



hydroSpider2

User Manual

Models HHS-153 – HHS-178

Date September 2026

Contents

1. [Introduction](#)

- [1.1 Overview](#)
- [1.2 Package Contents](#)
- [1.3 Typical Applications](#)
- [1.4 Part Numbers and Options](#)

2. [System Overview](#)

- [2.1 Inputs](#)
- [2.2 System Monitors](#)
- [2.3 Controls](#)
- [2.4 Alarms](#)
- [2.5 Logger](#)
- [2.6 Communications](#)
- [2.7 Web Interface](#)

3. [Installation](#)

- [3.1 Opening the Case](#)
- [3.2 Installing the SIM Card](#)
- [3.3 Internal 9V Backup Battery](#)
- [3.4 Closing the Case](#)
- [3.5 Mounting](#)
- [3.6 Connecting the Antenna](#)
- [3.7 Connecting Power](#)
- [3.8 Connecting Sensors](#)
- [3.9 Controls and Outputs](#)
- [3.10 Commissioning Checklist](#)

4. [LCD / Keypad](#)

- [4.1 Overview](#)
- [4.2 Display Screens](#)
- [4.3 Resetting a Counter Channel](#)
- [4.4 Modifying a Channel Offset](#)

5. [Web Interface](#)

- [5.1 Connecting to the hydroSpider2](#)

- 5.2 [Logging In](#)
- 5.3 [Alarms Page](#)
- 5.4 [Inputs Page](#)
- 5.5 [Controls Page](#)
- 5.6 [History — Download Logged Data](#)
- 5.7 [View Setup](#)
- 5.8 [Change Setup](#)
- 5.9 [About](#)
- 5.10 [On-Page Help](#)

6. [Configuration](#)

- 6.1 [Location and Site ID](#)
- 6.2 [Time and Date](#)
- 6.3 [Username and Password](#)
- 6.4 [Input Channels](#)
- 6.5 [Input Channel Calibration](#)
- 6.6 [Controls](#)
- 6.7 [Alarms](#)
- 6.8 [Network Settings](#)
- 6.9 [Email](#)
- 6.10 [Reports](#)
- 6.11 [Modem Diagnostics](#)
- 6.12 [Setup Management](#)
- 6.13 [Software Upgrades](#)
- 6.14 [Advanced Settings](#)

7. [Service Mode](#)

- 7.1 [Time and Date](#)
- 7.2 [Modem Diagnostics](#)
- 7.3 [Input Channel Calibration and Test](#)
- 7.4 [Software Upgrade](#)

8. [Maintenance](#)

- 8.1 [Internal 9V Backup Battery](#)
- 8.2 [External 12V SLA Battery](#)
- 8.3 [Routine Site Checks](#)

9. [Specifications](#)

- [9.1 Hardware Specifications](#)
- [9.2 Physical Specifications](#)

10. [Accessories](#)

- [Appendix A — I/O and Power Connector Pinout](#)
 - [Appendix B — Connecting Sensors](#)
 - [Appendix C — SDI-12 / RS-485](#)
 - [Appendix D — RS-232 / Serial](#)
 - [Appendix E — Alarm Status Codes](#)
 - [Appendix F — SMS Commands](#)
 - [Appendix G — LiveSMS](#)
 - [Appendix H — Remote Web Access](#)
 - [Appendix I — DNP3](#)
 - [Appendix J — Report Formats](#)
 - [Appendix K — Alert Formats](#)
 - [Appendix L — Log Codes](#)
 - [Appendix M — Power Considerations](#)
 - [Appendix N — SIM Cards and iPhones](#)
 - [Appendix O — Troubleshooting](#)
 - [Appendix P — Setup File Format](#)
-

1. Introduction

1.1 Overview

The hydroSpider2 is a compact telemetry, logging, and alarm system designed for remote, battery-powered monitoring applications. It fits inside a rain gauge, a secondary enclosure using the mounting plate kit, or your preferred weatherproof enclosure. The hydroSpider2 is available in 4G and Cat-M1 variants, with optional SDI-12/RS-485 intelligent sensor interface and LCD/Keypad.

The hydroSpider2 is configured and monitored via a built-in web server, accessible from any web browser — no special software is required. Configuration is performed via a computer or tablet connected either by LANlink cable (Ethernet) or HLink dongle (Wi-Fi).



1.2 Package Contents

Item
hydroSpider2 unit
Mobile antenna — 4G + Cat-M1 external blade antenna (self-adhesive), 3m cable, SMA connector
10-way I/O mating connector
Comms blanking cap
Input conditioning components — 1 pack, for sensor wiring (see Appendix B)
Quick Start Guide

A SIM card is not supplied — source one from your preferred carrier with mobile data and SMS enabled.

The LANlink Cable and HLink Dongle are available separately from Halytech and are required for initial configuration.

1.3 Typical Applications

- Rainfall and water level monitoring
- Environmental monitoring
- Irrigation and bore monitoring
- Agriculture
- Automatic Meter Reading (AMR)
- Water treatment

1.4 Part Numbers and Options

Current models:

Item code	Modem	Additional interface	LCD/Keypad
HHS-153	4G	—	No
HHS-154	4G	SDI-12 / RS-485	No
HHS-155	4G	—	Yes
HHS-156	4G	SDI-12 / RS-485	Yes
HHS-157	4G	RS-232	No
HHS-158	4G	TTL RS-232	No
HHS-170	Cat-M1	—	No
HHS-171	Cat-M1	SDI-12 / RS-485	No
HHS-172	Cat-M1	—	Yes
HHS-173	Cat-M1	SDI-12 / RS-485	Yes
HHS-174	Cat-M1	RS-232	No
HHS-175	Cat-M1	TTL RS-232	No
HHS-176	Cat-M1	Aux SDI-12	Yes
HHS-177	Cat-M1	SDI-12 / RS-485 + Aux SDI-12	Yes
HHS-178	4G	SDI-12 / RS-485 + Aux SDI-12	Yes

Software options (ordered separately from Halytech):

Option	Description
LiveSMS	Extended SMS capabilities: remote web access, alert escalation, modem scheduling, additional SMS commands — see Appendix G
DNP3	SCADA integration via DNP3 protocol — see Appendix I
FlowShark Triton	Interface for reading ADS FlowShark Triton flow units

Accessories:

Item code	Description
HHS-013	LANlink Comms Cable — required for configuration via Ethernet
HHS-016	SLA 12V 7.2Ah Battery with long connector lead
HHS-017	Power Supply 90W, cable with tinned ends (long lead)
HHS-060	Enclosure 400×300×150mm powdercoated, with glands, backing plate, battery bracket, antenna, and mounting brackets
HHS-061	Mounting plate kit — base plate and attaching screws
HHS-065	Input Accessories Kit
HHS-080	HLink Wi-Fi Dongle — required for configuration via Wi-Fi; requires firmware V1.8 or later

2. System Overview

2.1 Inputs

The hydroSpider2 has two hardware variants — Standard and Modbus/SDI-12 — with different physical connector inputs:

Input type	Standard	Modbus/SDI-12
Analogue	2	1
Digital	2	1
System	4	4

Analogue inputs accept voltage signals (0–2.5V native range) or current loop signals (4–20mA, factory calibrated). External resistors are required to accept 0–5V or 0–10V signals — see Appendix B.

Digital inputs accept voltage-free switch contacts. They can be configured as: Switch, Switch State, Counter, Event, or Difference. There is no galvanic isolation between digital inputs or between inputs and internal circuitry.

SDI-12 and Modbus inputs (Modbus/SDI-12 variants only) connect via the intelligent interface. Each physical sensor may provide one or more channel values — each value occupies one channel slot. There is no limit on the number of physical devices connected; the total channel count is the constraint. See Appendix C for connection and configuration.

Virtual channels (Super Channels) are software-calculated channels derived from other inputs.

All channel types — native inputs, system monitors, intelligent sensor readings, and virtual channels — share the same pool. Total configurable channels: 20.

2.2 System Monitors

The following system inputs are built in to all variants:

Input	Description
System temperature	Internal temperature
Battery voltage	Voltage at the BATT terminal
Charger voltage	Voltage at the CHG terminal
Internal moisture sensor	Detects moisture inside the enclosure

2.3 Controls

The hydroSpider2 has two control outputs:

Output	Label	Function
Control 1	SWP	Switched power output for sensor power and control. Voltage at SWP matches the BATT terminal (less ~0.5 V); CHG only charges the battery and does not feed SWP. Max 1 A.
Control 2	OC	Open collector — creates connection to GND through a 440Ω resistor; nominal 10mA

Controls can be activated manually via the web interface, triggered by alarms, or used as sensor power warmups. Output names are user-definable.

