HALYTECH

Spider 2 AMR

User Manual

Models	HAM-050, HAM-051
Date	March 2026

Contents

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1. Introduction

1.1 Overview

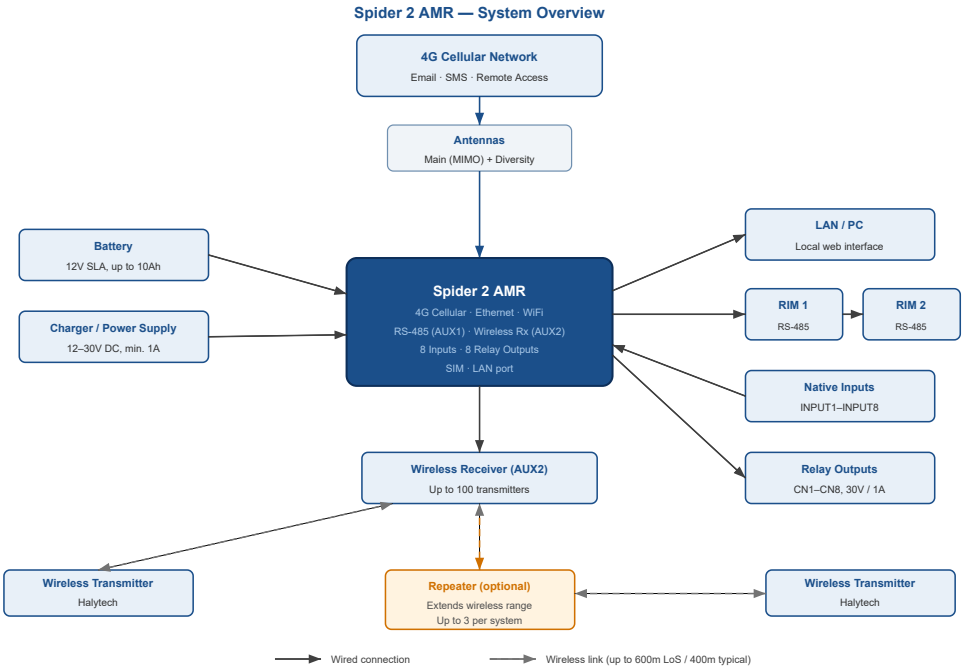
Spider 2 AMR is a complete, ready-to-install automatic meter reading and monitoring system for large numbers of utility meters — including water, gas, and electricity. It ships as a fully assembled package: the logger, battery, power supply, antennas, and wireless receiver are pre-installed in an IP66-rated weatherproof enclosure.

Spider 2 AMR can monitor inputs, control relay outputs, generate alarms, and log data. The system is configured and accessed using any standard web browser — no special software is required. A Spider 2 AMR can be accessed locally via a direct cable connection or WiFi, and remotely via an internet connection.

Typical applications:

- Automatic meter reading
- Water audits
- Process control
- Water treatment
- Waste management
- Irrigation

1.2 System Components



The Spider 2 AMR package includes everything required for a standard installation. The following items are pre-installed in the enclosure:

Item	Notes
Spider 2 AMR logger	Pre-installed in weatherproof enclosure
12V 7.2Ah SLA battery	Pre-installed inside enclosure
90W mains power supply	Pre-installed inside enclosure
Cellular whip antenna (main)	4G 5dB, 5m cable, SMA — mount externally for best signal
Cellular puck antenna (diversity)	Low-profile IP67, 3m cable, SMA — pre-mounted on top of enclosure
Wireless receiver (WRX-01, 433MHz)	HAM-051 only — pre-installed, connected to AUX2
High-gain 433MHz wireless antenna	HAM-051 only — 3.5m cable, SMA
Wall bracket for enclosure	Included
Antenna bracket (wall/pole mount)	×1 HAM-050, ×2 HAM-051
LAN cable	For initial setup connection

The installer provides: mains 240V AC supply (or solar panel if no mains available), SIM card, and field meters or transmitters.

1.3 Variants

Two packaged variants are available:

Item code	Description
HAM-050	Spider 2 AMR 4G Base Station — wired inputs only
HAM-051	Spider 2 AMR 4G Base Station — wireless + wired inputs

HAM-051 includes the wireless receiver (WRX-01) and high-gain 433MHz antenna required for Halytech Wireless Transmitters. HAM-050 does not include wireless capability.

