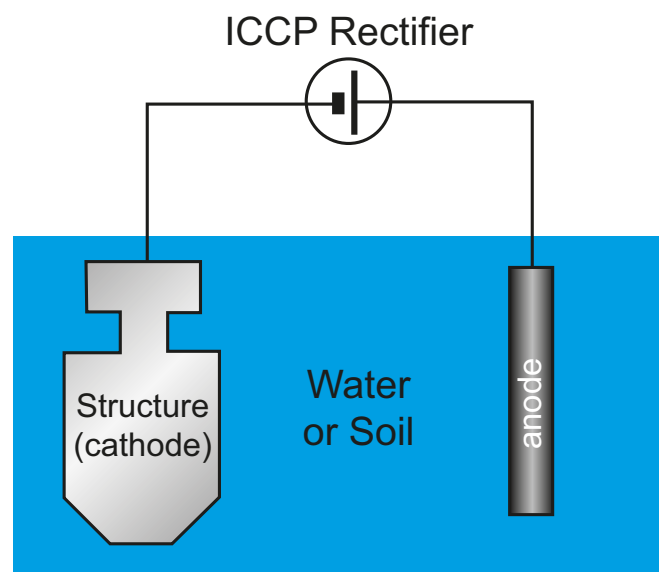
- the rectifier station status needs to be monitored, to ensure the voltage and current applied is correct
- the pipeline / structure needs to be monitored at many points to ensure the small potential is correct along the pipeline to the next rectifier station

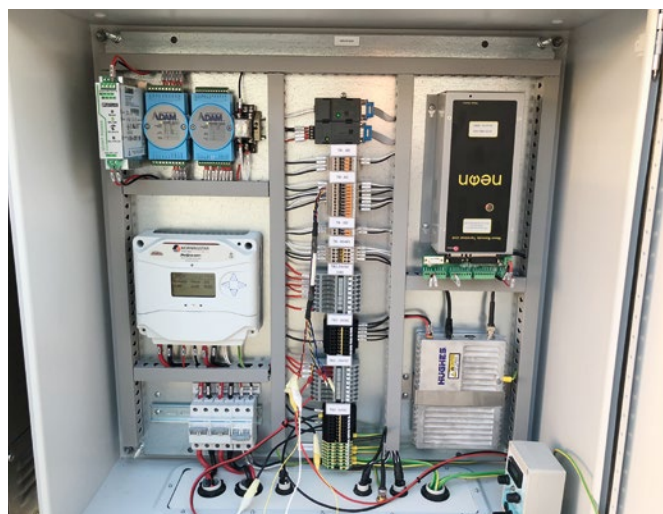
The rectifier station may have a small RTU with a Modbus interface to allow it to be controlled and monitored by a central SCADA system. The Rectifier system might have additional sensors, analog or digital, for monitoring the status of the rectifier.

This is a common approach when the power supply and communication infrastructure are readily available.

For the rectifier station a Neon Remote Logger can monitor either Modbus channels and / or individual analog and digital inputs and outputs. There may be a need to make adjustments to the applied voltage / current and these can be enabled to be remotely managed.

This system would typically be housed in a metal enclosure with a solar recharge system acting as a power supply. The Solar power system consists of a rechargeable lead acid sealed battery, a solar panel and a solar controller. Solar power systems should be properly rated for the instruments used and as such will provide long-term power solutions.





Telemetry would be needed to provide the rectifier station status in real time and possible control from the pipeline operations centre. This could be cell phone based or satellite modem based, more likely satellite based as the pipeline is likely to traverse very remote areas. Perhaps the rectifier station would need to communicate with the central Neon Server every 15 minutes to communicate readings to be displayed on a Central Neon Server and also report out status to a central pipeline SCADA or other management system.

The other parameters along the pipeline also need to be measured, and this can be a very simple occasional measurement of a very low voltage level of the pipeline structure when compared to earth.

The cathode protection telemetry systems can be very power hungry. Unidata can build large skids that can house the CP unit, Telemetry Inmarsat Satellite unit as well as large solar panels (4 x 205W) and securely store high capacity reachable batteries (12 x 2V 915Ah).

Telemetry would be needed to provide the occasional voltage readings from the measurement points, but quite infrequently, perhaps read the voltage hourly, store it locally, and then transmit the data to the central neon server daily, to minimise the power consumption and satellite airtime charges.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Low Voltage Sensors	Custom Part	Low Voltage Sensors

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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PORTS AND HARBOURS MONITORING



APPLICATION BACKGROUND

Port administration staff need easy, over the web, access to local wind and tidal information, as they rely on accurate local tide, current and weather information to manage shipping and general port operations safely and efficiently.

Many environmental monitoring systems are good at recording data but aren't always good at making it easily available. The Neon data-to-web service provides a simple, low-risk option to get the data to the people who need it very quickly. Adding a Neon data-to-web system enables existing monitoring operations to step up to internet

level, making it easy to access directly usable information via the web, with automated reporting and alarming.

The data can also be viewed while you are mobile, with a smart phone or tablet. This enables pilots and other operators to access wind and tidal information in near real time while working on or around the harbour.

Ships can get advanced warnings of any extreme conditions before entering the harbour.

APPLICATION DETAIL

Neon Remote Loggers can be installed at existing weather and tidal monitoring stations. They can be easily integrated with the existing wind speed, wind direction, sea level, velocity and direction instruments.

For example, one station may be located on a tower out in the harbour, to monitor the conditions near the harbour entrance. Another may be located on a wharf.

For simpler measurements, one or more Unidata Starflow Acoustic Doppler instruments could be installed to measure the speed of the currents. The inbuilt depth sensor could also report the rise and fall of sea level.

For wide channels, perhaps located at the harbour entrance, an underwater Acoustic Doppler Current Profiler (ADCP) which looks across the shipping channel could be installed. ADCP regularly measures the speed and direction of sea water currents as the tides ebb and flow. This instrument could also measure the rise and fall of sea level.

An ADCP continuously takes fast, accurate measurements of sea level and water movement in three dimensions, in near real time. These indicate the actual tidal forces acting on a ship and enable crew to ensure that the keel will always have sufficient clearance.

To measure cross-channel water currents, the ADCP transmits beams of sound pulses and calculates current velocities from the received 'echoes' reflected from suspended particles.

With a Neon Remote Logger system out in the harbour and another system at the wharf, wind and tidal data can be recorded and pushed on a regular interval, perhaps every 5 minutes up to a Neon server for storage and access.



The communications link could be cell phone based or satellite based depending on the cell phone coverage in the area. Also, for critical operations such as this, it is wise to have two different communication paths. Adding a mix of cell phone and satellite telemetry systems spreads the risk of failure.

Authorised personnel with Internet browser can access at this information on the Neon server, in real time, or examine older data, perhaps looking for trends. When set up, alarm messages are automatically sent to notify staff if wind or tide exceeded acceptable programmable limits. If customised reports have been set up, they are automatically sent to selected people.

On the Neon server you can easily set up a schedule to automatically send reports to specific parties. All or any of the information can be automatically delivered at any time and frequency, in a variety of formats, such as email.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-51	Starflow Ultrasonic Doppler Instrument 0-5m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument
Water Level Instrument	6541C-11	WLI with 500mm Pulley & Alk Batt Metric
Float	6541F-115	WLI Float Assembly - Cylinder 115mm (other options available)
Float Line	6541D-M	WLI Beaded Float line Metric

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G/4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU/NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU/NRL 3G/4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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POWER UTILITY REMOTE RECLOSER MANAGEMENT



APPLICATION BACKGROUND

Power utilities use circuit breakers and fuses to interrupt power in the event of a fault on a transmission line.

The problem with fuses and circuit breakers is that once activated, a person is needed to visit to replace the fuse or reset the circuit breaker. The problem could be long term failure of equipment or just a short term, like a tree falling onto a transmission line or wires touching in high winds momentarily.

To solve the short term problem reclosers and sectionalisers are used to allow for a reconnection of the power which saves the need for field staff to visit the site. Management of reclosers and sectionalisers from a distance, using a telemetry system, assists electricity network operators manage the electricity transmission network.

APPLICATION DETAIL

Reclosers and sectionalisers are distributed throughout the electricity network.

Simple reclosers are generally used to break and attempt to reclose the system based on voltage levels and a preset number of tries, perhaps 3 times, in the event of an overload condition. As reclosers are spread throughout the electricity network, only smaller sections of the network are affected for one recloser event, making it easier to manage the electricity transmission network.

More complex reclosers have additional features, perhaps a system of current transformers so the voltages on the 3 phase lines, the status of the recloser and a record of the number of trips are reported.

There are also recloser systems with inbuilt RTU modules which allow a high level of measurement capability as well as some control capability. There could be data logging and remote control functionality, full directional protection for overcurrent, earth fault and sensitive earth fault, over and under voltage, over and under frequency and auto reclosing functionality.

Unidata can provide voltage measurement instruments with Neon Remote Logger systems. These would be appropriate manual, semi or fully automated recloser systems.

For more sophisticated recloser and sectionaliser equipment Unidata can provide a Neon Remote System utilising Modbus. The System can be set up so that the Neon Remote System (Neon Remote Logger and Neon Application Software):

- Acts as Modbus Master that collects and presents Modbus Slaves' (reclosers and sectionalisers) data or
- Act as Modbus Slave that collects and presents reclosers and sectionalisers data as Modbus TCP for SCADA Modbus Master ingestion.

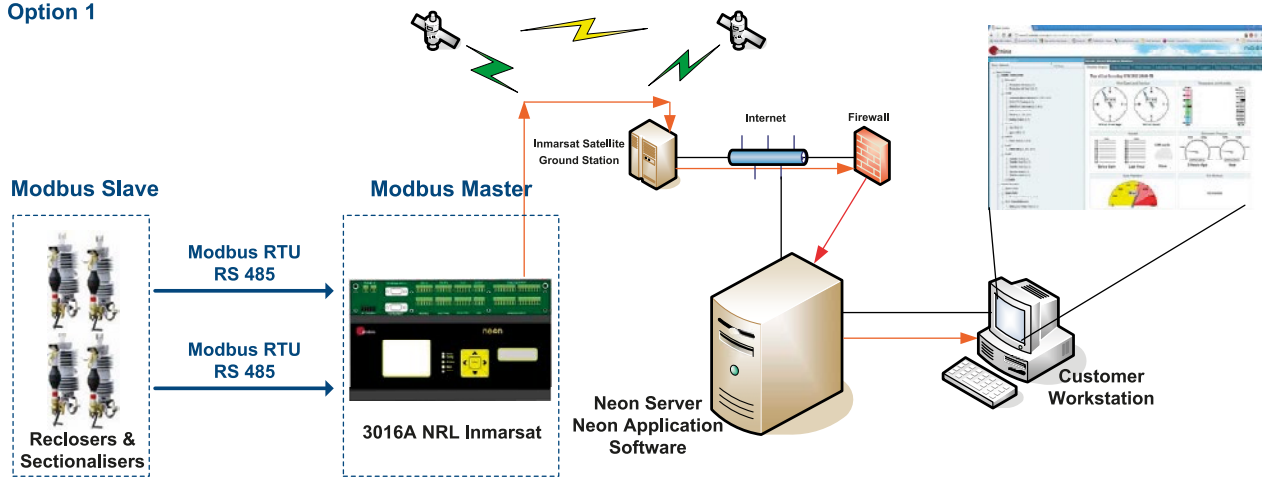
For management of reclosers a telemetry system is vital. In areas of cell phone coverage a Cellular 4G Neon Remote Logger can be used. Remote transmission system require satellite based telemetry systems such as the Neon Remote Logger Satellite - Inmarsat Satellite System which is "always on system" rather than a "satellite pass low earth orbit" system.

Unidata's Neon Applications Software manages the telemetry coming in from remote reclosers and presents that information directly on the Neon Web system.

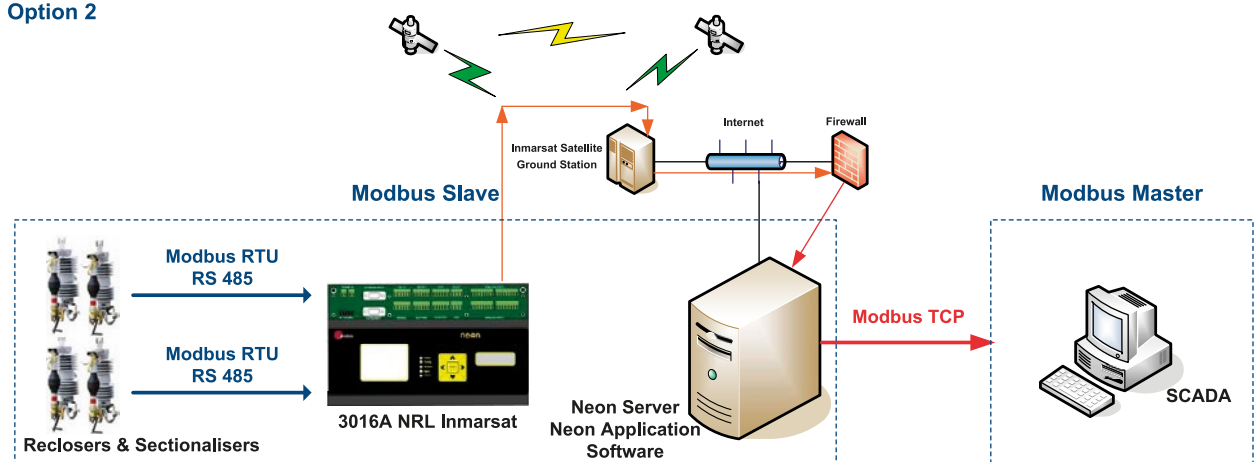
As power utilities often have a central SCADA system the information could also be presented in real time using a direct SQL database interface or a Modbus TCP interface.



Option 1



Option 2



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Customised Current Transformers	Current Trans	Custom Current Transformers, Custom Outputs V, 4-20mA
Recloser RTU / Modbus RTU	Modbus RTU	Recloser RTU
Sectionaliser RTU / Modbus RTU	Modbus RTU	Sectionaliser RTU

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CLO / 3008A-CLO	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-COI / 3008A-COI	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

AVAILABLE FROM: **Unidata Pty Ltd** | 40 Ladner Street, O'Connor, 6163 Western Australia | Tel: +61 8 9331 8600 | info@unidata.com.au | www.unidata.com.au

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REMOTE IMAGE CAPTURE / REMOTE VIDEO CAPTURE



APPLICATION BACKGROUND

Unidata has received many requests for enhanced remote monitoring with images for remote measurement sites.