2.4 Alarms

The hydroSpider2 supports 16 independently configurable alarms. Each alarm can:

- Trigger on a channel value, date/time schedule, periodic interval, or as a Super Alarm (combination of other alarms)
- Send SMS alerts to up to 3 phone numbers and email alerts to up to 3 email addresses
- Activate or pulse a control output
- Trigger faster logging while active

Alarms can be acknowledged via the web interface, by SMS command (LiveSMS option), or automatically after a configurable timeout.

2.5 Logger

The logger stores up to 300,000 records in non-volatile FLASH memory — records are retained without power. The logger records channel readings, control state changes, alarm events, communication events, and system events. Time resolution is 1 second.

The hydroSpider2 supports two independent automatic report slots, each configurable for period (1 minute to 1 day), format, and delivery destination (FTP, email, or HTTP/HTTPS POST).

For a full list of report formats, see Appendix J.

2.6 Communications

Interface	Detail
Mobile	4G or Cat-M1 — see Part Numbers table
Ethernet	Via LANlink Cable — for configuration and local access
Wi-Fi	Via HLink Dongle — for configuration and local access
SIM card	Nano SIM
Antenna	External blade antenna (self-adhesive), 3m cable, SMA connector

The default LAN IP address is `192.168.0.177`. The default Wi-Fi IP address (via HLink) is `192.168.2.177`.

2.7 Web Interface

The hydroSpider2 is configured and operated via a built-in web server. Any standard web browser can be used — no special software is required. The web interface provides access to:

- Live input readings and alarm status
 - Control activation and deactivation
 - Logged data download
 - Full configuration (via Change Setup)
 - Modem diagnostics and software upgrade
-

3. Installation

Recommendation: Before going on site, configure the hydroSpider2 using your sensors or simulate them. Halytech devices allow setups to be saved and restored — make use of this. If you have similar site configurations or standard templates, start with one of them. Much easier in the workshop than out in the field.

3.1 Opening the Case

1. Disconnect all external power supplies and sensors from the hydroSpider2.
2. Undo the four screws on the lid — one at each corner.
3. Lift the lid off the enclosure.



Keep the lid off until all internal work (SIM card, 9V battery) is complete.

3.2 Installing the SIM Card

A SIM card is required to send automatic reports and alarms over the mobile network. The SIM holder is located on the PCB inside the enclosure. The hydroSpider2 uses a Nano SIM.

SIM PIN: Most SIMs ship with no PIN enabled. If yours does have one, insert it into a mobile phone first and disable the PIN in the phone's settings before installing it in the hydroSpider2.

If the SIM was previously used in an iPhone, disable iMessage before installation — see Appendix N.

1. Locate the SIM holder on the PCB.
2. Slide the SIM cover to the **OPEN** position.
3. Hinge the cover upwards to open it.



4. Place the Nano SIM card flat into the socket, observing the notched corner orientation.



5. Close the cover back down over the SIM.

6. Slide the cover to the **LOCK** position.



3.3 Internal 9V Backup Battery

The 9V backup battery preserves system state (date/time, counters, alarm state, modem retry schedule) if main power is lost. Without it, this information is lost on power disconnection. The 9V battery is optional.

1. Connect a 9V battery to the battery clip on the PCB. Use a long-life non-rechargeable type — a 9V lithium battery is ideal.
2. Insert the battery into the metal holder.

With only the 9V battery connected, the hydroSpider2 does not log, alarm, or report — normal operation resumes automatically when main power is restored.

If the LCD/Keypad is not detected on power-up, disconnect the 9V battery before connecting the LCD, then reconnect.

3.4 Closing the Case

1. Align the lid onto the enclosure.
2. Reinsert and tighten the four screws in a diagonal sequence: top left, bottom right, bottom left, top right.

3.5 Mounting

The hydroSpider2 must be installed inside a weatherproof enclosure. Common installations include inside a tipping bucket rain gauge or a secondary enclosure using the mounting plate kit.



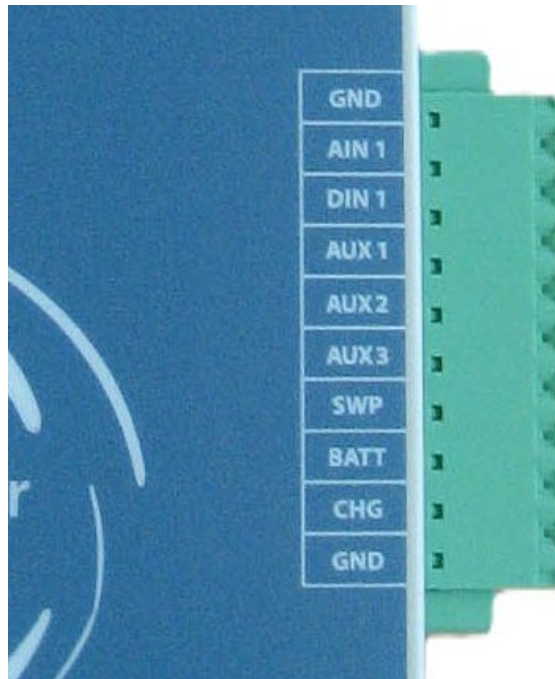
To avoid damage, it is critical to prevent insect infestation. Ensure all cable entries are sealed.

3.6 Connecting the Antenna

1. Screw the SMA antenna connector into the **ANT** port using fingers only.
2. Do not use tools to tighten — overtightening will cause damage.
3. Position the antenna for best signal — if installing inside a rain gauge or enclosure using plastic pipework, the antenna can often remain inside. Otherwise mount externally.

3.7 Connecting Power

The hydroSpider2 has two separate power inputs on the I/O and Power connector. See Appendix A for the full connector pinout.



Option A — Battery or DC supply (BATT):

1. Connect positive to **BATT** and negative to **GND**.
2. Nominal input: 12V DC, min 1A.
3. Observe correct polarity — reverse polarity will damage the unit.

Option B — Charger supply or solar panel (CHG):

1. Connect positive to **CHG** and negative to **GND**.
2. Input: 16–24V DC 2A or 12V solar panel.
3. Connect a 12V SLA battery (max 7.2Ah) to the BATT port — the charger will maintain the battery. If no battery is required, leave BATT unconnected.
4. Observe correct polarity on all connections — reverse polarity will damage the unit.

3.8 Connecting Sensors

Connect sensors to the I/O and Power connector. Sensor wiring is site-specific — for full wiring details by sensor type, see Appendix B.

Summary of input connections:

Sensor type	Connect to
Switch, counter, event (pulse)	DINx → GND
4–20mA current loop	AINx → GND
Voltage 0–2.5V	AINx → GND (direct)
Voltage 0–5V or 0–10V	AINx with resistor divider — see Appendix B
SDI-12 / Modbus sensors	Via intelligent interface (Modbus/SDI-12 variants only) — see Appendix C

3.9 Controls and Outputs

The hydroSpider2 has two control outputs on the I/O and Power connector:

Control 1 — Switched Power Out (SWP):

- Voltage at SWP matches the BATT terminal (less ~0.5 V switch drop). The CHG terminal only charges the battery — CHG voltage does not appear on SWP.
- Maximum output current: 1 A.
- Typical use: switching power to a sensor or peripheral before sampling. For sensors needing higher loop voltage, supply the higher voltage directly to BATT (with CHG left disconnected).

Control 2 — Open Collector (OC):

- Creates a connection to GND through a 440Ω resistor when active; nominal 10mA.
- Typical use: activating accessories or external relays.

When connecting an inductive load (e.g. a relay coil) to the OC output, fit a flyback diode across the load to prevent voltage spikes — refer to the resistor/diode pack included in the box.

Controls can be activated manually via the web interface, triggered by an alarm, or used as sensor power warmups (configured in Change Input Setup → Options → Warmup source).

3.10 Commissioning Checklist

Before leaving site, confirm all of the following:

- Mobile signal $\geq 40\%$ (shown on the web interface under Network status) — see Section 6.11 Modem Diagnostics
- Location name and site ID set correctly
- Date and time correct
- All configured inputs are reading as expected
- Administrator password changed from default
- APN configured and modem is successfully connected
- Test report sent and received at the configured destination
- Setup saved to disk as a backup copy

Signal strength reference:

Level	Threshold	Action
Excellent	$\geq 75\%$	No action
Good	$\geq 50\%$	No action
Acceptable	$\geq 40\%$	No action
Poor	$< 40\%$	Reposition antenna

4. LCD / Keypad

This section applies to units fitted with the LCD/Keypad option only.