Each unit ships with one of the following software variants factory-installed:

Part number	Description
HAM-050	Spider 2 AMR 4G Base Station — wired inputs only
HAM-051	Spider 2 AMR 4G Base Station — wireless and wired inputs (includes WRX-01 wireless receiver)
Modbus Server option	Add-on available on HAM-050 or HAM-051 — adds Modbus TCP/IP server for SCADA integration

All variants support wired Modbus inputs (RIMs via RS-485). Wireless capability requires the WRX-01 receiver hardware — included with HAM-051, not included with HAM-050.

The software variant is shown on the About page in the web interface and on the LCD display.

1.4 Accessories

Wired and wireless devices that extend the system:

Component	Description
Halytech Wireless Transmitter(s)	Wireless pulse-counting transmitters, one per meter (HAM-051 only)
Halytech RIM(s)	Halytech Remote Input Modules for pulse meters — wired Modbus devices connected via AUX1 RS-485
3rd Party Modbus devices	Any device with RS-485 Modbus out or Ethernet Modbus output

1.5 How It Works

The Spider 2 AMR acts as the central base station for an automatic meter reading installation. It collects consumption data from meters in the field by polling connected devices on a regular schedule. Two connection methods are supported: wired meters connect via Remote Input Modules (RIMs) or other Modbus RS-485 devices — such as smart meters — daisy-chained on an RS-485 bus back to the base station; wireless meters connect via battery-powered Halytech Wireless Transmitters mounted at each meter, which

communicate with the wireless receiver built into the base station. A single Spider 2 AMR can manage both wired and wireless devices simultaneously. Collected data is logged internally and delivered automatically — by email, FTP, or cellular data — on a configured schedule. An optional Modbus Server variant is also available, enabling the base station to serve collected data out over Ethernet to a SCADA or building management system.

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2. Installation

> **Audience: Installer**

2.1 Mounting

The Spider 2 AMR enclosure is IP66-rated and suitable for indoor or outdoor installation. Mount on a vertical surface using the supplied wall bracket.

1. Fix the wall bracket to the wall at the chosen location.
2. Hang the enclosure on the bracket.
3. If mounting outdoors, ensure cable entries and the enclosure door seal are intact.

Position the unit to allow:

- Clear access to the door for commissioning and maintenance
- Cable entry from below where possible to reduce water ingress risk
- A clear external surface or mast nearby for the cellular whip antenna

2.2 Power Wiring

The Spider 2 AMR has no ON/OFF switch. The unit starts operating as soon as power is applied.

The 12V 7.2Ah SLA battery and 90W mains power supply are pre-installed and pre-wired inside the enclosure. The installer connects mains 240V AC to the power supply via the enclosure cable entry.

If mains power is not available, disconnect the mains power supply and connect an external solar panel to the Charger connector (16–30V DC, minimum 1A).

> **Note:** If using a larger battery or your own external charging system, connect the battery to the Battery connector only and leave the Charger connector unconnected. Battery voltage monitoring and logging will still function normally.

2.3 Native Inputs (INPUT1–INPUT8)

Eight native inputs are provided on two multi-pole connectors (four inputs per connector), labelled INPUT1 to INPUT8. Each input has two screw terminals. Use wire up to 1.5mm^2.

> **Note:** There is no galvanic isolation between inputs or between inputs and internal circuitry.

Each input can be configured as one of the following types:

Input type	Description
Switch	Switch closure or voltage-free contact. Active state = terminals shorted. Must be stable for at least 5 seconds to register.
Analogue	Native input range 0–2.5V DC. Input conditioning supports 0–5V, 0–10V, 4–20mA, and 0–20mA. All analogue inputs share a common ground. 12-bit resolution. 2-point user calibration.
Counter	Increments on each terminal short. Supports up to 10Hz. Rolls over at 999,999.999.
Utility Meter	Records pulse count per logging period. Typical use: water, electricity, and gas meters (up to 10Hz).
Disabled	Input removed from all reports and menus.

Wiring by input type:

Switch, Counter, and Utility Meter inputs:

Connect the sensor between the input terminal and system ground.