These requests are driven by the need to see what is happening on the sites in order to confirm measurement instrument readings. The need for images will only increase as health and safety regulations are now mandating many operational requirements for visits to

remote sites. These new requirements are making it harder and more costly to send maintenance teams into the field to check remote equipment.

Effective high resolution images and some video reduces the need to visit remote sites. Reduced site visits represents significant cost savings.

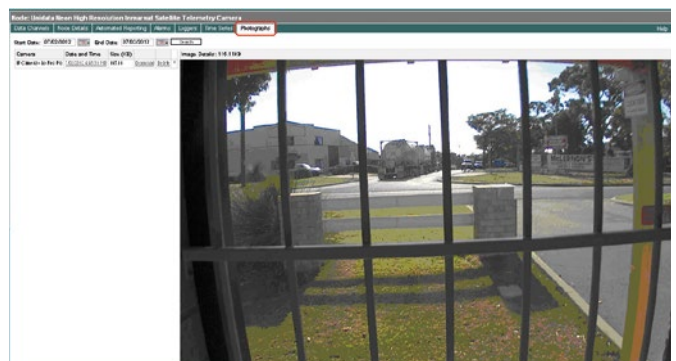
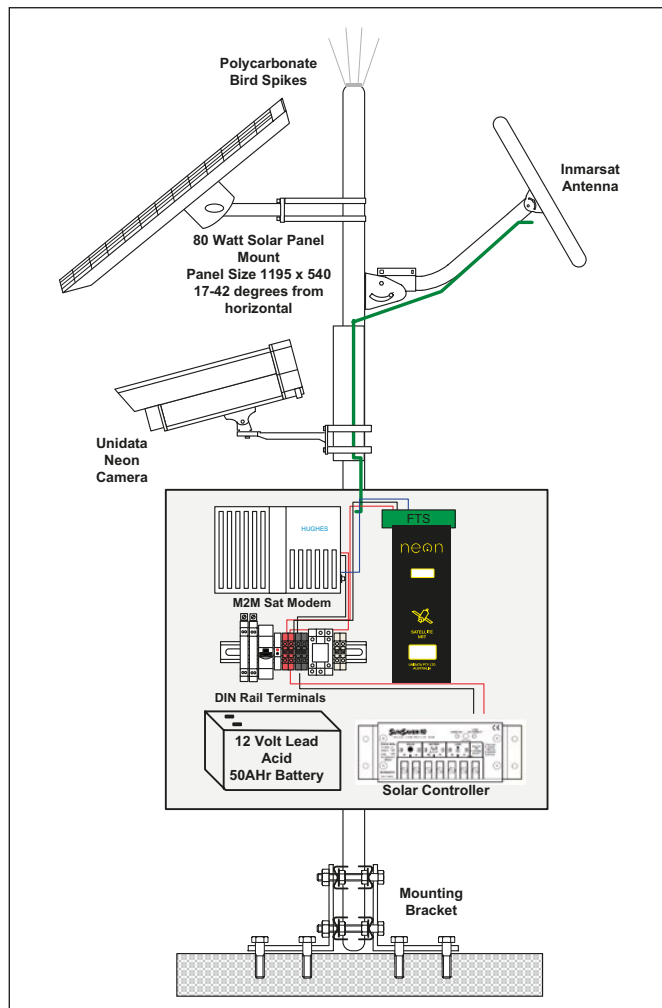
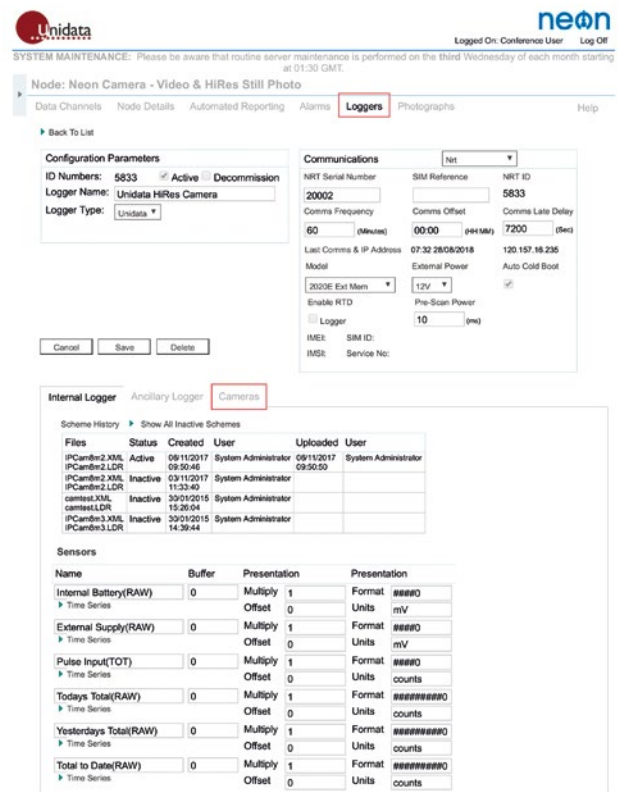
APPLICATION DETAIL

Unidata has both low resolution and high resolution Neon Camera systems. Low resolution camera systems provide cost effective low resolution images of monitored sites with a very small image resolution and a very small bandwidth load on the transmission system.

With the availability of the higher capacity communication networks, higher resolution, on demand service is now practical and reasonably priced. The Neon Applications Software includes support for different camera types. The low resolution camera is very cost effective, and the high resolution camera can be configured with different resolutions as required.

For remote image / remote video capture, a higher bandwidth telemetry system is needed. This is more likely to be a satellite telemetry system as cellular coverage is limited in remote areas. Also, as the bandwidth demands are high, and requiring an always on service, a low earth orbit satellite system or an older 2G cell phone system would not be adequate.

The Neon camera telemetry system also supports video. It has the ability to capture an immediate or scheduled high resolution image or an immediate video capture. The System allows for the length of the video capture to be specified in advance, for example 1 to 5 minutes. Suitable frame rate and resolution are configurable as well.



Unidata neon
 SYSTEM MAINTENANCE: Please be aware that routine server maintenance is performed on the third Wednesday of each month starting at 01:30 GMT. Logged On: Conference User Log Off

Node: Neon Camera - Video & HiRes Still Photo

Data Channels Node Details Automated Reporting Alarms **Loggers** Photographs Help

Back To List

Configuration Parameters
 ID Numbers: 5833 ☒ Active ☐ Decommission
 Logger Name: Unidata HiRes Camera
 Logger Type: Unidata

Communications
 NRT Serial Number: 20002
 Comms Frequency: 60 (Hz)
 Last Comms & IP Address: 07:32 28/06/2018
 Model: 2000E Ext Mem
 Enable RTD: ☐
 IMEI:
 SIM ID:
 IMSI:
 Service No:
 SIM Reference: 5633
 Comms Offset: 00:00 (hrs:min)
 External Power: 12V
 Pre-Scan Power: 10 (mA)
 Comms Rate Delay: 7200 (Sec)
 Auto Cold Boot: ☒

Cancel Save Delete

Internal Logger Ancillary Logger **Cameras**

Add Camera

Camera	Description	Camera Type	Camera Settings
Capture 1	Disabled Picture 1280x800	IP JPEG	Resolution: 1280x800 PTZ: PTZ Delay: 5 (Sec) Capture Schedule: Not Specified
Capture 0	Disabled Picture 640x480	IP JPEG	Resolution: 1920x1080 PTZ: PTZ Delay: 5 (Sec) Capture Schedule: Not Specified
Capture 0	Disabled Video 320x240	IP H264	Resolution: 320x240 PTZ: PTZ Delay: 5 (Sec) Frames per Second: 3 Video Duration (Seconds): 30 Capture Schedule: Not Specified
Capture 0	Disabled WARNING	IP JPEG	Resolution: 1920x1080 PTZ: WARNING PTZ Delay: 5 (Sec) Capture Schedule: Not Specified
Capture 0	Disabled SAMSUNG	IP JPEG	Resolution: 640x480 PTZ: SAMSUNG PTZ Delay: 5 (Sec) Capture Schedule: Not Specified
Capture 0	Disabled Bird	IP JPEG	Resolution: 1920x1080 PTZ: BIRD PTZ Delay: 5 (Sec) Capture Schedule: Not Specified
Capture 0	Disabled HDTV	IP JPEG	Resolution: 1920x1080 PTZ: PTZ Delay: 5 (Sec) Capture Schedule: Not Specified
Capture 0	Disabled Worker Sitting Area	IP JPEG	Resolution: 1920x1080 PTZ: CHAIR PTZ Delay: 5 (Sec) Capture Schedule: Not Specified

For most applications a slower frame rate of 5 frames per second, similar to security camera frame rates will provide a reasonable video performance reducing the bandwidth requirements.

The Neon Applications Software maintains the high resolution images and video files in the SQL database and these can be viewed on the web interface and / or reported out of the neon system in the same way data logging files are reported out. For example by ftp, email or by direct SQL database access.

The screen shots (pictured) show how the Unidata Neon High Resolution Satellite Telemetry Cameras are added to Neon via the Cameras tab on the Loggers tab, and how the resolution, frame rate and encoding can be selected via the web interface at a central location, while the equipment is located at the very remote location.

Multiple camera buttons may be added so that different resolution images and videos may be captured from the same camera without the need to reconfigure the camera. Simply press the appropriate capture button to take a photograph or video at the required resolution or frame rate.

Photographs and captured videos may be viewed on the photographs tab. An historical list of photographs is presented. Photographs and videos may be previewed on screen or downloaded for viewing at full resolution.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
RS232 Camera with 3G / 4G NRT	2502E-3E-L	Neon Camera System with 3G / 4G NRT
Ethernet Camera	2502B / C / F	Various IP Cameras

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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REMOTE OPERATIONS WORK FLOW



APPLICATION BACKGROUND

This application note describes a remote work flow system which is used in the field for remote based maintenance trucks to enable centrally based work flow systems to be used by remotely located personnel.

The remote locations are anywhere within a region and the central location is in a head or branch office.

Trucks in the field would be equipped with Inmarsat BGAN Satellite communication systems with roof mounted omni directional satellite antennae to provide internet connectivity, voice connectivity, and WiFi connectivity. In some regions cell phone coverage may be available, and this provides similar functionally.

The trucks in the field would be equipped with rugged tablet computers, for example the ALGIS rugged laptop computer which would be accessing several corporate applications on a central office or central control centre.

Trucks in the field would be equipped with a Neon GPS receiver / Neon remote asset / vehicle tracking system so the location of each truck could be known and displayed at the central location or control centre to at all times to ensure a high level of occupational health and safety for field staff.

The trucks may also have a small printer for printing various documents as and when required.

APPLICATION DETAIL

The GPS co ordinates of each truck would be checked every period, typically each 5 minutes and their location displayed on Google Maps or other LIS systems such as ESRI at the central control room.

These systems could geo reference the truck in the field and bring up alarms if the location was outside safe limits.

A security camera inside the vehicle and / or outside the vehicle would take a low resolution image typically each 5 minutes and that image would be displayed next to the truck icon on Google Maps or other LIS systems such as ESRI at the central control room.

Other vital functions, perhaps temperature, water availability, truck battery volts, fuel level and other parameters could also be monitored and displayed and alarmed if out of limits. A field staff / driver distress button could also be installed in the truck to alert the central location of any dangerous condition.

The rugged tablet computer in the field could access well, pipeline and other infrastructure information documents which are available on document systems within the company's document control system through an appropriate Adobe / PDF interface, providing up to the minute accurate information on all remote infrastructure.

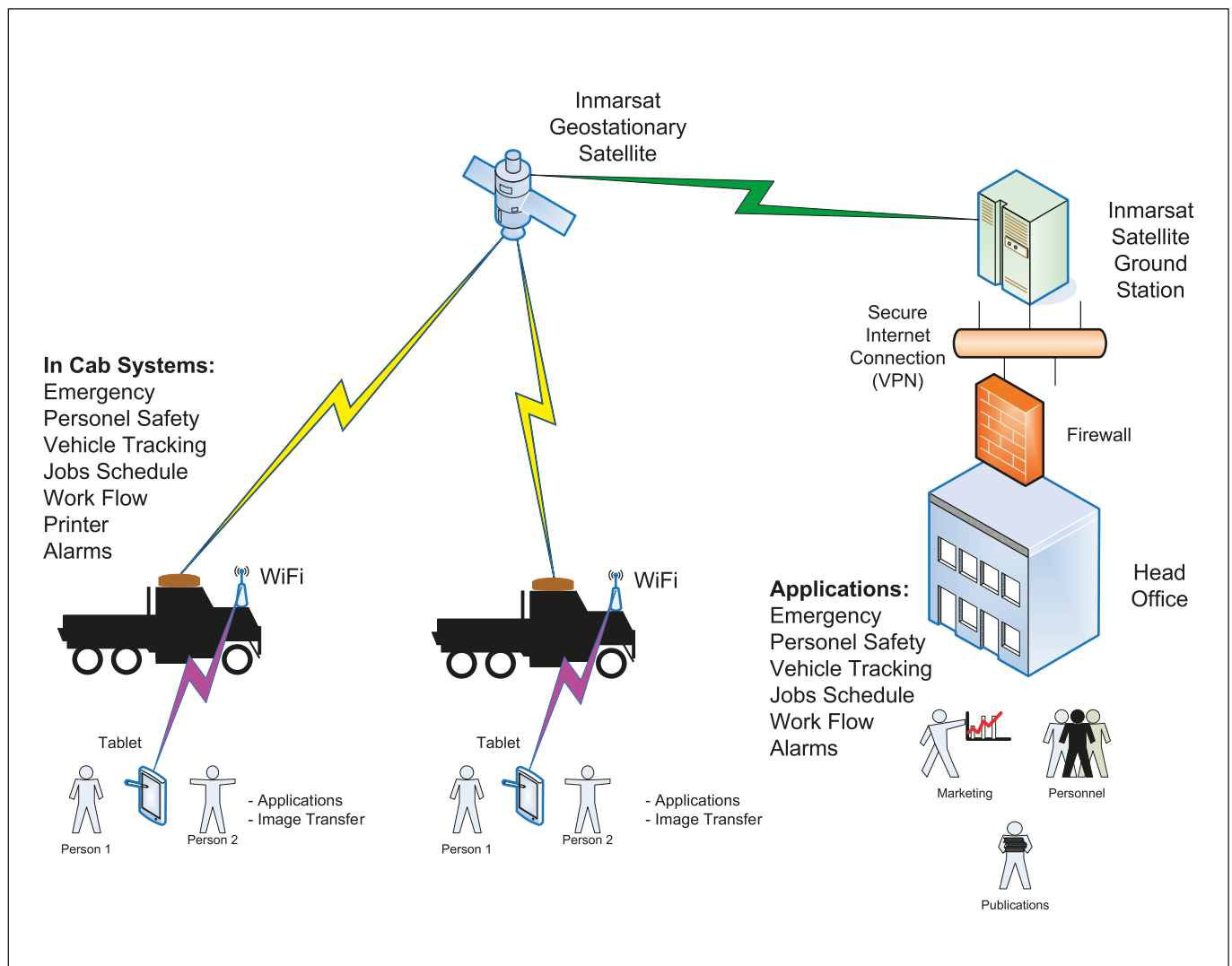
This would eliminate the need to carry updated reference manuals and would ensure any updated manual would be immediately available for field staff use, and they would be accessing only the latest manuals / instructions.