4.1 Overview

The LCD/Keypad provides a local display for reading channel values and performing basic operations without a computer. The display is a two-line LCD. The keypad has three keys: left arrow, right arrow, and OK.

The display is normally off to conserve power — press any key to turn it on.

Auto-off: the display turns off automatically after 2 minutes of key inactivity. The backlight turns off first as a warning; the display turns off approximately 30 seconds later.



4.2 Display Screens

Cycle through the display screens using the left and right arrow keys:

Screen	Content
1	Current date and time
2	Current value of each input channel ( = most recently logged value, not a live reading)
3	Charger voltage and battery voltage
4	System temperature
5	Internal moisture indicator state
6	LAN IP address and network mask
7	Software version

4.3 Resetting a Counter Channel

1. Cycle to screen 2 and navigate to the counter or event channel to reset.
2. Press **OK**.
3. Press left or right arrow to highlight **YES**.
4. Press **OK** — the count is reset to zero.

4.4 Modifying a Channel Offset

Applies to: Analogue voltage, Analogue 4–20mA, SWL super channel.

1. Cycle to screen 2 and navigate to the channel to adjust.
2. Press and hold **OK** for 3 seconds.
3. Press left or right arrow to highlight **YES**, then press **OK**. An underline cursor () appears at the leftmost character position.
4. Use the arrow keys to move the cursor to the digit to change.
5. Press **OK** to select the digit — cursor changes to a flashing block.
6. Use the arrow keys to change the digit:
 - Digits: 0–9
 - Leftmost position: sign character — space for positive, minus () for negative
 - Decimal point position: fixed, cannot be changed

7. Press **OK** when finished with that digit — cursor returns to underline.
 8. Repeat steps 4–7 for each digit to change.
 9. When finished editing all digits, press and hold **OK** for 3 seconds — a SAVE? prompt appears with the modified value shown above it.
 10. Press left or right arrow to highlight **YES** to apply or **NO** to discard.
 11. Press **OK** — if saved, the display updates and the channel offset is applied.
-

5. Web Interface

The hydroSpider2 is configured and monitored via a built-in web server. Any standard web browser can be used — no special software is required.

5.1 Connecting to the hydroSpider2

Option A — Via LANlink Cable (Ethernet):

1. Power up the hydroSpider2.
2. Disconnect the computer from all networks, including Wi-Fi.
3. Plug the round hydroSpider-end of the LANlink cable into the **Comms** port.
4. Plug the computer-end connectors into the computer's LAN and USB ports.
5. Wait 30 seconds for the hydroSpider2 to register.
6. Open a browser and go to: `http://192.168.0.177`

Option B — Via HLink Dongle (Wi-Fi):

The HLink dongle plugs into the **Comms** port and creates a Wi-Fi access point directly from the hydroSpider2. Any Wi-Fi capable device — phone, tablet, or laptop — can connect without needing a LAN port. Keep the cable plugged in throughout the session.

1. Plug the HLink dongle into the **Comms** port.
2. On your device, connect to the Wi-Fi network created by the hydroSpider2.
3. Open a browser and go to: `http://192.168.2.177`

5.2 Logging In

The login page is shown on first access. Enter the username and password.

Field	Default value
Username	<code>user</code>
Password	<code>changeme</code>

Change the password on first login — see Section 6.3.

If credentials are lost, contact Halytech for assistance. The user cannot recover access independently.

Three access levels are available — see Section 6.3 for details.

5.3 Alarms Page

The Alarms page is shown by default after login. It displays the current state of all configured alarms, auto-refreshing every 10 seconds.

To acknowledge an active alarm, click on it in the alarm list. For alarm status codes, see Appendix E.

5.4 Inputs Page

The Inputs page shows the current reading of all configured input channels at the time the page was loaded. Refresh the page to get updated readings.

5.5 Controls Page

The Controls page shows the current state of each control output and allows manual activation and deactivation. Multiple controls can be changed before saving — click **Save** to apply all changes at once.

5.6 History — Download Logged Data

The History page allows logged data to be downloaded from the hydroSpider2 as a CSV file.

1. Set the **End Date** and **End Time** — the download will include records up to this point.
2. Set the **Number of Records** to download.
3. Select the **Format** — see Appendix J for available formats.
4. Select the direction: **Oldest first** or **Newest first**.
5. Click **Download** — the browser will save the file.

5.7 View Setup

View Setup displays the current configuration in read-only form. Use this to verify settings without entering Change Setup.

5.8 Change Setup

Change Setup is the configuration area. All configuration changes are made here.

Important: Logging and alarm generation are suspended while Change Setup is active. This applies for the entire time any Change Setup page is open. Change Setup exits

automatically after 20 minutes of inactivity.

All controls are turned off by default when Change Setup is entered (configurable via Advanced Settings).

5.9 About

The About page displays the device serial number, firmware version, and licence information.

5.10 On-Page Help

Most Change Setup pages include a built-in **Help** button. Click it to display context-sensitive help for that page directly in the browser.

6. Configuration

All configuration is performed via Change Setup in the web interface. Connect using the LANlink or HLink dongle — see Section 5.1.

On-page Help. Each Change Setup page has a ? Help button that opens an in-context help window with field-by-field guidance. This manual covers configuration at a reference level — for screen-by-screen detail of every field, use the Help (?) buttons in the device.

Recommended first-time configuration order:

1. Set location name and site ID
2. Configure network — APN, primary/secondary network method
3. Test mobile connectivity — signal strength test and test SMS
4. Configure input channels
5. Configure controls
6. Configure alarms
7. Configure reports
8. Save setup to disk
9. Reset report starting point

6.1 Location and Site ID

Navigate to **Change Setup** → **Change Location / Site ID**.

- **Location name** — used in SMS alerts, report filenames, and the web interface. Up to 16 characters.
- **Site ID** — secondary identifier included in reports.
- **Long location name** — extended location name used in reports when the "Use long location name" Advanced Setting is enabled.
- **Modem phone number** — the SIM card's phone number. Must be entered manually — it is not read automatically from the SIM.
- **SMS PIN** — 4-digit PIN required for control activation and remote access commands (LiveSMS option). Set to to disable.

6.2 Time and Date

Navigate to **Change Setup** → **Date and Time Settings**.

1. Click **Set from computer** to synchronise the device clock from the browser's system time.
2. Or enter the date and time manually.

Always set the clock to standard (non-DST) time — daylight saving is not supported.

NTP synchronisation: The hydroSpider2 synchronises its clock automatically once per day via NTP when a mobile connection is available. Without NTP, the clock may drift up to 30 seconds per month. To sync immediately, click **Synchronise now**. NTP settings can only be modified by the Administrator account.

6.3 Username and Password

Navigate to **Change Setup** → **Change Usernames and Passwords**.

Three access levels are available:

Level	Default username	Default password	Permissions
Administrator	user	changeme	Full configuration access
Service	service	changeme	View readings, diagnostics, calibration, save setup, manual upgrade
User	user	user	View readings only

Change the Administrator password on first access. Default credentials are the same on all devices from the factory.

6.4 Input Channels

Navigate to **Change Setup** → **Change Input Setup**.

For each channel:

1. Set the **Type** — select input type (see below).
2. Set the **Name** — user-defined channel name (used in reports and the web interface).
3. Set the **Units** — engineering units for display and calibration.

4. Set the **Logging period** — how often to log data, or select **General** to use the shared logging period.
5. Use the **Options** icon (cog) for additional per-channel options.
6. Use the **Examine** icon (magnifying glass) to request a new reading from the sensor.

Global logging settings (at the bottom of Change Input Setup):

Setting	Description
General logging period	Logging interval for all channels set to "General"
General fast logging period	Logging rate during alarm fast-logging
Logging offset	Shifts logging time from on-the-hour (e.g. offset 20 min → logs at :20 past each hour)

All channels are also logged automatically at midnight each day, regardless of logging period.

6.4.1 Input Types

Native inputs (physical inputs on the I/O connector):

Type	Description
Switch	Logs each state change (ON/OFF) and duration the switch was ON. Active = digital input shorted to GND. Minimum stable state: 3 seconds.
Switch State	Logs state at each logging period. Does not log ON duration.
Counter	Increments on each pulse. Max 100 Hz (5ms minimum pulse width). Calibratable to engineering units (e.g. litres per pulse).
Event	Records each pulse with timestamp and running total. Suitable for pulses less than once per 30 seconds.
Difference	Records the difference between two counter inputs.
Analogue (Voltage)	Records voltage at each logging period. Native range: 0–2.5V.
Analogue (4–20 mA)	Factory calibrated with built-in biasing resistors. EOR indicates sensor not connected or not functioning.
Analogue (Switch)	Connects a switch to an analogue input. Reads ON if voltage < 1.25V; OFF if 1.25–2.5V.