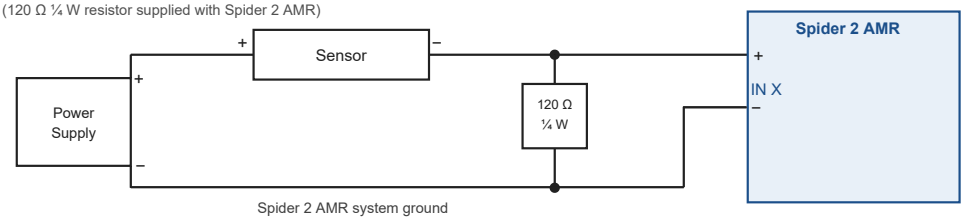
Analogue inputs — current loop (0–20mA or 4–20mA):

A 120Ω ¼W resistor (supplied) is required across the input terminals.

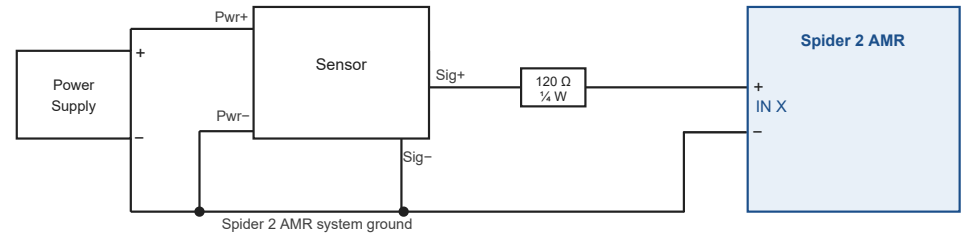
- 2-wire sensors: connect power supply positive to sensor positive; sensor negative through the 120Ω resistor to the input terminal; negative to system ground.
- 4-wire sensors: connect power supply to sensor power pins; sensor output positive through the 120Ω resistor to the input terminal; sensor output negative to system ground.

Analogue Input Wiring — Current Loop

2-wire — 0–20 mA / 4–20 mA
(120 Ω ¼ W resistor supplied with Spider 2 AMR)



4-wire — 0–20 mA / 4–20 mA
(120 Ω ¼ W resistor)



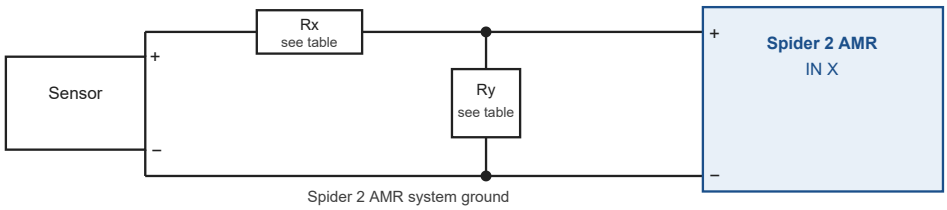
Analogue inputs — voltage (0–5V and 0–10V):

Voltage divider resistors are required for inputs above 2.5V:

Sensor range	Rx	Ry
0–2.5V	None	None
0–5V	1kΩ ¼W metal film	1kΩ ¼W metal film
0–10V	3.3kΩ ¼W metal film	1kΩ ¼W metal film

Analogue Input Wiring — Voltage Input

Rx and Ry resistors may be required depending on sensor output range (see table below)



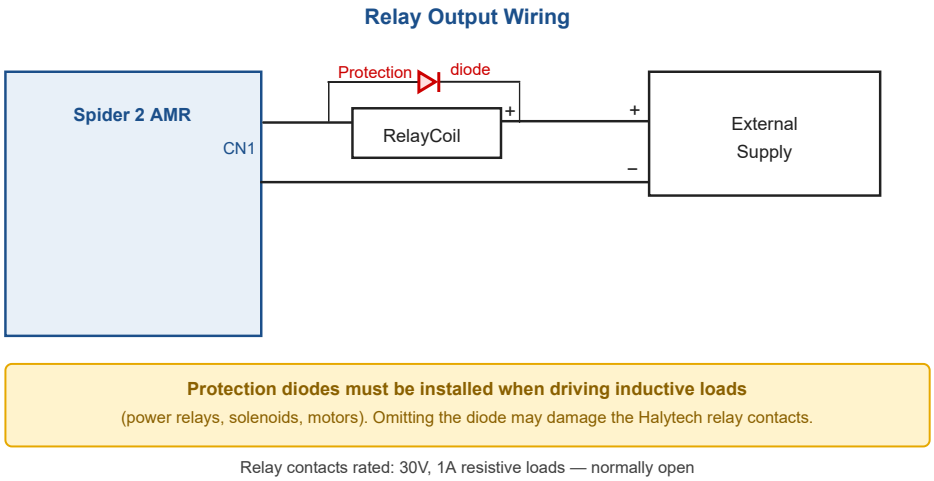
Sensor Range	Value of Rx	Value of Ry
0 – 2.5 V	None required	Leave out
0 – 5 V	1 kΩ ¼ W metal film	1 kΩ ¼ W metal film
0 – 10 V	3.3 kΩ ¼ W metal film	1 kΩ ¼ W metal film

Note: AUX1 switched power pin can supply power to analogue sensors — see section 2.5

> **Tip:** The switched power pin on AUX1 can supply power to analogue sensors. See section 2.5.