The rugged tablet computer in the field would also access a work flow / scheduling system for jobs to be completed in he field, and associated Health and Safety plans.

The staff in the field could access the work flow system indicating job progress and completion through the rugged tablet computer in the field. The staff in the field could also take high resolution images and some video to indicate the operational status of various infrastructure in the field.

The main cost for the truck would be an omni directional antenna based Inmarsat BGAN Satellite receiver. Some other truck infrastructure would need to be considered, printers, cameras and the like as well as a rugged tablet computer, such as an ALGIS.

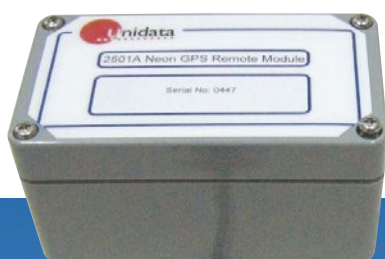
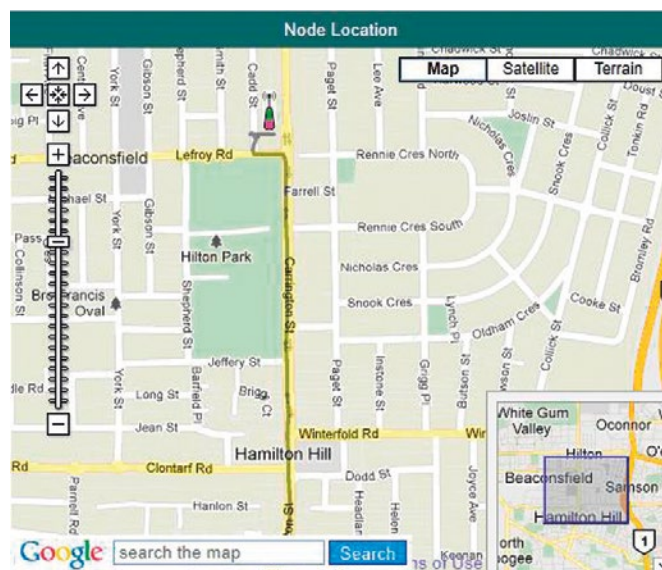
The applications are relatively small interfaces between other corporate applications.



The satellite bandwidth would utilize a special SCAPS tariff package with Inmarsat to allow for, say 1 GB per month, across 100 trucks, where some trucks would use less and some trucks would use more. A cell phone service would also use an aggregated plan for airtime.

The router / firewall settings in the truck and at the central location would be set up to only access the allowed applications, to ensure there is no use of the system for general applications, especially social networks.

General internet connectivity would normally be disallowed through router settings and through use of a secure VPN / APN network supplied by the satellite operator.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Algis Tablet	Custom Part	Rugged Laptop Computer
Ethernet Camera	2502B / C / F	Various IP Cameras
GPS Receiver with 3G / 4G NRL	3004B-MC00	GPS Receiver with Neon Remote Logger

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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REMOTE PROCESS CONTROL MEASUREMENT / MODBUS TCP



APPLICATION BACKGROUND

Oil companies, mining companies, public water, electrical and gas utilities all have some form of automated industrial measurement and process control application to provide better management of automated processes.

These processes usually need to be monitored remotely, hence there is a requirement to have sensor and process data read electronically on site and then transferred to a central system or control room where staff can view the readings and make decisions about the operation of or perhaps the shutdown of functions at a remote site.

APPLICATION DETAIL

A typical remote site may have industrial pressure / temperature sensors monitoring key points in a remote pumping station / oil well / gas pipeline. In a remote pumping station, it is likely that a local industrial Remote Terminal Unit (RTU) would be providing local control to several processes as well as providing the capability to connect via Modbus to a central Supervision Control and Data Acquisition (SCADA) system.

Most RTUs have the industry standard Modbus interface. Modbus is a serial communication protocol that is used to establish master / slave communication between devices. Master / slave communication is a type of data transfer where only master can send request to slave to perform the action and send response back to master. There is no way for the field device acting as a slave to initiate communication.

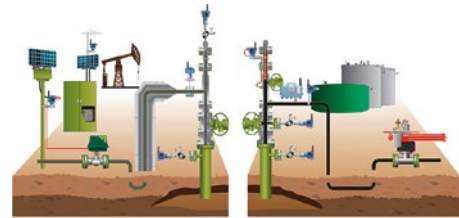
Unidata can provide the Neon Remote System that can be set up so that:

- Neon Remote Logger and Neon Server act as Modbus Master that collects and presents Modbus Slaves' data or
- Neon Remote Server act as Modbus Slave that presents data as Modbus TCP for SCADA Modbus Master ingestion.

Unidata Neon Remote Loggers can connect to the Modbus interface of most RTU equipment and can extract status and readings information on a routine basis, say every 5, 10 or 30 minute basis and transmit that data across a cell phone and / or a satellite network to central Neon Server. The collected data, status points and instrument readings are then stored and displayed on the Neon Server. Using a standard web browser, data can be accessed from anywhere on the Internet using a standard web browser.

Subject to Health, Safety and Security Regulation requirements, limited control functions can be initiated across the link, for example remote shutdown.

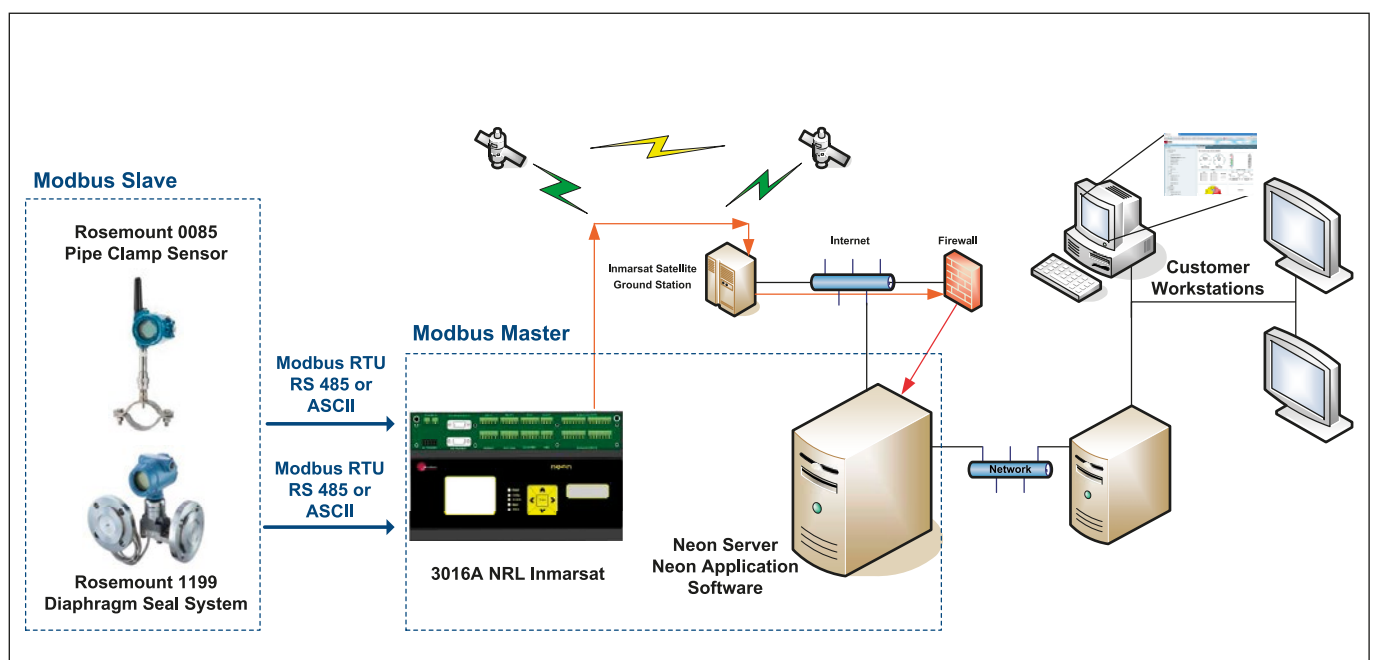
There are some typical application scenarios detailed below.

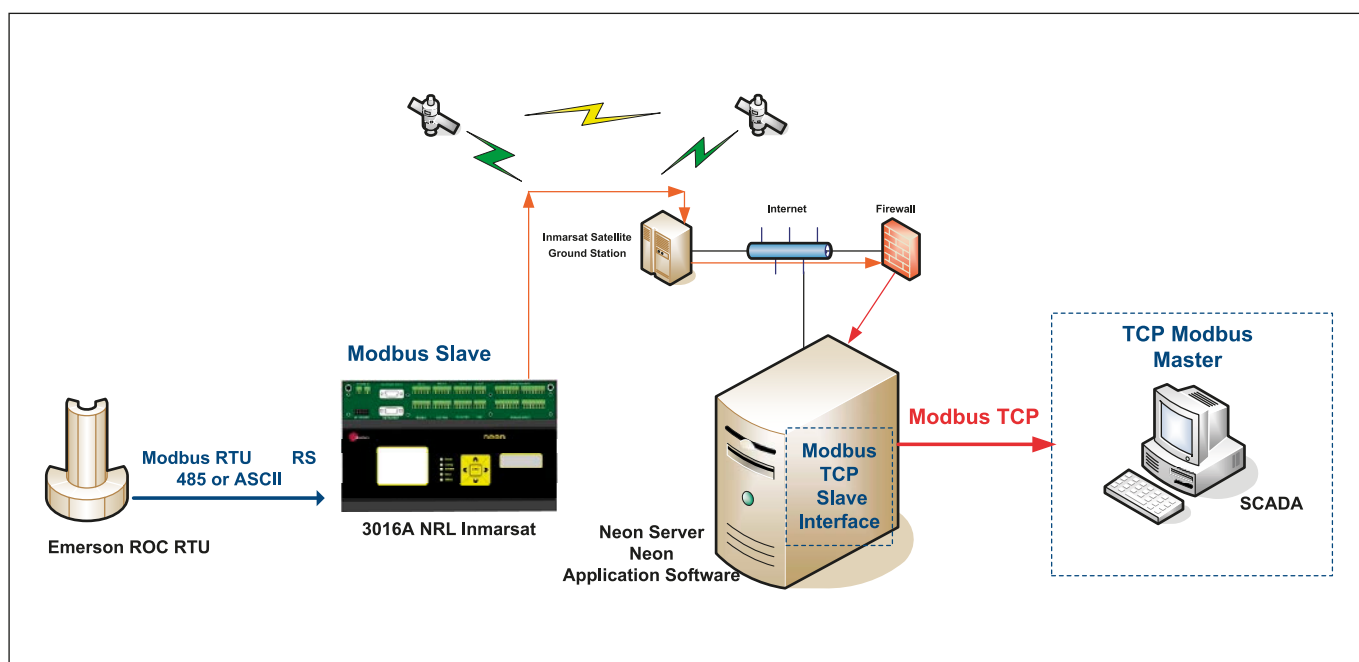


This application example (below) shows specific pressure and temperature sensors being read via standard industrial Modbus inputs. In this configuration pressure and temperature sensors are modbus slaves while the Neon Remote Logger acts as modbus master. The data is available for reporting out by ftp, web services and a specific SQL database view.

The following application shows a typical (for example Emerson ROC) RTU data being collected by the Neon Remote Logger (slave), then being passed to the Neon Server which acts as Modbus TCP interface to (master) central SCADA system.

The data is available for reporting out by ftp, web services and a specific SQL database view.





TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Customised Pressure Sensors	Custom Part	Custom Pressure inc Vacuum Sensors, Custom Output V, 4-20mA
Modbus RTU	Modbus RTU	

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
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NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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GEO THERMAL POWER STATION MONITORING



APPLICATION BACKGROUND

Geothermal electric power stations are generally located where high temperature geothermal resources are available near the surface, often near areas where there are natural hot springs.

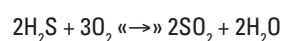
Geothermal power stations pull hot water / steam from the ground, use it to run turbines and then return the water back to the original source. The three basic designs for the geothermal power stations are:

- Dry steam - steam goes directly from the ground to the turbine
- Flash steam - hot water is “depressurised” in to steam that then drives the turbine
- Binary cycle - hot water is used to heat secondary liquid, one with the lower boiling point than water. Using secondary liquid allows for production to be varied, can be increased or decreased multiple times each day, so energy produced can match actual demand.

Geothermal energy systems offer a cleaner, more sustainable renewable energy, that can supply regular, continuous power but it can still have negative impact on the environment, people and wildlife. Water, air and land can be affected.

Water pumped from underground contains high levels of harmful chemicals like sulfur, so it is important to ensure that used water is not returned in to the environment. The power stations that have a loop air system emit gases from the extraction well, like hydrogen sulfide, known to smell like rotten eggs, into atmosphere.

The problem with hydrogen sulfide (H_2S) is that when in contact with the oxygen in the air (O_2) changes into sulfur dioxide (SO_2).



Sulfur dioxide is found to cause heart and lung diseases, acid precipitation, which then damages plants, soils and acidifies water bodies.

Pumping large amounts of water from the geothermal reservoir can cause land surface to sink and use of fracking process increases already high risk of earthquakes.