6.4.2 System Inputs

System inputs are built-in monitors available on all units:

Input	Description
System temperature	Internal temperature
Battery voltage	Voltage at the BATT terminal
Charger voltage	Voltage at the CHG terminal
Internal moisture sensor	Detects internal moisture

6.4.3 Super Channels

Super Channels are derived channels calculated from other input values. They share the same channel pool as native and system inputs.

Type	Description
Rating Table	Interpolates from a user-supplied stage/discharge lookup table (up to 100 pairs)
$Ax + By + C$	Sum, difference, or scaled combination of two channels
Evapotranspiration	Hargreaves model using solar radiation and mean temperature
Wind Speed / Direction	Vector average, angular average, or Sigma Theta (Yamartino method)
SWL	Standing Water Level: $SWL = OFFSET - Head$

Super Channels can be used in reports and as alarm trigger sources, the same as native or system channels. They are not normally calibrated — the input channels are calibrated and Super Channel calculations operate on those calibrated values. The exception is **SWL**, which must be calibrated once to set the current reading; the offset is calculated automatically from there.

Rating Table

Selects an input channel and applies linear or logarithmic interpolation against a user-supplied lookup table. The table is generated from Hydstra software and uploaded to the device.

Once a Rating Table Super Channel is set up:

1. **Change Input Setup** → **cog (Options)** — choose the input channel that feeds the rating table.
2. A **Rating Table Options** button appears at the bottom of the Change Input Setup page. Open it to:
 - Upload a rating table (Hydstra format)
 - Select the **Interpolation Method**: Linear or Logarithmic
3. After upload, a **Rating Table Management** page becomes accessible from Change Setup — use this to download the existing table or upload a replacement.

Ax + By + C

Performs the calculation:

$$z = (A \times x) + (B \times y) + C$$

Where A and B are scaling factors (can be negative), x and y are input channels, and C is a fixed offset (added or subtracted from the result).

Use the cog (Options) icon to select the input channels and enter A, B, and C.

Example — water depth from a pressure sensor with atmospheric compensation:

A pressure sensor at the bottom of a tank reads gauge pressure (water depth + atmospheric); a second sensor reads atmospheric pressure. To get water depth in metres from sensors reading in bars (1 bar $\approx$ 10.19 m of water):

- A = 10.19, x = depth-pressure channel (bar)
- B = -10.19, y = atmospheric-pressure channel (bar)
- C = 0

Result: water depth in metres, atmospheric pressure subtracted.

Evapotranspiration

Calculates daily reference evapotranspiration (ET_0) using the Hargreaves model:

$$ET_0 = 0.0135 \times (T + 17.78) \times R_s \times (595.5 - 0.55 \times T) / 238.8$$

Where:

- **T** = mean daily temperature (°C)
- **R_s** = total daily solar radiation (MJ/m²/day)

Use the cog (Options) icon to select the input channels for temperature and solar radiation.

Wind Speed and Direction

Four calculation methods are available, depending on what the input channels report. Each method averages over the Super Channel's logging period.

Method	Inputs	Result
Wind Speed Vector Avg	Instantaneous wind speed + instantaneous direction	Vector-averaged wind speed
Wind Direction Vector Avg	Instantaneous wind speed + instantaneous direction	Vector-averaged wind direction
Wind Direction Average	Instantaneous wind direction	Mean direction (correctly handles 0°↔360° wrap)
Wind Direction Sigma Theta	Instantaneous wind direction	Standard deviation of direction (Yamartino method)

SWL — Standing Water Level

Calculates standing water level in a bore from a head-of-water input.

$$\text{SWL} = \text{OFFSET} - \text{Head}$$

Where Head is the water depth above the sensor and OFFSET is set automatically during calibration.

To use:

1. Set up a head-of-water input channel (typically a pressure sensor calibrated in metres of water).
2. Add a Super Channel with type **SWL** and select the head channel as input.
3. Calibrate SWL once: enter the **current standing water level** as the desired value. The offset is computed automatically from there.

6.4.4 Channel Logging Options

Option	Description
Log Difference	Logs the change since the last log rather than the raw value. Variants: Any / Positive only. Useful for meters.
Minimum change	Minimum change threshold before a log entry is made, combined with a Force Log interval.
Filter type	Average (all input types); Integrate (SDI-12, RS-232, RS-485, Rating Table, $Ax+By+C$ inputs).
Log Min/Max	Logs minimum and maximum values within each logging period in addition to the standard value.
Periodic Reset	Resets the accumulated value at a set interval (1, 3, 6, 12, or 24 hours) — used for daily totals such as rainfall.
Warmup source	Assigns a control output as a sensor power supply that activates before each reading.

6.5 Input Channel Calibration

Navigate to **Change Setup** → **Change Input Setup** → **Calibrate** (for the relevant channel).

Calibration formula: `value_calibrated = (value_raw × scaler) + offset`

Available calibration methods:

Method	Description
Change Offset Only	Adjusts offset only — useful for fine-tuning a zero point
4-20mA Calibration	Enter the real-world value at 4 mA and 20 mA — device calculates scaler and offset
2-point calibration	Apply two known inputs and enter expected outputs — see §6.5.1
Manual calibration	Enter scaler and offset directly
Change Desired Value	Align the running counter to the source meter's current reading — see §6.5.2 (counter / event inputs only)

6.5.1 2-Point Calibration (Analogue)

Applies to: Analogue (Voltage), Analogue (4–20 mA).

2-point calibration automatically calculates the scaler and offset by taking two raw readings and the user's real-world values for each.

Procedure:

1. Apply a known low input to the sensor (e.g. immerse a pressure sensor in 20 cm of water).
2. On the calibration page, take a reading. Enter the real-world value (e.g.) in the **desired reading** field.
3. Click **Click here** to lock in the first point.
4. Apply a known high input (e.g. immerse the sensor in 290 cm of water).
5. Take a reading. Enter the real-world value in the desired reading field.
6. Click **Click here** to lock in the second point.
7. Click **Save** to commit the calibration.

Constraints:

- The two points must be separated by at least **1000 raw counts** for analogue voltage inputs, or at least **4 mA** for 4–20 mA inputs. If the spacing is less than this, calibration will fail and

the procedure must be restarted.

- Larger spacing between the two points produces more accurate calibration.

6.5.2 Change Desired Value (Counter)

Applies to: Counter, Event.

Used to align the hydroSpider2's running count to the current reading on the source meter — for example, after pulses were missed (sensor temporarily disconnected, or meter was reset).

1. Read the current value from the source meter.
2. On the channel's calibration page, enter that value in the **desired value** field.
3. Save. The hydroSpider2 continues counting from that value.

The current calibrated value is also displayed on this page; click **Update** at any time to refresh it.

6.6 Controls

Navigate to **Change Setup** → **Change Controls**.

For each control:

1. Set the **Custom name** — user-defined label (e.g. "Sensor Power", "Alarm Output").
2. Set the **Warmup time** — how long the control stays active before a sensor reading, if used as a warmup.

All controls are turned off by default when Change Setup is entered (configurable via Advanced Settings).

6.7 Alarms

Navigate to **Change Setup** → **Change Alarm Setup**.

For each alarm:

1. Set the **Alarm name**.
2. Set the **Trigger source** — channel value, date/time, periodic, or Super Alarm.
3. Set the **Control action** (optional) — turn a control on continuously, or pulse for 1–999 seconds.
4. Set the **Counter action** (optional) — increment or reset a virtual counter.
5. Set the **Log action** (optional) — immediately log another channel when the alarm triggers.

6. Set **Send alarm report** — Disabled / Once only / Two times / Repeat (fast period).
7. Enable **Fast logging** to increase logging rate while the alarm is active.
8. Set the **Message** — text included in SMS and email alerts.
9. Set the **Auto acknowledge time** — time after triggering when the alarm is automatically acknowledged (minimum 5 minutes, default 60 minutes).
10. Enter up to 3 **phone numbers** and 3 **email addresses** for alerts.