2.4 Relay Outputs (CN1–CN8)

Eight relay outputs are provided on two multi-pole connectors (four per connector), labelled CN1 to CN8. Each output provides latching relay contacts rated at 30V, 1A resistive loads.



> **Important:** Install external protection diodes when driving inductive loads such as power relays.

Outputs can be controlled:

1. Via the web interface Controls page
2. Via SMS commands
3. Automatically by a programmed alarm

Alarm-driven control has the highest priority and overrides manual control. If two alarms conflict on the same output, the OFF command overrides ON.

2.5 AUX1 — RS-485 and Switched Power

AUX1 is an RS-485 port used to connect RIMs and other Modbus devices.

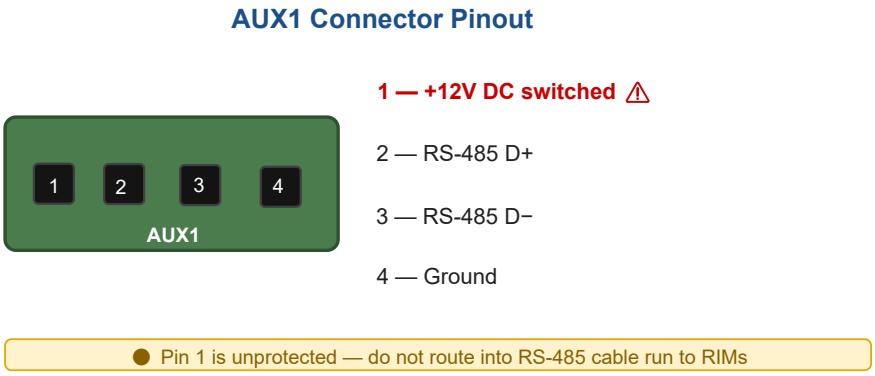
Pin	Function
1 (left, nearest LAN)	Switched +12V DC power output
2	RS-485 D+
3	RS-485 D−
4	Ground

> **Caution:** The switched power output on Pin 1 is unprotected. A short to ground may damage the unit. Do not route Pin 1 through the RS-485 cable run to RIMs — it is intended for local sensor power only.

The switched power output characteristics:

- Voltage: the larger of battery voltage or charger voltage
- Maximum current: 500mA
- Power is switched off when the unit enters sleep state
- 4-second warm-up period when the unit re-enters active state

This switched power pin can be used to power analogue sensors connected to native inputs. Example: connect a 2-wire 4–20mA sensor with the switched power pin as the supply, through a 120Ω resistor to the input terminal.



2.6 AUX2 — Wireless Receiver

> **Applies to:** HAM-051

The wireless receiver (WRX-01) is pre-installed inside the enclosure and connected to the AUX2 port. No wiring is required. The Spider 2 AMR supplies all necessary power to the receiver.

Connect the high-gain 433MHz antenna to the receiver's SMA connector. Antenna installation is described in section 2.9.

2.7 SIM Installation

The Spider 2 AMR requires a nano SIM card to communicate over the mobile network.

The SIM must have the following services enabled:

Service	Notes
SMS transmission and reception	Required for alarms and SMS commands
Internet access	Required for remote browser access and data reporting
Telstra activation requires Extranet enabled used to be code GPTEXB3	**Telstra SIMs only** — required for remote browser access. Request when activating the SIM. Telstra provides this free of charge. See Check Prior to Publishing note.

Before installing the SIM:

Most SIM cards are issued without a PIN. If your SIM has a PIN set, disable it before installation — insert the SIM into a phone and remove the PIN via the phone's SIM security settings. The Spider 2 AMR cannot prompt for a PIN and will fail to connect if one is active.