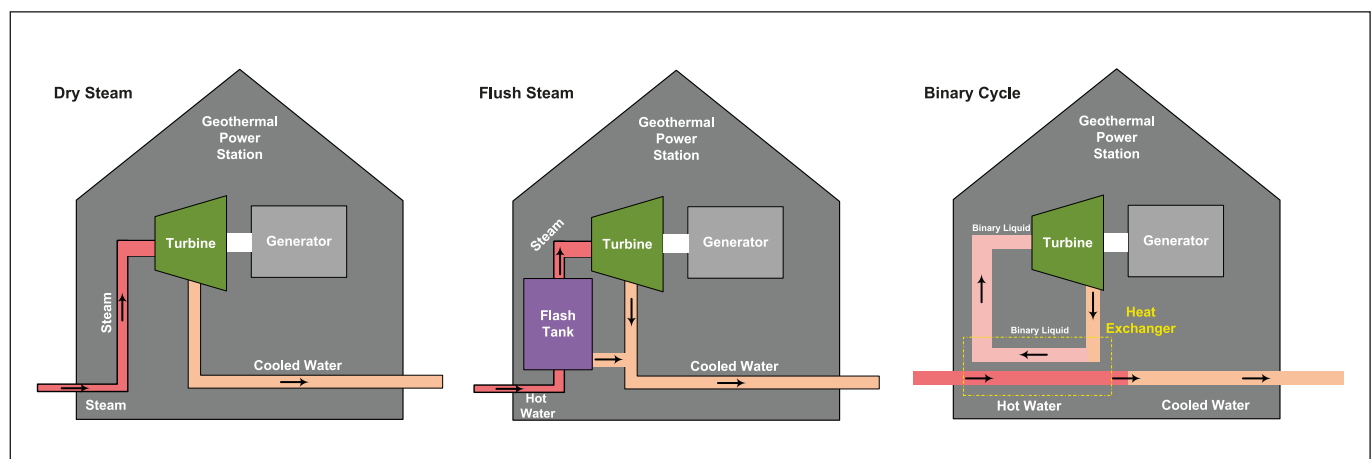
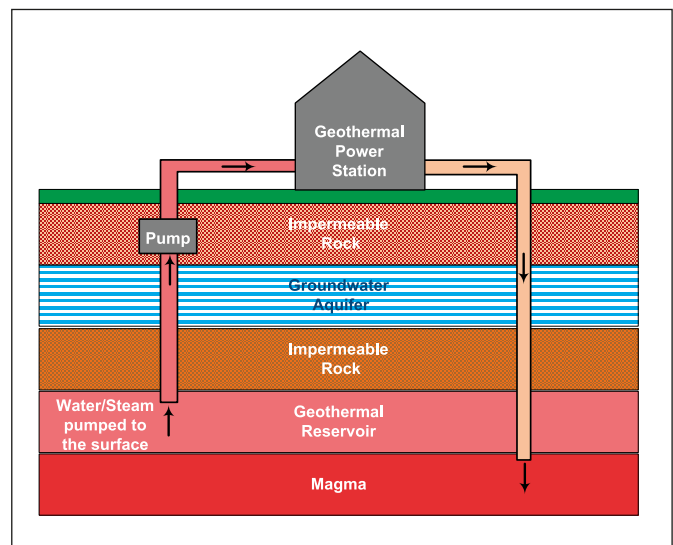
The constant monitoring and reporting is imperative when a geothermal power station is located near populated areas.

APPLICATION DETAIL

Firstly, there will be a requirement to monitor the weather in the area using Tier 2 weather station equipment to record the ambient conditions, especially wind speed and direction, so there is good knowledge of the general wind conditions to make sure emissions from the plant are not being carried by the wind to areas of population, such as a local town or city. There may be the need for one Tier 2 to be installed at the plant and at each perimeter fence of the facility to get a good reading for the local area.

Unidata supplies various weather station instruments, either a multifunction ultrasonic weather transmitter, which is very convenient to install, as well as separate discrete weather instruments. For this application, the simpler ultrasonic weather transmitter would most likely be the best choice for the application.

To provide telemetry option, a Neon Remote Logger can be connected to each weather station and be set up to read the instruments every minute, store the raw and average readings every 5 minutes, and then transmit the data to a central Neon Server every, say, 15 minutes.





As well as weather station equipment that measures weather conditions such as wind speed, direction, humidity, temperature, solar radiation etc, there would also be a requirement to add additional instruments to measure the presence of noxious gases and seismic activity.

There are many manufacturers of gas monitoring equipment. One such manufacturer is Dräger and there are sensors to measure noxious gases such as CO, CO₂, NO, H₂S, SO₂ as well as O₂ and N.

These instruments typically provide a 4-20mA analog output or a Modbus output which can be read by Neon Remote Logger routinely, perhaps every minute and then routinely send the data to the Neon Server every 15 minutes. The system could also be equipped with a ground seismic monitor to take daily readings of seismic activity. This way, so a clear pattern of the base level of seismic activity can be determined, and then used as a reference for monitoring the effects of the geothermal power station activities.

The Neon Remote Logger scheme / program can also be set up to check parameters each minute and raise an alarm and an immediate transmission to the Neon Server in the event of any reading is outside it's preset limits. The Neon Server can also be set up with alarm actions, to notify staff by email or text, with an escalation process, of any out of limits conditions.

As well as the immediate actions to deal with for high / dangerous gas levels, data can be analysed and long term trends can be determined to help minimise environmental impacts and optimise production.

Finally, water quality measurements for any outflows can be important, so a water quality instrument on any outflows would allow outflows to be checked for quality, to maintain environmental compliance. These instruments can also be connected with a Neon Remote Logger to the central Neon Server, either with a radio link, or by connecting directly into the plant network using an Ethernet cable.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
WXT536 measures barometric pressure, humidity, precipitation, temperature, wind speed & direction	6501V-H	Vaisala Weather Transmitter RS232 / 422 / 485 SDI-12
Dräger Gas detection Instrument	Dräger MiniWarn	CO ₂ / CO Gas Monitor
Water Electroconductivity Instrument	6536E	Water EC Instrument with Batt, 512K CMOS memory
Four Electrode Water Conductivity Probe	6536P-2-10 / 20 / 30 / 50	4EL Water Conductivity Probe - 10m, 20m, 30m or 50m
Temperature Thermistor Probes	6507E	Red Thermistor Probe 3K@25 with requested cable lengths
Linear Temperature Probe	6535A	Temperature Probe LM34 with requested cable lengths
Humidity and Temperature Probe	6539B	Humidity & Temp Probe (5-18V)
Rain Gauge	6506C	Rain Gauge / Tipping Bucket
Mounting Arrangement for Temp Probes	6704A / B	Radiation Gill Screen & Mount
Radiation sensors	7241C-A	Pyranometer Sensor High Output - Apogee
Mounting Arrangement for Pyranometers	7241M	Pyranometer Sensor Instrument Mounting & U Bolts

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

AVAILABLE FROM: **Unidata Pty Ltd** | 40 Ladner Street, O'Connor, 6163 Western Australia | Tel: +61 8 9331 8600 | info@unidata.com.au | www.unidata.com.au

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UNDERGROUND MINE GAS MONITORING



APPLICATION BACKGROUND

Gas buildup in underground mines is very dangerous as it can cause explosions which can result in injury or loss of life. Such explosions are also costly as mine tunnels, mine shafts and expensive mining equipment can be destroyed.

Mines have ventilation equipment to ensure there is no gas buildup but the control of these ventilation systems is difficult if there is no information on the gas levels within the mine.

This application note details how monitoring in a mine may be achieved.

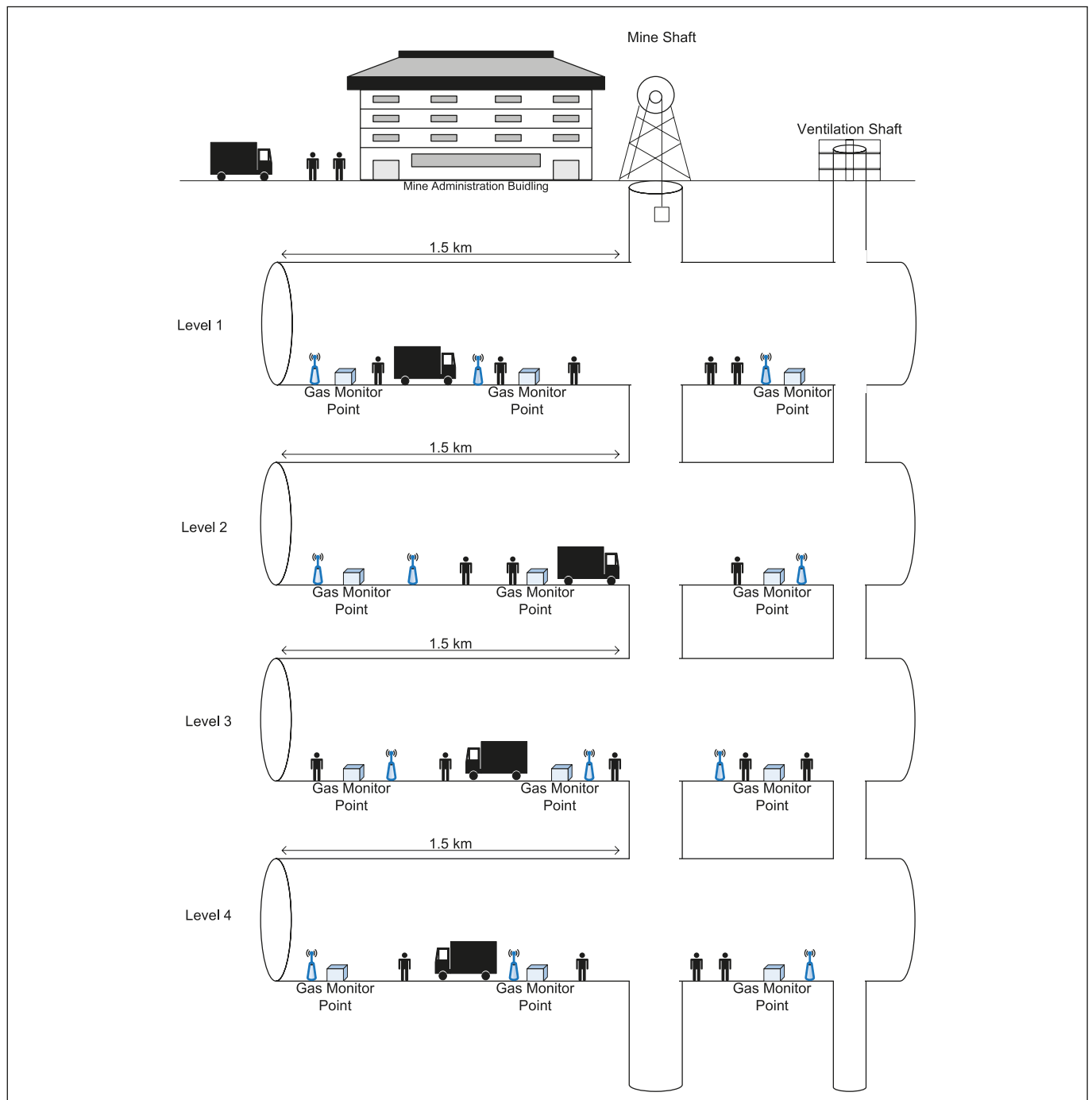
APPLICATION DETAIL

There are many manufacturers of gas monitoring equipment. One such manufacturer is Dräger which provides explosion proof and intrinsically safe gas monitors to measure noxious gases such as CO , CO_2 , NO , H_2S , SO_2 as well as O_2 and N_2 .

These instruments typically provide a 4-20mA analog output or a Modbus output which can be read by Neon Remote Terminal routinely, perhaps every 1, 5 or 10 minutes to be logged, alarm limit checked and then transmitted via a communication channels to a Neon Server on a regular schedule, perhaps every 5 minutes.

Underground mines typically have one or more mine shafts, many tunnels leading from those mine shafts and one or more ventilation shafts. Neon Remote Terminal Gas Monitor Stations can be set up at many different locations within the mine to monitor gas and other local conditions, such as temperature, humidity and perhaps dust and sound.

Underground mines generally have an existing communications system within the mine. Old mines had wired systems, like a telephone. Modern mines have wireless communications systems either cell phone based or standard 802. WiFi based, with a leaky feeder / leaky coax antenna throughout the mine, and WiFi access points.





The Neon Remote Terminal / WiFi can be used in this application with data being transferred from the Neon Remote Terminals via the existing WiFi system to a Neon Server within the Mine Administration building on the surface.

The Neon Server can be used to check gas and other ambient parameters at each measuring station / at each Neon Remote Terminal and display information on a standard web browser and on a schematic diagram of the overall mine to highlight any out of limit ambient or gas parameters.



The Neon Remote Terminal can also be programmed to increase or decrease ventilation in the mine based on the current measurements. The Neon Server can be set up to check incoming data for any out of limit conditions and activate an alarm. Alarm actions can be set up to activate visual or audible alarm indicators. Alarm actions can also be set up to email and text mine staff and mine safety officers to alert them of any out of limit / any dangerous conditions.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Dräger Gas Detection Instrument	Dräger MiniWarn	CO ₂ / CO Gas Monitor
Dräger Gas Detection Instrument	Dräger PAC 3000 / 5000 / 7000 Monitor	CO ₂ / CO Gas Monitor

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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VEHICLE / ASSET TRACKING



APPLICATION BACKGROUND

Many industries need to track vehicles and other assets for commercial and occupational health, safety and security reasons.

GPS receiver modules are easily obtained to mount on a vehicle or asset and the position of the asset is shown locally.

This application reads the GPS position and routinely sends the position via cell phone or satellite networks to a central server to display on Google Maps using a standard web browser and perhaps exported out to a companion GIS/Land Information System.

This vehicle / asset tracking system is generally used in conjunction with a wider application, such as remote asset monitoring.

There are several applications for mobile maintenance facilities, truck mounted repair facilities for example, where test and commissioning data is collected from oil wells or other assets on a regular maintenance trip. Having the GPS location recorded along with the data is useful as an audit trail of the measurements at different locations.