Alarm trigger sources:

Source	Description
Channel	Triggers when channel value is above, below, or changes by a set amount; or on switch state or error
Date / Time	Triggers at a specified time on selected days, months, and weekdays — see below
Periodic	Triggers at a regular interval with optional offset — see below
Super Alarm	Triggers based on combined active/inactive state of other alarms (AND/OR logic) — see below

Date / Time alarm options:

Option	Description
Trigger Time	Time of day at which the alarm should go active
Remain Active For	How long (seconds) the alarm stays active after triggering
Months of the Year	January–December — the months in which the alarm may activate
Days of the Month	1–31 — the days of the month on which the alarm may activate
Days of the Week	Monday–Sunday — the weekdays on which the alarm may activate

All three calendar conditions (Months of the Year, Days of the Month, Days of the Week) must be met for the alarm to activate. For example, a weekly alarm on Mondays at 00:00 = all months selected, all days of the month selected, only Monday selected as day of the week.

Periodic alarm options:

Option	Description
Period	How often the alarm triggers (e.g. every 1 hour, every 30 minutes)
Offset	A delay added to the trigger time. Example: period 1 hour + offset 20 minutes triggers at 20 past each hour
Remain Active For	How long (seconds) the alarm stays active after triggering

Periodic and Date / Time alarms can be combined via a **Super Alarm** — for example, "trigger every hour, but only on weekdays between 08:00 and 18:00".

Alarm behaviour:

- An alarm is **active** when its trigger condition is met, **inactive** when not.
- An alarm **triggers** (sends alerts) only when active AND unacknowledged.
- After triggering, the alarm will not re-trigger until acknowledged AND gone inactive, then active again.
- Fast logging runs at the General fast logging period while the alarm is active. Fast logging stops when the alarm deactivates, not when acknowledged.

Acknowledging alarms:

- Web interface — click the unacknowledged alarm on the Alarms page.
- Auto-acknowledge — the device acknowledges automatically after the configured time.
- SMS — using `ACK ALx` or `ACK ALL` command (LiveSMS option only).

For alarm status codes, see Appendix E.

6.8 Network Settings

Navigate to **Change Setup** → **Change Network Settings**.

Mobile Internet (Modem)

1. Set **Method** to Mobile Internet (Modem).
2. Enter the **APN** for the SIM card — confirm the correct value with your carrier or SIM provider.
3. If LiveSMS remote access is required, enter the **Remote APN** — a SIM with a public dynamic IP address is required. Contact your carrier to enable this and obtain the correct Remote APN value.
4. Enable **Authentication** only if required by the SIM — not needed in most cases.
5. Set a **Data limit** (maximum MB per day) if required.
6. Enter the **Modem phone number** — must be entered manually; it is not read from the SIM.

Primary and Secondary Network

- **Primary network** — used for reports, emails, NTP, and software/setup updates.
- **Secondary network** — used for report failover only; not for emails or updates.

- **Transmit mode** — Fail over or Both. Both (simultaneous) is only available when one network is Iridium satellite.

SMS Recovery

When enabled, the modem becomes active for up to 3 minutes at the configured interval (daily at midnight, or weekly) to allow delivery of queued incoming SMS messages. Works whether or not reporting is enabled.

6.9 Email

Navigate to **Change Setup** → **Change Email Settings**.

Setting	Value
SMTP port (unauthenticated)	25
SMTP port (authenticated)	587
SSL / TLS	Not supported

Enter the SMTP server address, From address, and optionally a test email address. Enable authentication and enter credentials if required by the SMTP server.

To test email delivery, navigate to **Change Setup** → **Email Diagnostics** and send a test email. The SMTP conversation is displayed in real time — server response codes in red identify any issues.

6.10 Reports

Navigate to **Change Setup** → **Change Report Settings**.

The hydroSpider2 supports two independent automatic report slots. For each slot:

Setting	Description
Reports to send	Email, FTP 1, FTP 2, HTTP — any combination
Period	1 minute to 1 day
Send report	Always, or only when new data available
Offset	Delay from start of period (e.g. daily at 6:30am: offset 6h 30m)
Enable recovery	Unsent data included in next report (up to 30,000 records)
Format	See Appendix J
Time order	Oldest first or newest first

Reset Report Starting Point: marks all existing logged records as already sent — use after setup and testing to prevent test data appearing in the first real report.

Daily Heartbeat Report: an optional status report sent once per day regardless of logging activity.

For report formats, see Appendix J.

6.11 Modem Diagnostics

Navigate to **Change Setup** → **Modem Diagnostics**.

Use this page to verify mobile connectivity after inserting a SIM card or changing antenna location.

Signal Strength Test:

1. Click **Mobile Signal Test**.
2. The modem turns on and displays signal strength continuously until the test is closed.

Use this test to confirm the SIM card is active and that the antenna location has adequate signal before leaving site.

SMS Test:

1. Enter a phone number in the **Phone number** field.
2. Click **Send Test SMS**.

The unit sends an SMS to the nominated number containing the unit's location name, serial number, current signal strength, and date/time. A successful send confirms end-to-end mobile

communication.

Signal strength reference:

Level	Threshold	Action
Excellent	≥ 75%	No action required
Good	≥ 50%	No action required
Acceptable	≥ 40%	No action required
Poor	< 40%	Reposition antenna — connection may be unreliable

6.12 Setup Management

Navigate to **Change Setup** → **Manual Setup Management**.

Save setup to disk:

1. Click **Save setup to disk**.
2. Save the `.cfg` file to a known location — use as a backup or template for similar units.

Some browsers flag `.cfg` files as potentially harmful during download. This is a false positive — dismiss the warning and save the file.

Load setup from disk:

1. Click **Browse** and select a setup file.
2. Click **Load setup from disk**.

The setup file must be from the same product type and the same or earlier firmware version.

Email setup: sends the current setup file as an email attachment — useful for off-site backup.

Restore factory defaults: resets all settings to defaults. Log file data is unaffected.

6.13 Software Upgrades

Manual upgrade:

1. Navigate to **Change Setup** → **Manual Software Upgrade**.
2. Click **Choose File** and select the upgrade file (`.hal`).
3. Click **Upgrade Now**.
4. Wait up to 5 minutes, then reconnect to the web interface.

No progress indicator is shown during the upgrade.

Automatic upgrade: The hydroSpider2 can check for and install new firmware automatically once per day after a report is sent, either from the Halytech upgrade server or a self-managed FTP server. Automatic upgrades will not run if reporting is disabled.

6.14 Advanced Settings

Navigate to **Change Setup** → **Advanced Settings**.

Setting	Description
Turn all controls off on entry to Change Setup	Default: on. Disable to prevent controls being turned off when entering Change Setup.
Minimum auto-acknowledge time	Default: 60 min. Configurable down to 5 min.
Store messages with channel data	When off, info messages go to a separate diagnostic area — increases channel data capacity.
Enable 4-20mA error handling	Escalates out-of-range 4–20 mA readings from warnings to errors, enabling alarm triggering.
Use long location name	Uses the Long Location field in reports.
Modbus baud rate	Default: 19200. Must match connected Modbus sensor. (Modbus/SDI-12 variants only.)
Modbus parity	Default: Even. Must match connected Modbus sensor. (Modbus/SDI-12 variants only.)
Modbus stop bits	Default: 1. Must match connected Modbus sensor. (Modbus/SDI-12 variants only.)

7. Service Mode

Service Mode provides a restricted configuration interface for field commissioning without the risk of altering report or alarm settings.

Log in with the **Service** account credentials (default username: `service`, password: `changeme`).

Available in Service Mode:

- View all current channel readings
- Access and adjust Time/Date (NTP settings cannot be changed)
- Calibrate inputs (including Examine and Test — see Section 7.3)
- Modem diagnostics
- Save setup to disk
- Manual software upgrade

Exiting Service Mode re-enables normal logging.

7.1 Time and Date

Time and date can be set in Service Mode — see Section 6.2 for the procedure. NTP settings cannot be modified from the Service account.

7.2 Modem Diagnostics

Available in Service Mode — see Section 6.11 for the procedure.

7.3 Input Channel Calibration and Test

Navigate to **Calibration** → **[channel]** → **Examine and Test**.

1. Click **Examine and Test** on the input calibration page.
2. The input reading is temporarily reset to zero (the original accumulated value is preserved and unaffected in the log).
3. Apply test pulses — the web page counts each pulse in real time. If an LCD/Keypad is fitted, the same live count is shown on screen 2 (input channel screen) — useful when one person drives the test from a laptop and another verifies pulses in the field.
4. Click **Exit** — the original accumulated value is restored.

This allows field pulse verification (e.g. checking a water meter reed switch) without corrupting the live reading.