APPLICATION DETAIL

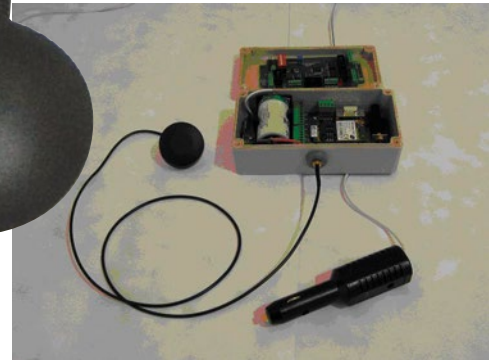
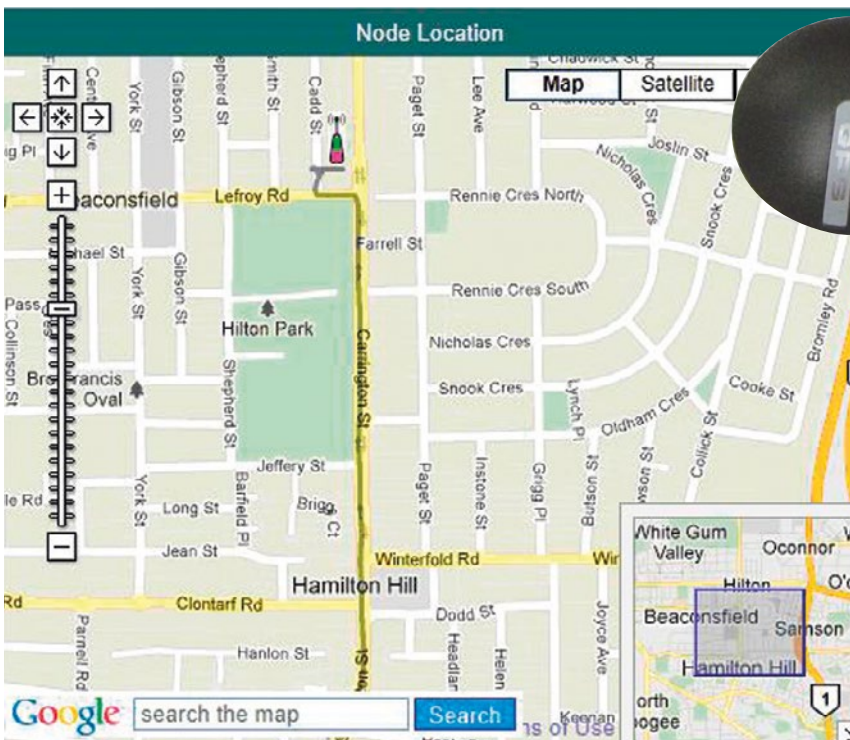
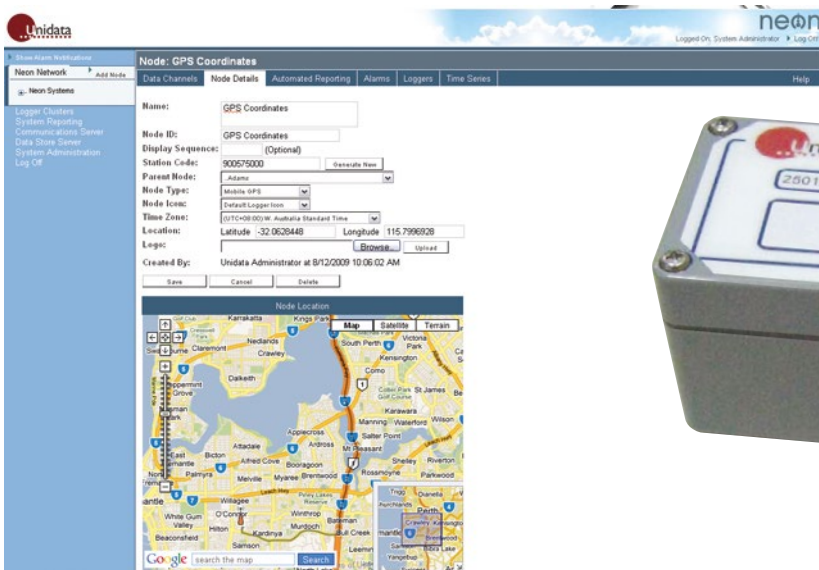
The 2501A Neon GPS Receiver Module is a GPS Receiver with a dedicated interface to the Neon Remote Logger family of products.

The 2501A Neon GPS Receiver Module receives standard NMEA GPS data streams and puts those data streams into registers that can be read by Neon Remote Loggers. The Neon Remote Loggers can be programmed to routinely or on demand obtain the current latitude and longitude and send this position data to the Neon Server.

The system supports Geo Fencing, where the system can alarm when the unit is brought within a specified distance from a location, for example 500 meters from a depot or pumping station.

The Neon Server presents the position data overlaid on a Google maps interface if required, as well as displaying various options for tracking history and tracking of different specified groups. The connected Neon Remote Logger records the latitude and longitude as required by the logging scheme and schedule so the position can be logged in the same way as normal logged data. Hence the position logging is maintained even when there is no cell phone or satellite phone coverage.

Neon Remote Loggers have digital inputs and outputs and available for input or output of tracking status information or operational information.



As an example an input could be connected to a distress button, a disable button, a battery status or vehicle status input. As an example, an output could be connected to a warning light or siren.

	Sensor Name	Channel Type	Data Times	Data Values	Units	Status
Remove	<u>LATITUDE(RAW)</u>	Latitude	From: 27/04/2011 09:27:00 To: 27/07/2011 14:21:11	First: -32.5366400 Last: -32.0665516	Dec Mins	Active
Remove	<u>LONGITUDE(RAW)</u>	Longitude	From: 27/04/2011 09:27:00 To: 27/07/2011 14:21:11	First: 115.7506933 Last: 115.7793383	Dec Mins	Active
Remove	<u>NMEAAGE(RAW)</u>	Not Specified	From: 27/04/2011 09:27:00 To: 27/07/2011 14:21:11	First: 0 Last: 0		Active
Remove	<u>Internal Battery(RAW)</u>	Not Specified	From: 27/04/2011 09:27:00 To: 27/07/2011 14:21:11	First: 3747 Last: 3759	mV	Active
Remove	<u>External Supply(RAW)</u>	Not Specified	From: 27/04/2011 09:27:00 To: 27/07/2011 14:21:11	First: 27500 Last: 25297	mV	Active
Remove	<u>SDISTAT(MAX)</u>	Not Specified	From: 27/04/2011 09:27:00 To: 27/07/2011 14:21:11	First: 0 Last: 0		Active



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
GPS Receiver with 3G / 4G NRL	3004B-MC00	GPS Receiver with Neon Remote Logger

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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WATER USAGE METERING



APPLICATION BACKGROUND

Measurement of water usage is usually done manually and very occasionally, perhaps once per year. This provides usage over a long period, but usage patterns cannot be determined.

Water Utilities and high usage water customers often need to know usage patterns, hourly, daily, monthly etc. to better understand how water is being used or possibly wasted in their organisations. These measurements can also be used to detect leaks, so that water usage and the cost of water can be monitored.

Neon Metering Logger can be wired up to a water meter to act as a logger and communicator. Data readings such as pulses

are recorded by the NRL and uploaded to Neon. This data is then analysed and can be presented in numerous ways.

Water metering users typically set up the NRL to record metering pulses for 24 hours, and then upload the data once per day at a predetermined time, e.g. midnight.

Water metering customers at times may wish to set an alarm point, such that an unusual water usage over a period is signalled as an alarm condition. The alarm occurrence is sent to Neon server and an appropriate response is generated, like sending an email or sms text message to allocated people.

APPLICATION DETAIL

Water meters usually provide a pulse output based on, say 1 litre per second, 10 litres per second and so on. When considering logging systems, you may wish to have a Neon Remote Logger measure and record the raw litres per second, or accumulate pulses in custom specified way by mathematically calculating usage at the logger level before uploading the data to a central server. As the data is not for any process control requirement, sending the collected water usage information to the Neon Server once per day is usually sufficient.

Scanning - Decide on an appropriate scan interval. Scan interval determines how often the logger scans inputs. Typically: scan inputs each minute and then sets equipment to sleep to conserve battery life.

Alarms - Decide if there are any high water usage conditions you wish to check and if that condition is exceeded, what action is to be taken. For example: report the alarm information to the server immediately and / or send an email or text to assigned people.

Logging Data to Memory - Decide on an appropriate logging interval. Logging interval defines the time between the logs. At each log, data is recorded in the logger memory. Typical log interval is 5 minutes. A logger wakes up every 5 minutes, scans inputs as per defined scan rate, stores data in the memory and sets equipment to sleep in order to conserve battery life.

The next consideration is how to power the Neon Remote Logger. A power budget should be calculated by Unidata engineers in order to determine the most practical and economical way to power the NRL. The most common solutions are lithium battery packs or solar recharge system (set of properly sized up solar panels, a solar controller and a rechargeable sealed lead acid battery).



With a daily reporting schedule, and using the single high capacity lithium battery as a power source, NRL units will measure and report for 3 to 5 years before a battery change is needed. The Neon Remote Logger can be set up to regularly report battery voltage. The alarm can be sent if the low battery voltage was detected.

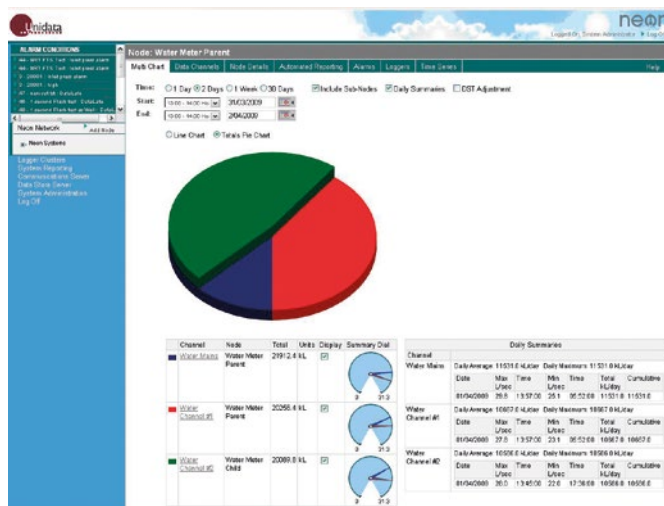


To configure a water meter node on the Neon Server, the node type of "Water Meter" is selected from the drop down box available on the Node Details tab. This will change the layout of Neon for nodes of this type in particular a new Water Meter tab will appear with extra charting options.

A Channel Type selection will now be available on the Data Channels tab; this provides extra options when displaying data for channels related to water meters. To activate this feature a channel type "Litres per Second" can be selected, this will add extra information to the displayed data on the Water Meter Tab and a daily total line in KL will appear in the Daily Summaries table.

A water meter type report can be configured via the Automated Reports tab; Neon can also export Hydstra formatted report files. Another available option is to "Enable Aquarius Interface" which will allow for Aquarius to import or export the data for the specified node.

Water meters in large organisations often have one main water meter, then several sub meters. The Neon System allows water users to set up a 'parent and child relationship' so the 'child' water meter usage can be aggregated to check usage by the main 'parent' water meter.



Water Meter | Data Channels | **Node Details** | Automated Reporting | Alarms | Loggers

Name: Neon Water Metering

Node ID:

Display Sequence: 13 (Optional)

Parent Node: Unidata Neon Demo Area

Node Type: Water Meter

Node Options: ☐ External Content ☐ Strip Charts

Aquarius: ☐ Enable Aquarius Interface

Node Icon: Default Logger Icon

Time Zone: (UTC+08:00) W. Australia Standard Time

Location: Latitude -32.0600549503722 Longitude 115.799063444138

Admin Email:

Notes:

Water Meter | Data Channels | **Node Details** | Automated Reporting | Alarms | Loggers | Photographs

Name: Neon Water Metering

Node ID:

Display Sequence: 13 (Optional)

Parent Node: Unidata Neon Demo Area

Node Type: Water Meter

Node Options: ☐ External Content ☐ Strip Charts

Aquarius: ☒ Enable Aquarius Interface

API Version: Aquarius 3.X

Acquisition URL:

Publish URL:

Username: Password: *****

Location:

Data Direction: ☒ Export ☐ Import

Node Icon: Default Logger Icon

Time Zone: (UTC+08:00) W. Australia Standard Time

Location: Latitude -32.0600549503722 Longitude 115.799063444138

Admin Email:

Notes:

TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Pulse Output Water Meter	Custom Part	Water Meter 1 / 5 / 10 / 100 litres per minute (Elster)
T-Probe	Custom Part	Pulser for Retro-Fitting to V100
PR6	Custom Part	Inductive Pulser for V200 Range of Cold Water

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CLO / 3008A-CLO	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-COI / 3008A-COI	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

AVAILABLE FROM: **Unidata Pty Ltd** | 40 Ladner Street, O'Connor, 6163 Western Australia | Tel: +61 8 9331 8600 | info@unidata.com.au | www.unidata.com.au

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SEWER MONITORING



APPLICATION BACKGROUND

Water and waste utilities need to monitor sewer levels and flows. If there are equipment breakdowns within the sewer system, overflows may occur. There are large fines and other penalties levied on water and waste utilities when there is a sewer overflow and the cost of cleanups is substantial.

Sewer overflow conditions can be detected with simple level limit switches, which may be installed within the sewer pipe at different levels, to trip a level limit alarm. Sewer flows can also be measured with the Unidata Starflow Ultrasonic Doppler flow meter installed on the bottom of the sewer pipe.

APPLICATION DETAIL

The overflow application is relatively simple. There could be a set of mechanical limit switches installed inside the sewer pipe, perhaps 3 switches at low, medium and high positions within the pipe, usually mounted on an angle bracket which is then inserted into the sewer pipe.

Each limit switch is wired back to the Neon Metering Logger which is set up to detect when the limit level is exceeded. The Neon Metering Logger alarm is activated and this alarm condition is sent to the Neon server via cellular, LoRa or satellite networks. The Neon Server processes the alarm and sends emails and / or text messages to alert operators of that out of limit and potential overflow condition.

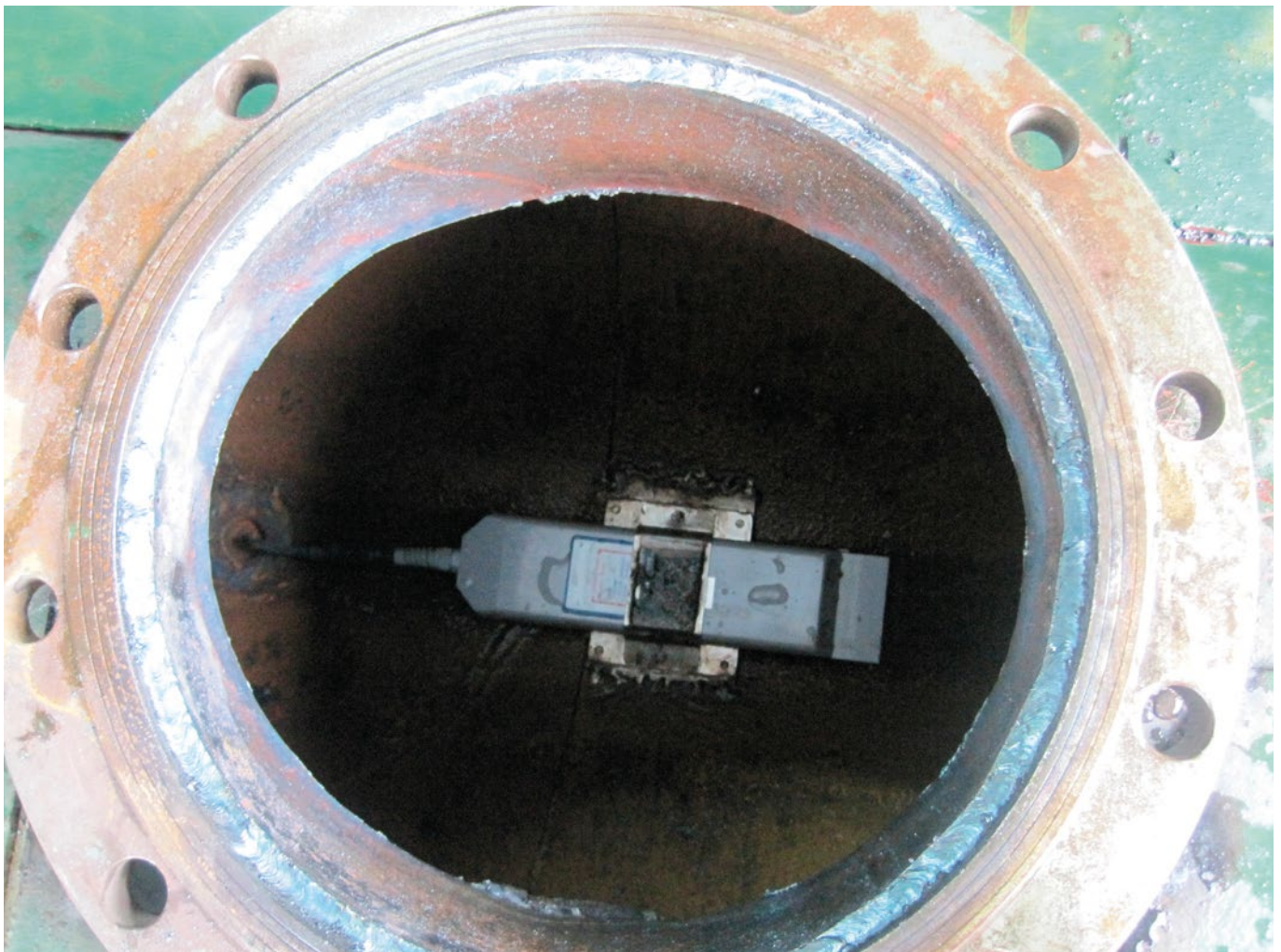
Water and Waste utilities often need more sophisticated alarm handling, with multiple levels of escalation, such that if the first alarm was not acknowledged and attended to by the first person, within a pre-determined time, further alarms are sent to different escalation contacts, to make sure the potential overflow condition is being attended to.

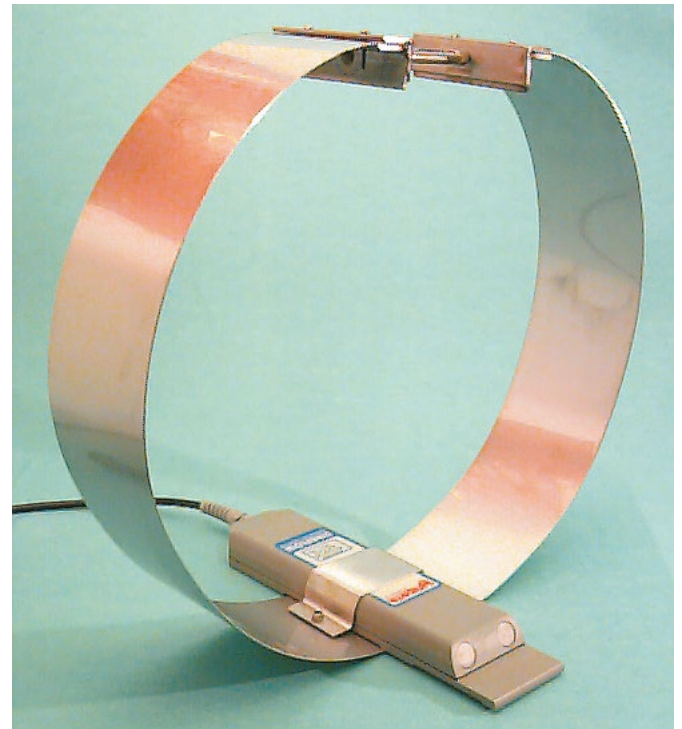
The M series Neon Metering Loggers are powered by a single lithium battery, and can operate for more than two years on that one lithium battery, so they are simple to install without the need for any power infrastructure. The industrial 3016 & 3008 models require a sealed lead acid battery and a solar panel.



A Neon Metering Logger can be wired up to a Unidata Starflow ultrasonic doppler flow meter to measure the velocity and the depth, and then calculate the flow reading based on the size and the shape of the pipe, which can be rectangular, circular or ovoid.

There may be a need to log routine levels and flows over a period, say over 24 hours, and then upload that routine data once per day at a predetermined time, e.g. at midnight to the Neon Server.

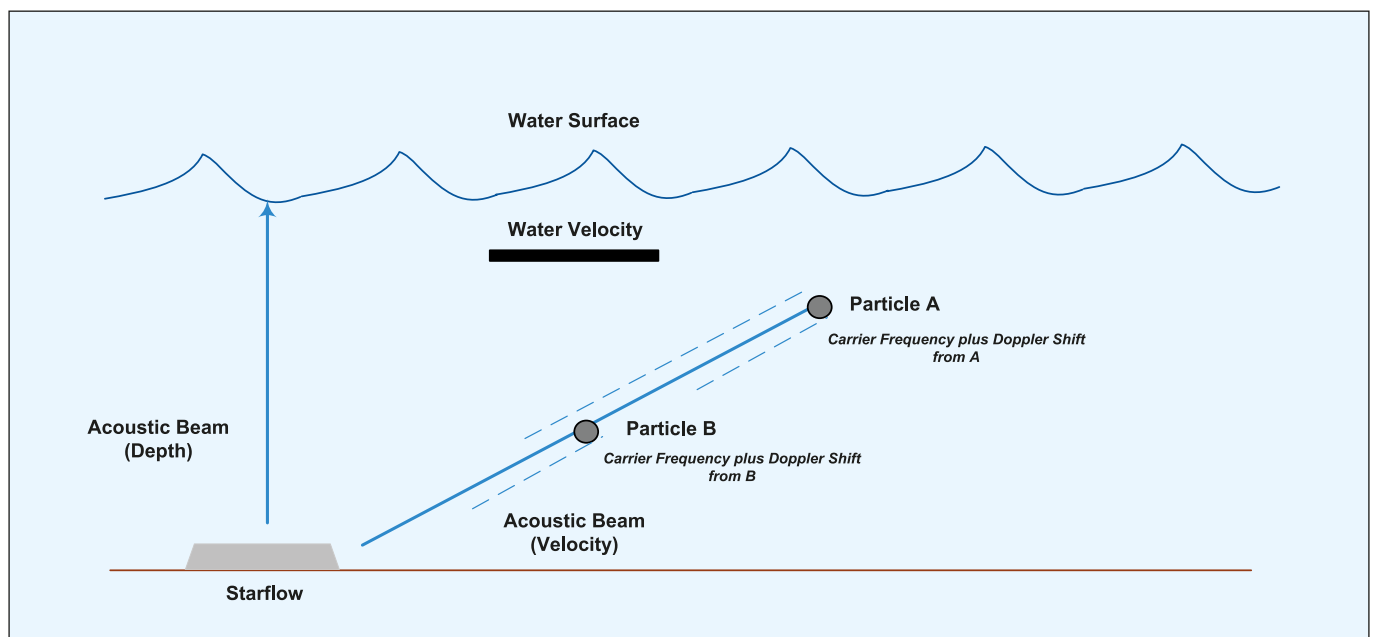




You should decide on an appropriate sensor reading interval, typically this would be to read the sensors every minute, and store the sensor data in memory every 5 minutes and send the sensor data to the Neon Server every few hours. To conserve battery life, equipment is set to sleep between sensor readings, however limit switch changes are detected immediately, even when the equipment is asleep. These limit switch changes trigger an immediate alarm transmission to the Neon Server and a text message can be sent to the relevant personnel to alert them of this alarm condition.

Another consideration is how to power the Neon Metering Logger. A power budget should be performed by Unidata engineers to decide the best power method, either solar panels and sealed lead acid battery system or lithium batteries.

In regard to mounting, the starflow instrument should be mounted inside the pipe using a pipe band or a mounting bracket. Care should be taken to make sure the installation is mechanically smooth, so any debris in the sewer flow is not caught on any sharp edges of the instrument, the mounting plate or the cable.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Mechanical Limit Switches	Custom Part	Various Industrial Switches
Ultrasonic Doppler Instrument - velocity, depth & flow	6526J-21	Starflow Ultrasonic Doppler Instrument 0-2m
Ultrasonic Doppler SDI-12 Instrument - velocity & depth	6527A	Starflow QSD Ultrasonic Doppler SDI-12 Instrument

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CLO / 3008A-CLO	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-COI / 3008A-COI	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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INDUSTRIAL TANK LEVEL MONITORING



APPLICATION BACKGROUND

Measurement of levels in tanks is important across many industrial applications. There are many tank monitoring applications, for example fuel monitoring, mining process liquids monitoring, and pipeline corrosion inhibitor liquid monitoring.

The monitoring is required for two purposes. One purpose is to make sure the liquid does not run out / the tank does not run dry.

Another purpose is to ensure the liquid is being drawn from the tank in line with the expected usage, which is another indicator that the process using the liquid is operating correctly, and is a derived measure of the flow from the tank.

APPLICATION DETAIL

For this application, it would be appropriate to use a pressure sensor, and use the pressure from that sensor to determine the level in the tank. The sensor would be most likely strain gauge technology, sometimes called a hydrostatic sensor.

These sensors can be either vented or non-vented. Vented sensors have one side of the sensor exposed to the liquid being measured and the other side of the sensor open to the air, either directly exposed, or exposed by using a small vent tube inside the cable with a vent to the atmosphere at the termination end of the cable. Non vented sensors need a barometric pressure sensor at the location of the measurement to provide the current atmospheric pressure, which is then used in a calculation to compensate / normalise the pressure reading based on the current atmospheric pressure at that location and at that time.

The casing for such sensors can be either stainless steel or titanium. Titanium is chosen for more corrosive environments. The output of such sensors can be 0 to 5 volts, 4 - 20mA, SDI-12 or Modbus.

The diagram shows two methods of connecting the sensor. The first method is to immerse the sensor in the liquid and the cable exits from the top of the tank. The second method involves adding the T piece with an attached pressure sensor to the tank output pipe. Pressure measured within the T piece is directly related to the level in the tank.

Consideration should be given to the choice of communication channel for the telemetry function. The most economical choice, if available, would be to use a cellular network. All Unidata Neon Remote Loggers support this option.

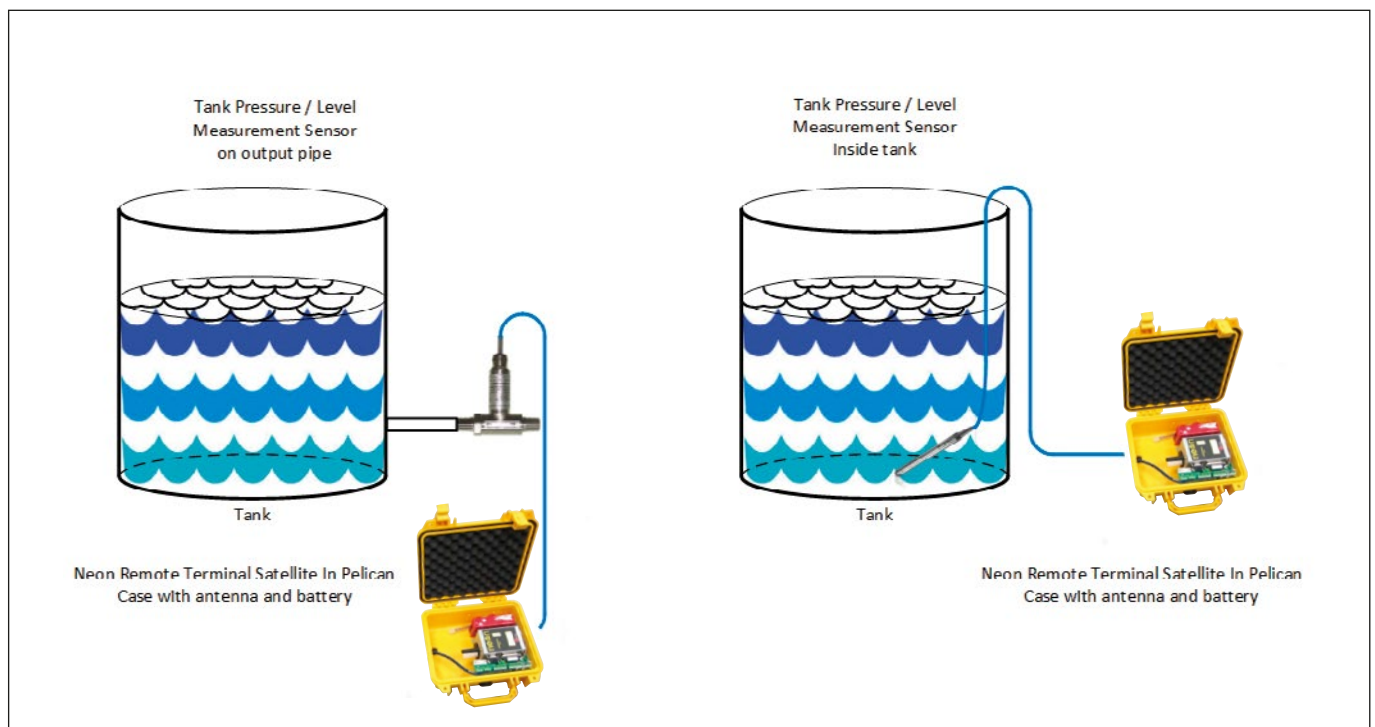
If there is no cell phone coverage then the Satellite Neon Remote Loggers would be the way to go. As tank monitoring is low volume data, services such as Iridium short burst data, Inmarsat ISAT Data pro or Orbcom are probably the best options.