7.4 Software Upgrade

Manual software upgrade is available in Service Mode — see Section 6.13 for the procedure.

8. Maintenance

8.1 Internal 9V Backup Battery

The 9V backup battery is optional. It preserves system state (date/time, counters, alarm state, modem retry schedule) when main power is lost.

- Use a good quality long-life 9V battery. A 9V lithium battery is ideal.
- Rechargeable batteries are not recommended — they self-discharge faster than long-life non-rechargeable types.
- Lithium batteries are difficult to test reliably. Replace every 5–7 years as a precaution.
- If measured: a reading below 8.5V means the battery is flat — replace immediately.

Replacement procedure:

1. Open the hydroSpider2 — see Section 3.1.
2. Disconnect the old 9V battery from the clip.
3. Connect a new 9V battery to the clip and seat it in the metal holder.
4. Close the unit — see Section 3.4.

If the LCD/Keypad is not detected on power-up after replacement, disconnect the 9V battery, connect the LCD, then reconnect the 9V battery.

8.2 External 12V SLA Battery

The BATT port accepts a 12V SLA battery (max 7.2Ah when the charger is in use). Replacement batteries are available from Halytech — see the Accessories table in Section 1.4.

Checking battery condition

Battery voltage is available via the web interface system monitors and the LCD (screen 3, where fitted). Measure resting voltage — no charging, no significant load. Check at dawn before solar charging begins, or after disconnecting the charger for 30 minutes. {spider2-amr-manual §7.1}

Voltage at rest	Condition
12.6–13.0V	Healthy, fully charged
12.0–12.5V	Partially discharged
Below 11.5V	Discharged or failing — investigate

{spider2-amr-manual §7.1}

SLA batteries typically last 2–5 years depending on temperature, depth of discharge, and charge cycling. {spider2-amr-manual §7.1}

Replace the battery if:

- Resting voltage is consistently low despite adequate charging
- The unit cannot maintain operation through expected no-charge periods (e.g. cloudy days for solar installations)

Replacement procedure:

1. Disconnect the charger supply (or solar panel) from the CHG port first.
2. Disconnect the old battery from the BATT port.
3. Connect the new battery — positive to BATT, negative to GND. Max 7.2Ah when the charger is in use.
4. Reconnect the charger supply.
5. Observe correct polarity — reverse polarity will damage the unit.

8.3 Routine Site Checks

On each site visit, check:

- **Battery voltage** — view on the web interface system inputs; see Section 8.1 (9V backup) and Section 8.2 (external SLA) for replacement thresholds
- **Signal strength** — should be $\geq 40\%$ (see Section 6.11 Modem Diagnostics); reposition the antenna if below threshold
- **Connectors** — inspect the I/O, Halytech Comm Port, and antenna connectors for corrosion, dirt, or damage
- **Sensor readings** — verify each configured input is returning plausible values; address any issues before leaving site

9. Specifications

9.1 Hardware Specifications

Inputs:

Type	Standard	Modbus/SDI-12
Analogue	2	1
Digital	2	1
System	4	4

Modbus/SDI-12 variants additionally support SDI-12 and Modbus sensor inputs via the intelligent interface. Each physical sensor may provide one or more channel values; each value occupies one channel slot. All channel types — native inputs, system monitors, intelligent sensor readings, and virtual channels (Super Channels) — share a pool of 20 total configurable channels. Standard variant total: 16. See Appendix C.

Analogue inputs:

Parameter	Value
Resolution	12 bits
Input range (native)	0–2.5V
Current input	4–20mA (factory calibrated)
Sampling period	User definable (1 second minimum)

Digital / Counter inputs:

Parameter	Counter	Event
Minimum pulse width	5 ms	10 ms
Maximum frequency	100 Hz	< once per 30 seconds
Range	0–999,999.999	0–999,999.999

Outputs:

Output	Type	Rating
Control 1 (SWP)	Switched Power Out	Max 1A
Control 2 (OC)	Open Collector	440Ω to GND, nominal 10mA

Alarms:

Parameter	Value
Total alarms	16
Phone numbers per alarm	3
Email addresses per alarm	3
Alert mechanisms	SMS, Email, DNP3, Exception Reports

Logger:

Parameter	Value
Capacity	300,000 records
Storage	Non-volatile FLASH
Time resolution	1 second

Communications:

Interface	Detail
Mobile	4G (selected variants) or Cat-M1 (selected variants)
SIM card	Nano SIM
Ethernet	Via LANlink Cable
Wi-Fi	Via HLink Dongle
Antenna	SMA connector

Power:

Parameter	Value
BATT	12V DC nominal, min 1A
CHG	16–24V DC, 2A; or 12V solar panel
Battery capacity limit (charger use)	Max 7.2Ah SLA
Optional internal backup	Standard 9V battery

9.2 Physical Specifications

Parameter	Value
Dimensions	158(W) × 90(H) × 46(D) mm
Weight	360 g
Enclosure rating	IP60
Enclosure material	ABS
Mounting	Surface mount
Operating temperature	–20°C to +60°C
Warranty	12 months manufacturers warranty

10. Accessories

Separately-available items for installation, setup, and spare parts:

Item code	Description
HHS-013	LANlink Cable — Ethernet comms cable for setup (not required per unit)
HHS-080	HLink Wi-Fi Dongle — Wi-Fi comms for setup (requires firmware V1.8 or later)
HHS-016	SLA 12V 7.2 Ah battery — with long connector lead
HHS-017	Power supply — 90W, cable with tinned ends
HHS-060	Enclosure 400×300×150mm — powdercoated, with glands, backing plate, battery bracket, antenna, and mounting brackets
HHS-061	Mounting plate kit — base plate and attaching screws
HHS-065	Input Accessories Kit

Contact sales@halytech.com.au for ordering.

Appendix A — I/O and Power Connector Pinout

Standard variant pinout — 10-pin green terminal block.

Modbus/SDI-12 variants have a different connector pinout — refer to Appendix C.

The terminals are labelled on the terminal block — use the label. Pin numbers count from one end and are given only for reference.

Terminal	Pin	Function	Notes
GND	1	Ground	Common for all signals
AIN1	2	Analogue Input 1	0–2.5V or 4–20mA (user selectable)
DIN1	3	Digital Input 1	Switch / Counter — active = short to GND
OC	4	Open Collector Output	Control 2 — 440Ω to GND, nominal 10mA
DIN2	5	Digital Input 2	Switch / Counter — active = short to GND
AIN2	6	Analogue Input 2	0–2.5V or 4–20mA (user selectable)
SWP	7	Switched Power Out	Control 1 — max 1A
BATT	8	Power In / Battery	12V DC nominal, min 1A; max 7.2Ah SLA when charger in use
CHG	9	Charger Supply In	16–24V DC 2A or 12V solar panel
GND	10	Ground	Common for all signals

Appendix B — Connecting Sensors

Sensor wiring is site-specific. The following table summarises connection points by sensor type.

Sensor type	Connect to	Notes
Switch / counter / event	DINx → GND	Active = short to ground
4–20mA current loop	AINx → GND	Factory calibrated — no external resistor required
Voltage 0–2.5V	AINx → GND	Direct connection
Voltage 0–5V	AINx with 1.2kΩ + 1kΩ resistor divider	See note below
Voltage 0–10V	AINx with 3.3kΩ + 1kΩ resistor divider	See note below
SDI-12 / Modbus	Via intelligent interface	Modbus/SDI-12 variants only — see Appendix C

Resistor divider (0–5V and 0–10V inputs):

The analogue input has a native range of 0–2.5V. To accept 0–5V or 0–10V signals, fit a resistor voltage divider between the signal source and the AINx pin. Resistors are included in the resistor/diode pack supplied with the unit.

Do not apply signals above 2.5V directly to an AINx pin. Use a resistor divider. Higher voltages may damage the input.

Sensor power (warmup):

For sensors requiring power to be applied before sampling, connect the sensor supply to the SWP (Control 1) output. Set the warmup time in Change Input Setup → Options → Warmup source.

Appendix C — SDI-12 / RS-485

Applies to Modbus/SDI-12 variants only.

The Modbus/SDI-12 variants include an intelligent interface supporting SDI-12 and RS-485 (Modbus) sensors. Both SDI-12 and Modbus sensors can be connected simultaneously. Each physical sensor may provide one or more channel values; each value occupies one channel slot from the device's 20-channel total. There is no limit on the number of physical devices connected.