However, the data transmission costs escalate greatly for these services when the data rate is anything more than an occasional transmission of a short packet of data.

The third option is to use a LoRa Neon Remote Logger. In this case, water level sensors are read by the logger according to the scheme. A set of short data packets will be sent, as set by logging interval, to the LoRa WAN gateway over either private or public LoRa network.

LoRa WAN gateway transfers data packets to Neon Server using Ethernet, cellular or satellite network.



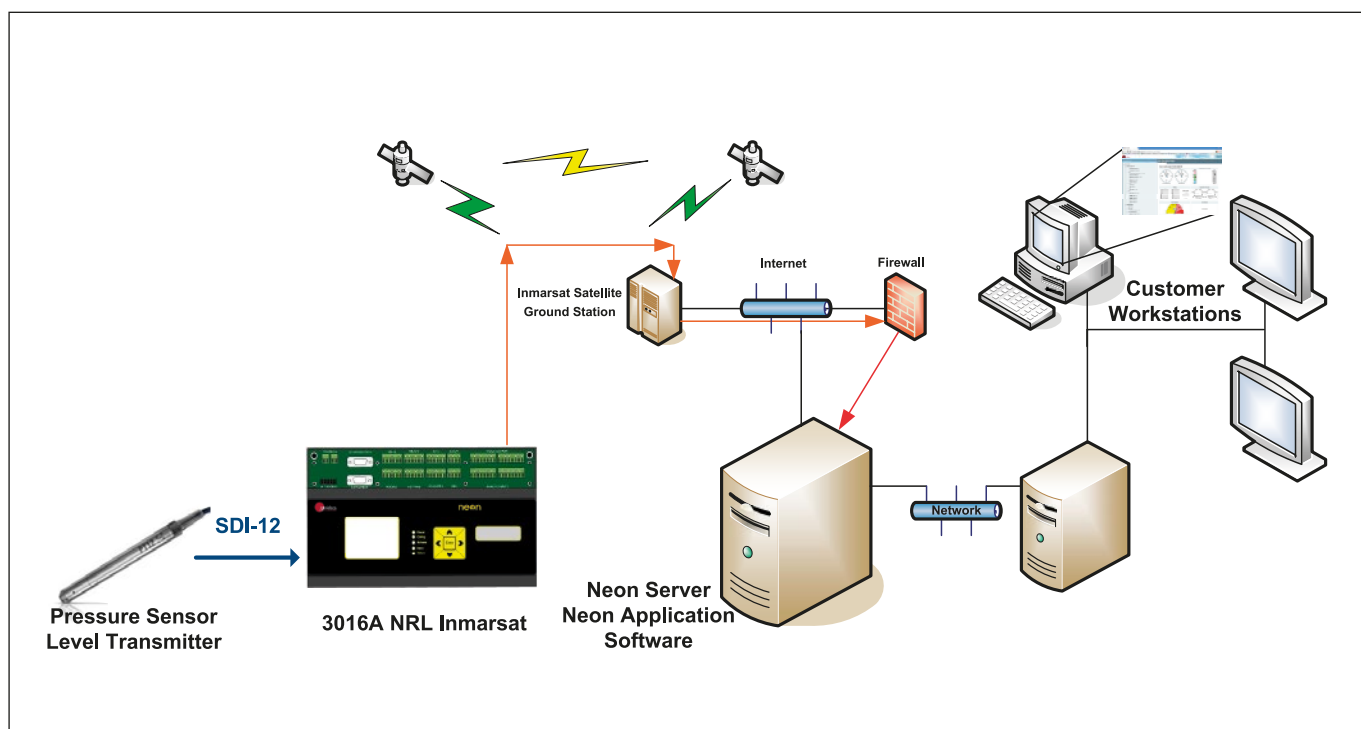


The LoRa WAN system has a typical range of up to 5km, the range reduces in built up areas depending on building density and increases where there is line of sight and when a larger antenna is used.

The application is quite a simple one; the tank level should be measured, perhaps hourly, and stored locally and then sent to the Neon Server daily to display the level on the Neon Web application. The Neon Remote Logger in the field would also have alarms set up based on any unusual condition, for example too fast level changes would indicate a leak and too slow level changes would indicate a blockage. In the event either of these conditions was detected an immediate transmission back to the server will be initiated and an alarm set to alert operators of the problem.



As the power requirements for this type of monitoring are light, the whole system could be housed inside a small pelican case and powered by a set of lithium batteries. The power budget is small as the sensor would be turned on every few hours and only for the short period of time needed to take a measurement. In this configuration a suitable lithium battery pack could power the entire system for up to 5 years.



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
Hydrostatic Water Depth Probes	6542D-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
Hydrostatic Water Depth Probes Titanium	6542D-T-A / B / C	PT12 Pressure / Temperature Sensor SDI-12 3.5m, 10m or 20m
4-20mA Pressure Transmitter	6548A-B / C	Submersible Pressure Transmitter 4-20mA 5m or 10m

NEON TELEMETRY - NRL / RTU / FIELD UNITS

Options	Unidata Part Number	Description
Ethernet	3016A-000 / 3008A-000	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G	3016A-C00 / 3008A-C00	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3016A-CL0 / 3008A-CL0	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat	3016A-00I / 3008A-00I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Equatorial Orbit Satellite - Inmarsat & 3G / 4G	3016A-C0I / 3008A-C0I	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Low Earth Orbit Satellite - Globalstar	3016A-00G / 3008A-00G	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Satellite - Iridium Short Burst Data	3016A-00R / 3008A-00R	Neon Remote Logger-16 or 8 Analog Ch / Touch Screen Display
Standalone RTU / NRL - Industrial	3004A-00 / 3004A-0L	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
Cellular RTU / NRL 3G / 4G - Industrial	3004AC0 / 3004A-CL	Neon Remote Logger-4 Analog Ch with or without Touch Screen Display
M – Series Standalone RTU / NRL	3004B-M000 / 3004B-M0B0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Cellular RTU / NRL 3G / 4G	3004B-MC00 / 3004B-MCB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series LoRa RTU / NRL	3004B-ML00 / 3004B-MLB0	Neon Remote Logger-4 Analog Ch with or without Li Battery
M – Series Ethernet RTU / NRL	3004B-MEBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Microsatellite RTU / NRL	3004B-MHBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional
M – Series Iridium Short Burst Data RTU / NRL	3004B-MIBL	Neon Remote Logger-4 Analog Ch, Li Battery & LCD are optional

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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HIGHER CAPACITY WEATHER STATION



APPLICATION BACKGROUND

In this example the weather station is connected via an SDI-12 interface to 3004ML Neon LoRa Logger that collects and records the weather station data. 3004ML Neon LoRa Logger then sends recorded data, at specified intervals, via a LoRa network to a central Neon Server.

The Neon Server can either be customer owned physical or cloud server, or a fee based Neon Hosting service that can be purchased from Unidata.

The weather station is set up with a logging scheme using the Starlog 4 software to read the measuring instruments on a predetermined schedule, every 15 minutes, and send the data to the Neon Server via the LoRa network on each measurement cycle. As this is a message based service, there is no on-line configuration from the Neon Server; hence the system needs to be set up with a logging scheme before deployment to the field.

When the data arrives at the Neon Server, it is displayed on a graphical interface. If out of limits conditions occurred, alarms are raised and emails / SMS texts are sent to appropriate staff.

APPLICATION DETAIL

LoRa is one of the several LPWAN technologies which allow for a free spectrum connection between the LoRa system in the field and a LoRa gateway. The range of LoRa depends on the local geography and the antenna type. A small chip antenna soldered onto the 3004ML allows for a range of around 1 km depending on the geography i.e. if unit is installed outdoors and there is line of sight from the LoRa field unit and the gateway. A large antenna mounted high on a pole may extend the range to 10km or more, also depending on the geography.

The setup of LoRa is more complex than other systems and requires the skills of a communications engineer familiar with the LoRa system. LoRa gateway needs to be purchased, configured and installed and LoRa network needs to be configured before the system can be set to work. There are several gateway manufacturers and in this example either a MultiTech gateway or a Kerlink gateway can be used. The gateways need to be powered-on all the time and they also need a direct Ethernet connection, a cell phone hot spot or a satellite modem.

The 3004ML LoRa nodes can be setup to use OTAA (Over the Air Activation) OR ABP (Activation by Personalisation). In general ABP is usually used by larger networks which utilize multiple gateways over a large geographical location where the activation is controlled by a network server such as Actility.

OTAA is generally used with smaller networks where there are a small number of LoRa nodes connecting to a single gateway like Kerlink or MultiTech and the gateway can authenticate the devices appropriately.

Using **ABP** join mode requires the user to define the following values and input them into both, the device and gateway or network server.

- **DevAddr:** This is a logical address used to identify the object on the network.

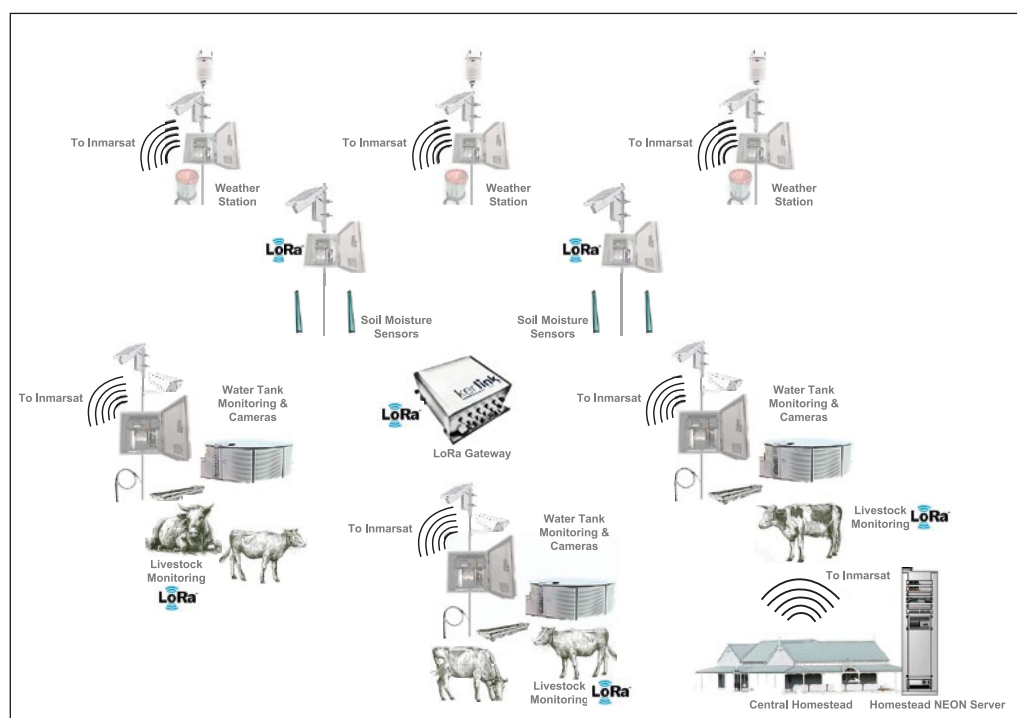


- **NetSKey (Network Session Key):** Encryption key between the object and the operator used for transmissions and to validate the integrity of messages.
- **AppSKey (Application Session Key):** Encryption key between the object and the user (via the application) used for transmissions and to validate the integrity of messages.
- **DevEUI:** This identifier, factory set, makes each object unique. In principle, this setting cannot be adjusted.

Using **OTAA** join mode requires the user to define the following values and input them into both the device and gateway or the network server.

- **AppEUI:** This is a unique application identifier used to group objects. This address, 64 bits, is used to classify the peripheral devices by application. This setting can be adjusted.
- **AppKey:** This is a secret key shared between the peripheral device and the network. It is used to determine the session keys. This setting can be adjusted.

Both the ABP method and the OTAA can be configured using the Unidata StarlogV4 menu system.

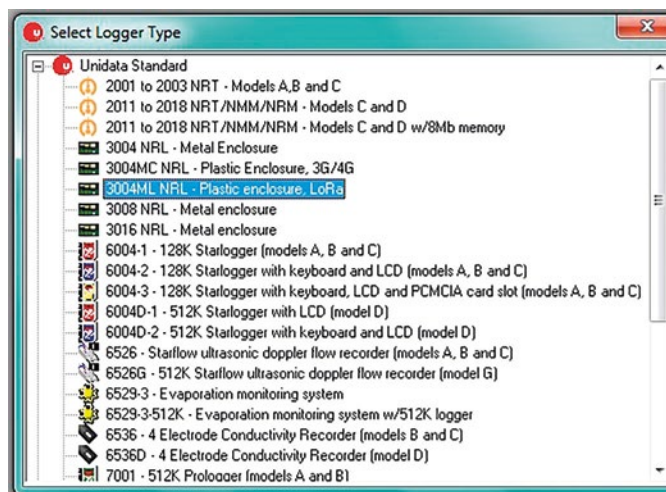


The LoRa payload for this application note is indicated below:

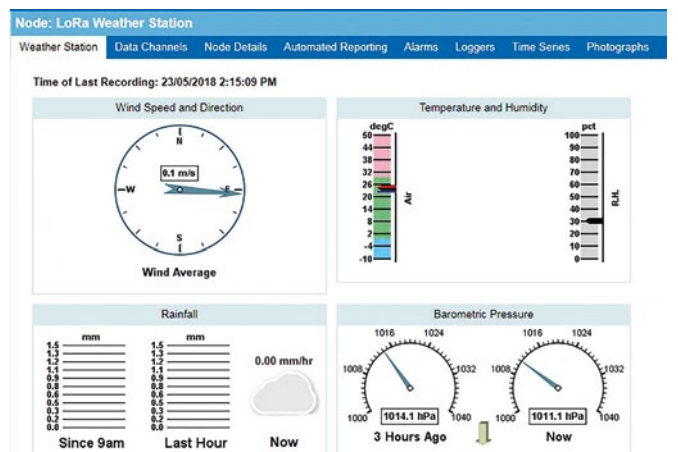
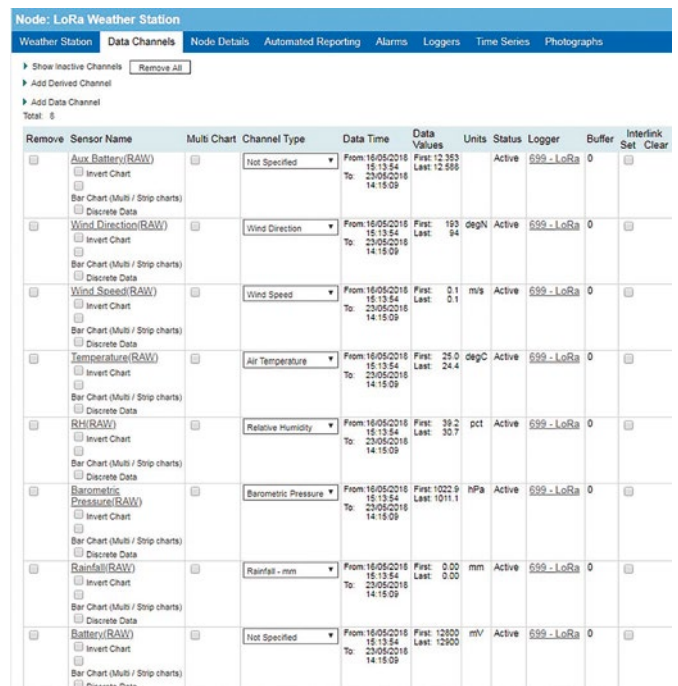
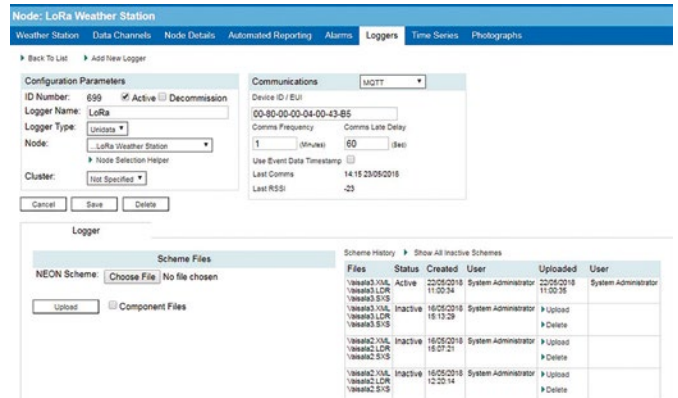
```
-----
LoRa Payload Example:
5C6BF5AF759DA000100F8008301F5272F007F00
-----
LoRa Payload ( All data is Little Endian)

0x5C6BF5A - TimeStamp - Can be Ignored when using non Unidata Gateway
0xF759 - Neon Battery voltage - 0x59F7 = 23031 x 0.000536177 = 12.34 volts
0xDA00 - Wind Direction - 0x00DA = 218 x 1 = 218 Deg
0x0100 - Wind Speed - 0x0001 = 1 x 0.1 = 0.1 m/s
0xF800 - Temperature - 0x00F8 = 248 x 0.1 = 24.8 DegC
0x8301 - Relative Humidity - 0x0183 = 387 x 0.1 = 38.7 %
0xF527 - Barometric Pressure - 0x27F5 = 10229 x 0.1 = 1022.9 hPa
0x2F00 - Rainfall - 0x002F = 47 x 0.01 = 0.47 mm
0x7F00 - Weather Station Battery voltage - 0x007F = 127 x 100 = 12700 mV
-----
```

The Starlog 4 Software setup screen shots are shown below:



Some screen shots showing the data on the Neon Server are shown below:



TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
M – Series LoRa RTU / NRL	3004B-ML00	Neon Remote Logger - 4 Analog Ch without Li Battery
M – Series LoRa RTU / NRL	3004B-MLB0	Neon Remote Logger - 4 Analog Ch with Li Battery
Ethernet & 3G / 4G and LoRa	3016A-CLO	Neon Remote Logger - 16 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3008A-CLO	Neon Remote Logger - 8 Analog Ch / Touch Screen Display

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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LOWER CAPACITY DRAIN SUMP WATER LEVEL MONITORING



APPLICATION BACKGROUND

In this example a water level sensor is being used to measure the water level in a drain sump for a local council. The drain sump is in a low lying area in parkland where the water level in the drain sump needs to be monitored once per day.

The water level sensor is an industrial grade pressure sensor connected by a 10 meter cable to a Neon 3004ML Neon LoRa Logger. As the measurement is only needed once per day the internal lithium battery can be used to power the sensor via a 4-20mA loop as well as the 3004ML Neon LoRa Logger.

The data collected is sent via a LoRa network to a central Neon Server. The Neon server can either be customer owned physical or cloud server, or a fee based Neon Hosting service that can be purchased from Unidata.

When the data arrives at the Neon Server, it is displayed on a graphical interface. If out of limits conditions occurred, alarms are raised and emails/SMS texts are sent to appropriate staff.

APPLICATION DETAIL

LoRa is one of the several LPWAN technologies which allow for a free spectrum connection between the LoRa system in the field and a LoRa gateway. The range of LoRa depends on the local geography and the antenna type. A small chip antenna soldered onto the 3004ML allows for a range of around 1km depending on the geography i.e. if unit is installed outdoors and there is line of sight from the LoRa field unit and the gateway. A large antenna mounted high on a pole may extend the range to 10km or more, also depending on the geography.

The setup of LoRa is more complex than other systems and requires the skills of a communications engineer familiar with the LoRa system. LoRa gateway needs to be purchased, configured and installed and LoRa network needs to be configured before the system can be set to work. There are several gateway manufacturers and in this example either a MultiTech gateway or a Kerlink gateway can be used. The gateways need to be powered-on all the time and they also need a direct Ethernet connection, a cell phone hot spot or a satellite modem.

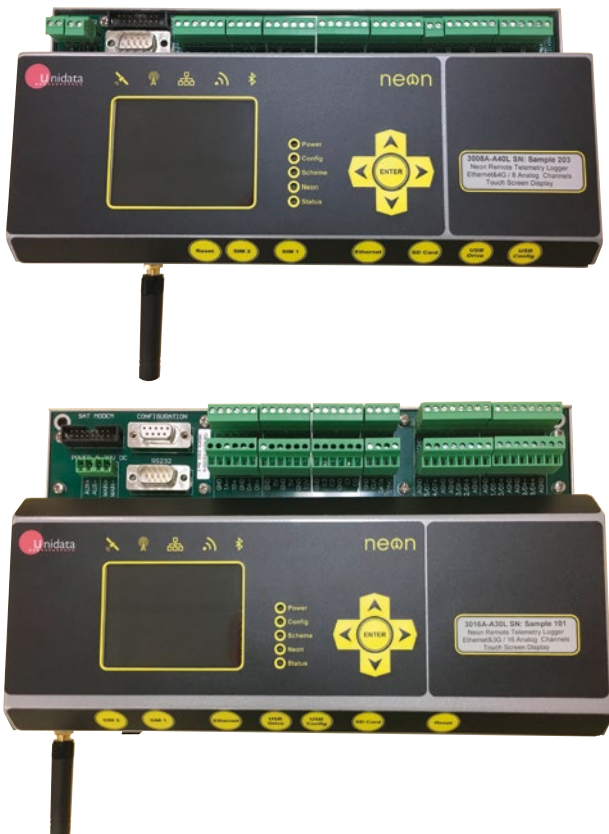
The 3004ML LoRa nodes can be setup to use OTAA (Over the Air Activation) OR ABP (Activation by Personalisation). In general ABP is usually used by larger networks which utilise multiple gateways over a large geographical location where the activation is controlled by a network server such as Actility.

OTAA is generally used with smaller networks where there are a small number of LoRa nodes connecting to a single gateway like Kerlink or MultiTech and the gateway can authenticate the devices appropriately.



Using **ABP** join mode requires the user to define the following values and input them into both, the device and gateway or network server.

- **DevAddr:** This is a logical address used to identify the object on the network.
- **NetSKey (Network Session Key):** Encryption key between the object and the operator used for transmissions and to validate the integrity of messages.
- **AppSKey (Application Session Key):** Encryption key between the object and the user (via the application) used for transmissions and to validate the integrity of messages.
- **DevEUI:** This identifier, factory set, makes each object unique. In principle, this setting cannot be adjusted.



The LoRa Payload for this application note is shown below:

LoRa Payload Example:

EC18FA5A3319E294DFFE594C594

LoRa Payload (All data is Little Endian)

0xEC18FA5A - TimeStamp - Can be Ignored when using non Unidata Gateway
 0x3319 - Battery Voltage - $0x1933 = 6541 \times 0.000536177 = 3.458$ volts
 0xE294 - A0 4-20mA - $0x94E2 = 38114 \times 0.0003178914 = 12.11$ mA
 0xFDFF - A1 4-20mA - $0xFFFFD = 65533 \times 0.0003178914 = 20.83$ mA
 0xE594 - A2 0-40DegC - $0x94EC = (38124 \times 0.0007947286) - 10 = 20.29$ DegC
 0xC594 - A3 100-1000kPa - $0x94C5 = (38085 \times 0.01788139) - 125 = 556$ kPa

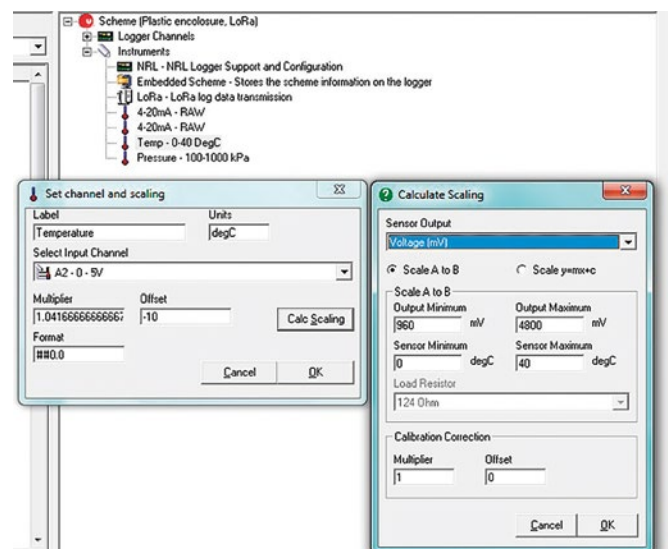
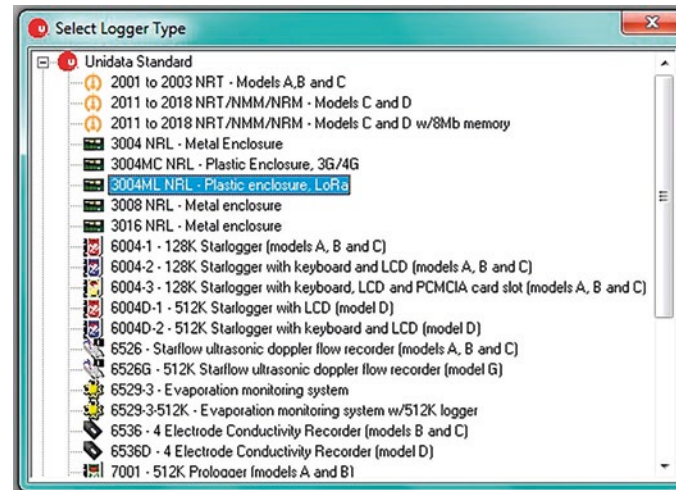
Using **OTAA** join mode requires the user to define the following values and input them into both the device and gateway or the network server.

- **AppEUI:** This is a unique application identifier used to group objects. This address, 64 bits, is used to classify the peripheral devices by application. This setting can be adjusted.
- **AppKey:** This is a secret key shared between the peripheral device and the network. It is used to determine the session keys. This setting can be adjusted.

Both the ABP method and the OTAA can be configured using the Unidata StarlogV4 menu system.



The Starlog 4 Software setup screen shots are shown below:



```

>f
ABP
OTA
FSB
PN
DR
TXDR

>f
FSB = 0
= 1
XRT = 175
IP = 203.59.141.70
PRT = 3900
APN = "telstra.internet"
USR = .
2SIM_APN = "connectme"
2SIM_USR = .
SAT_APN = #777
SAT_USR = .
ETH_IP = 0.0.0.0
ETH_NM = 255.255.255.0
ETH_GW = 0.0.0.0
NJM = OTA
NA =
NSK/NL = 0.0019824541500000
DSK/NK = 0.4a2f49f4776f20dc79da1c2335300000
FSB = 1
PN = 0
DR = 0
TXDR = 4

ABP
OTA
FSB
PN
DR
TXDR

```

TYPICAL CONFIGURATION

APPLICATION SPECIFIC INSTRUMENTS / INPUTS

Options	Unidata Part Number	Description
M – Series LoRa RTU / NRL	3004B-ML00	Neon Remote Logger - 4 Analog Ch without Li Battery
M – Series LoRa RTU / NRL	3004B-MLB0	Neon Remote Logger - 4 Analog Ch with Li Battery
Ethernet & 3G / 4G and LoRa	3016A-CL0	Neon Remote Logger - 16 Analog Ch / Touch Screen Display
Ethernet & 3G / 4G and LoRa	3008A-CL0	Neon Remote Logger - 8 Analog Ch / Touch Screen Display

NEON APPLICATION SOFTWARE - CUSTOMER SERVER

Options	Unidata Part Number	Description
Neon Applications Software	2302A	Neon Server Software Licence Incl 5 NAL
Neon Applications Software	2302A-10	Additional 10 NRT Access Licence
Neon Applications Software	2302A-20	Additional 20 NRT Access Licence
Neon Applications Software	2302A-50	Additional 50 NRT Access Licence

NEON HOSTING SERVICE - UNIDATA SERVER

Options	Unidata Part Number	Description
Neon Hosting Service	2301A	Neon Data Initial Subscription Setup Fee
Neon Hosting Service	2301A-01	Neon Data Service Fee for 1-50 NRT
Neon Hosting Service	2301A-02	Neon Data Service Fee for 51-100 NRT
Neon Hosting Service	2301A-10	Neon Data Service Fee Metering

DATALOGGER MANAGEMENT SOFTWARE

Options	Unidata Part Number	Description
Starlog V4 Management Software	6308A-AUE	STARLOG V4 Full Licence Key

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NOTES

[illegible]

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