SDI-12:

Parameter	Value
Protocol compliance	SDI-12 v1.3
Supported commands	M, C, CC, R, RC
Device address range	0–9, a–z, A–Z (each sensor must have a unique address)

Modbus (RS-485):

Parameter	Default	Notes
Baud rate	19200	Configurable via Advanced Settings (§6.14)
Parity	Even	Configurable via Advanced Settings (§6.14)
Stop bits	1	Configurable via Advanced Settings (§6.14)
Device address range	1–255	Each device must have a unique address
Supported function codes	3, 4, 6	Read Holding Registers, Read Input Registers, Write Single Register
Register addressing	0-based index	

Baud rate, parity, and stop bits must be configured to match the connected sensor.

Appendix D — RS-232 / Serial

Applies to RS-232 / Serial variants of hydroSpider2 (HHS-157 and HHS-174). The TTL RS-232 variants (HHS-158 and HHS-175) use 3.3V or 5V logic levels only — these units are clearly labelled on the green I/O and Power connector and **must not** be connected to standard RS-232 equipment.

The RS-232 / Serial option replaces the OC control and the native DIN2 and AIN2 inputs with serial communication pins. With the option fitted, the unit supports up to 16 input channels — any combination of native, system, and intelligent RS-232 / Serial channels.

Connector Pinout (RS-232 variants)

Label	Function	Comment
GND	Ground	Common for all signals
AIN1	Analogue 1	0–2.5V or 4–20mA (user selectable)
DIN1	Digital 1 / Switch 1 / Counter 1	Active = short to GND
TxD	Serial transmit data	Output
RTS	Serial RTS signal	Output
RxD	Serial receive data	Input
SWP	Switched Power Out	Driven by Control 1, max 1A
BATT	External Power In or Battery	Nominal 12V DC; max 7.2Ah SLA when charger in use
CHG	Charger Supply In	15–24V DC 2A or 12V solar panel
GND	Ground	Common for all signals

RS-232 / Serial variant pinout differs from the Standard pinout (Appendix A) — the OC, DIN2, and AIN2 pins are not available on these units.

Configuring Serial Channels

Set the channel **Type** to a supported serial protocol (see below) and the **Source** to **Interface**.

Serial Protocol 1 — Dust Sensors

For RS-232 dust sensors that report particle and meteorological readings. The protocol returns eight predefined reading types with built-in calibration scaling — when this protocol is selected, calibration is applied automatically.

Reading	Offset	Scaler	Units
TSP / Inhalable	−25.6	0.1	µg/m ³
PM10 / Thoracic	−25.6	0.1	µg/m ³
PM2.5 / Respirable	−2.56	0.01	µg/m ³
PM1 / PM2	−2.56	0.01	µg/m ³
Temperature	−256	0.1	°C
Relative Humidity	−256	0.1	% RH
Wind Speed	0	0.1	m/s
Wind Direction	0	1	°

Per-channel options:

- **Device Address** — 4-digit address of the sensor (digits 0–9 only). The same address applies to every channel reading from that sensor; changing the address on one channel automatically updates the others.
- **Reading** — choose which of the eight readings the channel should log. Calibration is set automatically per the table above; you can adjust manually on the calibration page if needed.
- **Extract values from** — LCD (current display reading, averaged over ~10 seconds) or Memory (sensor-internal averaged value, typical 10-minute storage period).

When sampling **Memory** readings, set the channel's sample and logging periods to match the sensor's storage period. When the sensor's memory reaches ~80% capacity, the hydroSpider2 commands the sensor to clear its memory — the next memory reading after a clear will not be logged because the buffer was just emptied. This affects Memory readings only — LCD readings are unaffected.

FL900 — Modbus over RS-232

The FL900 channel type allows the hydroSpider2 to communicate via Modbus over RS-232 with an FL900 data logger, typically used with Doppler radar flow sensors.

Per-channel options:

- **Device Address** — 1–255, the Modbus device address of the FL900 unit.
- **Data Address** — 0–65535, as listed in the FL900 manual for the reading you want to log.

FL900 RS-232 settings: 19200 bps, even parity, 1 stop bit. Set on the FL900 unit.

Address format conversions:

- Hex addresses (e.g. `0x03E8`) → convert to decimal (`1000`) before entering.
- Modbus addressing starts at 0 per the spec — some manuals list addresses starting at 1. If the sensor returns an exception, try subtracting 1 from the listed address.
- Legacy 5-digit addresses (e.g. `40001`) — drop the leading digit and subtract 1 (so `40001` → `0000`).

Appendix E — Alarm Status Codes

These codes appear on the Alarms Status page when an alarm is sending alerts.

SMS Alert Status Codes

Code	Meaning
1	1st attempt to 1st phone number
2	2nd attempt to 1st phone number
3	3rd attempt to 1st phone number
4	1st attempt to 2nd phone number
5	2nd attempt to 2nd phone number
6	3rd attempt to 2nd phone number
7	1st attempt to 3rd phone number
8	2nd attempt to 3rd phone number
9	3rd attempt to 3rd phone number
10	All attempts exhausted — alarm not acknowledged, no further sends

Email Alert Status Codes

Code	Meaning
1	1st attempt to all 3 email addresses
2	2nd attempt to all 3 email addresses
3	3rd attempt to all 3 email addresses
4	Email transmission succeeded or all attempts exhausted — no further sends

Appendix F — SMS Commands

Requires LiveSMS software option.

All SMS commands listed below require the LiveSMS software option. **If LiveSMS is not enabled, the hydroSpider2 will not receive any SMS commands** — even if the modem is on for other reasons.

To use SMS commands:

1. LiveSMS software option must be installed (order from Halytech — see Appendix G).
2. LiveSMS modem mode must be set to **Always** or **Schedule + Alarms** (so the modem is on to receive incoming SMS).
3. Commands may be sent in upper or lower case. One space between words. No spaces before or after commas.

Valid commands are acknowledged with a return SMS: `Location: OK SMS command`

Commands are not received while the modem is off — they will be received the next time the modem turns on (subject to SMS Recovery — see §6.8).

Command	Description	Example
<code>HELP</code>	Request list of supported commands	<code>HELP</code>
<code>GET ST</code>	Get current state of all inputs	<code>GET ST</code>
<code>GET CN</code>	Get current state of all controls	<code>GET CN</code>
<code>GET AL</code>	Get current state of all alarms	<code>GET AL</code>
<code>ACK ALx</code>	Acknowledge alarm x (x = 1–8)	<code>ACK AL3</code>
<code>ACK ALL</code>	Acknowledge all alarms	<code>ACK ALL</code>
<code>ON CNx</code>	Activate control x (no PIN)	<code>ON CN1</code>
<code>yyyy ON CNx</code>	Activate control x with PIN	<code>1234 ON CN1</code>
<code>OFF CNx</code>	Deactivate control x (no PIN)	<code>OFF CN1</code>
<code>yyyy OFF CNx</code>	Deactivate control x with PIN	<code>1234 OFF CN1</code>
<code>PULSE CNx</code>	Pulse control x for 1 second (no PIN)	<code>PULSE CN1</code>
<code>yyyy PULSE CNx</code>	Pulse control x for 1 second with PIN	<code>1234 PULSE CN1</code>
<code>GET REP</code>	Request current day's report via normal delivery	<code>GET REP</code>
<code>yyyy GPRS</code> <code>n,email</code>	Request remote web access session — see Appendix H	<code>1234 GPRS</code> <code>10,me@example.com</code>

Control activation commands (`ON` , `OFF` , `PULSE`) and remote access (`GPRS`) can be protected with a 4-digit SMS PIN. Configure via Change Setup → Change Location / Site ID.

Appendix G — LiveSMS

LiveSMS is a software option that extends the SMS and remote access capabilities of the hydroSpider2. Order from Halytech.

LiveSMS features:

- Remote web access via mobile network (see Appendix H)
- Alert escalation — resend alerts if not acknowledged within a set time
- Modem scheduling — set the modem to be on at specific times
- Additional SMS commands

Modem operating modes (configured via LiveSMS settings):

Mode	Description
Never	Modem is never left on to receive SMS commands
Always	Modem is always on
Schedule + Alarms	Modem follows the configured schedule; also turns on when an alarm triggers
Alarms Only	Modem turns on only when an alarm triggers

Appendix H — Remote Web Access

Requires LiveSMS software option.

Remote web access allows the hydroSpider2 web interface to be accessed over the mobile network from anywhere with internet access.

Pre-requisites (one-time setup):

1. SIM card must be enabled for dynamic public IP address — contact your carrier to request this.
2. Set Network Method to Mobile Internet (Modem) and enter the Remote APN value provided by your carrier.
3. Configure email settings correctly — send a test email to confirm before attempting remote access.
4. Configure LiveSMS to keep the modem on (Always or Schedule + Alarms).

Connecting remotely:

1. Send the following SMS to the device: `yyyy GPRS n,yourEmailAddress`
 - `yyyy` = LiveSMS PIN (omit if no PIN set)
 - `n` = minutes to wait online (10 recommended)
 - `yourEmailAddress` = address where the link will be sent
 - Example (no PIN): `GPRS 10,me@example.com`
2. The device responds with an acknowledgement SMS.
3. The device sends an email containing a link to the web interface.
4. Open the link — the login page will appear.

Session behaviour:

- Session closes automatically after 5 minutes of inactivity or 30 minutes total.
- To reconnect after a session closes, send the `GPRS` SMS again.

Appendix I — DNP3

Requires DNP3 software option.

The hydroSpider2 supports DNP3-L2 (level 2 subset) for SCADA integration. Configure via **Change Setup → DNP3**.

Setting	Description
Server IP address 1–3	Up to 3 DNP3 master server IP addresses — tried in order until a connection succeeds
Server port	TCP port to connect to (not used in listen mode); default 20000
Listen port	TCP port to listen on (listen mode only); default 20000
Local DNP3 address	This device's outstation address — must be unique across all outstations on the network
Server DNP3 address	DNP3 address of the master server

After entering settings, click **Save and Restart DNP3** to immediately attempt a connection.

Server IP addresses must be external public IP addresses — not internal network addresses.

Event reporting:

By default, every logged input value is sent to the master server as a DNP3 event. Alternatively, configure the device to report only changes in logged values.

Setting	Description
Enable Unsolicited	Whether to send unsolicited responses to the server
Report all logged data	When cleared, only value changes are reported as DNP3 events
Period	How often to send unsolicited responses
Fast Period	Reporting rate while an alarm with "Repeat (fast period)" is active
Offset	Delay added to the event send time

If using the modem to connect to the server (listen mode disabled), unsolicited responses must not be disabled — the modem only connects when there is data to send.

Appendix J — Report Formats

Format	Description
Raw	Date, time, primary ID, secondary ID, value
Diagnostic	As Raw, plus running total for "log difference" channels; extra debug info
Diagnostic Only	Debug messages only — no channel data
Filtered	Channel name, date/time, value — no debug messages
Multi-column	One column per channel; one row per timestamp
Multi-column (aligned)	As Multi-column, snapped to logging period timestamp — recommended for SDI-12/Modbus sensors
User ID	Uses user-defined channel IDs instead of default IDs
User ID (with controls)	As User ID, plus control on/off events
Custom format 1	Counter channels with log difference only — period start/end, difference, units
RID HTTP	Royal Irrigation Department (Thailand) format
NSW DPIE eagle.io	NSW water metering framework compliant

Report file naming: `<location>_<format>D_<date>.csv`

Format codes: R (Raw), F (Filtered), D (Diagnostic), M (Multi-column), S (User ID).

Appendix K — Alert Formats

SMS alert format: `[location name]: [alarm message text] / Time: HH:MM:SS DD/MM/YY`

SMS alerts are sent to each configured phone number in order. If a send fails, it is retried 3 times at 1-minute intervals before moving to the next number.

Email alert format: `[device] at [location] / [alarm message] / Generated by Alarm: [number]
([name])`

Email alerts are sent to all configured addresses simultaneously. If a send fails, it is retried 3 times at 3-minute intervals.

DNP3 alerts: unsolicited responses — sent once only, or repeated at the configured fast period while the alarm is active.

Appendix L — Log Codes

The following codes appear in Raw and Diagnostic format reports:

Code	Event
POWERON	Device turned on
SRAMRST	Settings reset to defaults
LOGERASE	Log file erased
REBOOTRQ	Device rebooting
CLKCHG	Clock changed
UPG OK / UPG FAIL	Software upgrade result
CFG OK / CFG FAIL	Setup file install result
NTP OK / NTP FAIL	Clock sync result
LANON / LANOFF	LAN connected / disconnected
AL ACT / AL DEACT	Alarm activated / deactivated
AL ACK / AL ATTACK	Alarm acknowledged (manual / automatic)
ALSMS OK / ALSMS FL	Alarm SMS sent / failed
ALEML OK / ALEML FL	Alarm email sent / failed
R FTP OK / R FTP FL	Report FTP upload result
R EML OK / R EML FL	Report email result
MODEMON / MODEMOFF	Modem turned on / off

Appendix M — Power Considerations

BATT: Accepts 12V DC nominal, min 1A. Connect a battery or DC power supply directly. Positive to BATT, negative to GND.

CHG: Accepts 16–24V DC at 2A, or a 12V solar panel. The built-in charger maintains a 12V SLA battery connected to the BATT port. Maximum battery capacity: 7.2Ah. If no battery is required, leave BATT unconnected.

9V backup battery: Preserves system state (date/time, counters, alarm state, modem retry schedule) when main power is lost. With only the 9V battery connected, the unit does not log, alarm, or report — normal operation resumes when main power is restored.

Modem and power consumption: Modem transmissions are the dominant power consumer. Use the modem scheduling feature (LiveSMS) to limit transmission periods and reduce current draw in solar or battery-only applications.

Replacement battery: External SLA battery — 12V 7.2Ah with long connector lead, available from Halytech. See the Accessories table in Section 1.4 for the item code.

Appendix N — SIM Cards and iPhones

If a SIM card has been activated in an iPhone before installation, Apple may have registered that number for iMessage. When iMessage is active, Apple intercepts SMS messages sent to that number — so your SMS commands to the hydroSpider2 will never be delivered to the hydroSpider2.

Before installing a SIM that has been used in an iPhone:

1. On the iPhone, go to **Settings** → **Messages**.
2. Turn off **iMessage**.
3. Remove the SIM from the iPhone, then install it in the hydroSpider2.

If iMessage is already registered and the iPhone is no longer available: Use Apple's online deregistration tool at **selfsolve.apple.com** to remove the number from iMessage before commissioning.

Appendix O — Troubleshooting

Symptom	Likely cause	Action
No signal strength shown	Antenna not connected or SIM not activated	Check antenna connection at ANT port; confirm SIM is activated with carrier
Registration failed	Incorrect APN, antenna fault, or SIM not activated	Verify APN settings match your carrier; check antenna; confirm SIM is activated
Signal present but SMS send fails	SIM plan does not allow SMS	Contact carrier to enable SMS on the SIM
Signal present but email fails	APN, SMTP, or address configuration error; mobile data not enabled on the SIM	Confirm APN is correct; check SMTP server settings; verify to/from email addresses are valid; confirm mobile data is enabled with your carrier
LCD/Keypad not detected on power-up	9V battery connected before LCD	Disconnect the 9V battery, connect the LCD, then reconnect the 9V battery
Cannot connect to web interface	Power or cable issue; computer network settings	Check power is connected to BATT (12V DC nominal) or CHG (16–24V DC) with correct polarity. Check the LANlink cable is connected at both ends. Disconnect from Wi-Fi. If still unable to connect, check the network adapter used for the LANlink connection is set to obtain an IP address automatically (DHCP).

hydroSpider2 User Manual — Halytech For the latest version of this document, visit halytech.com.au/hydrospider2.

Appendix P — Setup File Format

Setup files are saved and loaded via **Change Setup** → **Manual Setup Management**. The format is a plain text file with a fixed header, parameter list, and footer.

Format

```
.HYDROSPIDER2
.DEV=<device code>
.VER=<version number>
<parameter assignments, one per line>
.END
```

Header

The first three lines must be:

- `.HYDROSPIDER2` — file type marker
- `.DEV=<device code>` — must match the unit's device type (see table below). Wrong code is rejected.
- `.VER=<version number>` — must match or be lower than the firmware version running on the unit. Higher version is rejected.

Device Codes

Variant	Device Code
hydroSpider2 (Standard)	40
hydroSpider2 (Modbus / SDI-12 / RS-485)	41
hydroSpider2 (RS-232 / Serial / FlowShark)	42

Body

One parameter assignment per line. Only parameters being changed need to be listed — anything not in the file keeps its current value.

Footer

The file must end with `.END`.

Editing setup files manually

Setup files exported via **Save setup to disk** can be edited in any plain-text editor and reloaded via **Load setup from disk**. Useful for: bulk-deploying many units with similar configurations, restoring a known-good config, or making targeted changes without using the web interface.



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