> **iPhone users:** If using an iPhone to disable the PIN, turn off iMessage before inserting the SIM. If iMessage is active when the SIM is inserted, Apple registers that number with iMessage — SMS messages sent to the Spider 2 AMR from other iPhone users may then be delivered as iMessages to the iPhone instead of arriving as SMS at the Spider 2 AMR. After disabling the PIN, remove the SIM and turn iMessage back on. If iMessage has already been registered to the SIM number, search for "Apple iMessage deregister" for Apple's current deregistration tool.

Installing the SIM:

1. Push the SIM tray button (on the side of the unit) to release the tray.
2. Place the nano SIM into the tray with the contacts facing down.
3. Push the tray back into the unit until it clicks into place.

> **Note:** Do not insert or remove the SIM while the unit is powered on.

2.8 LAN Connection

The LAN port is a standard RJ-45 Ethernet connector. It is used for:

- Direct connection from a PC for local access and configuration
- Connection to a local area network (LAN) or wireless router

For standalone units not connected to a LAN, Easy Connect must be **enabled** (factory default). For units connected to a LAN, Easy Connect must be **disabled** — see section 5.11.

For connection procedures, see Appendix A.

2.9 Antenna Installation

All antennas are pre-connected at the factory. The installer mounts them in position — no cable connections are required.

The diversity cellular puck is pre-mounted on top of the enclosure — no further action required.

Cellular whip antenna (main) — all models

Mount externally for best cellular signal using the supplied antenna bracket.

1. Fix the antenna bracket to the wall or pole adjacent to the enclosure.
2. Mount the whip antenna on the bracket.

Directional cellular antennas with higher gain are available from Halytech for installations in fringe coverage areas.

High-gain 433MHz wireless antenna — HAM-051 only

A second antenna bracket is supplied for the wireless antenna.

1. Fix the antenna bracket to the wall or pole.
2. Mount the wireless antenna on the bracket.

> **Note:** For best wireless range, mount the 433MHz antenna at height with a clear line of sight to the transmitters. Avoid mounting directly behind metal surfaces.

Extension cables are available from Halytech if you can't locate antennas in a good location

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3. RIM Installation

> **Audience: Installer Applies to:** HAM-050, HAM-051 (all variants)

3.1 Mounting and Wiring a RIM

Each RIM requires its own 18–24V DC mains power supply and includes an internal 12V 7.2Ah lead-acid backup battery. RIMs are designed to be mounted near the meters they monitor.

Refer to the *RIM Installation Guide* for full mounting, wiring, meter connection, and commissioning instructions.

> **Note:** Check with local authorities before connecting to gas meters.

3.2 RS-485 Bus Configuration

RIMs connect to the Spider 2 AMR AUX1 port using CAT-5 (or better) twisted-pair cable wired in a daisy chain. Do not use a star (branched) topology.

- Maximum total cable length: 1000m
- Each RIM must have a unique address set by its rotary switch (1–15)
- Fit the 120Ω terminator jumper on the last RIM in the chain

The RS-485 cable carries only the data pairs (D+, D−, Ground). Do not connect the AUX1 switched power pin (Pin 1) into the cable run.

3.3 Adding RIMs to the System

Once RIMs are cabled and powered, configure each RIM address in the Spider 2 AMR software. The Spider will poll each RIM automatically and collect meter data. See the system configuration guide for setup steps.

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4. Wireless Transmitters

> **Audience: Installer Applies to:** HAM-051

4.1 Halytech Wireless Transmitter

The Halytech wireless transmitter is a self-contained, waterproof module that connects directly to a pulse-output meter (water, electricity, gas, or rain gauge). Transmitters are available in Single, Dual, and Quad channel variants.

The Spider 2 AMR coordinates all wireless communication — it polls each transmitter in turn and configures the signal path through any intermediate repeaters. Transmitters communicate only on their assigned path and do not broadcast independently. This maximises transmitter battery life.

Transmitters are available with built-in long-life batteries, replaceable batteries, or mains power.

Each transmitter has a unique address printed on a label attached to the unit. The address is 15 digits with dashes (e.g. `00278-04-03153276`). Record the address of each transmitter before installation — it is required during setup.

For utility metering installations, a pulse probe or pickup may need to be installed in the meter if not already fitted. These are available from the meter manufacturer or from Halytech.

4.2 Range and Placement

Wireless link	Range (line-of-sight)	High-rise (vertical)
Base station to transmitter	Up to 450 m	Up to 4 floors
Base station to/from high-gain repeater, or between high-gain repeaters	Up to 600 m	Up to 5 floors
Between standard repeaters, or standard repeater to transmitter	~300 m	Up to 3 floors

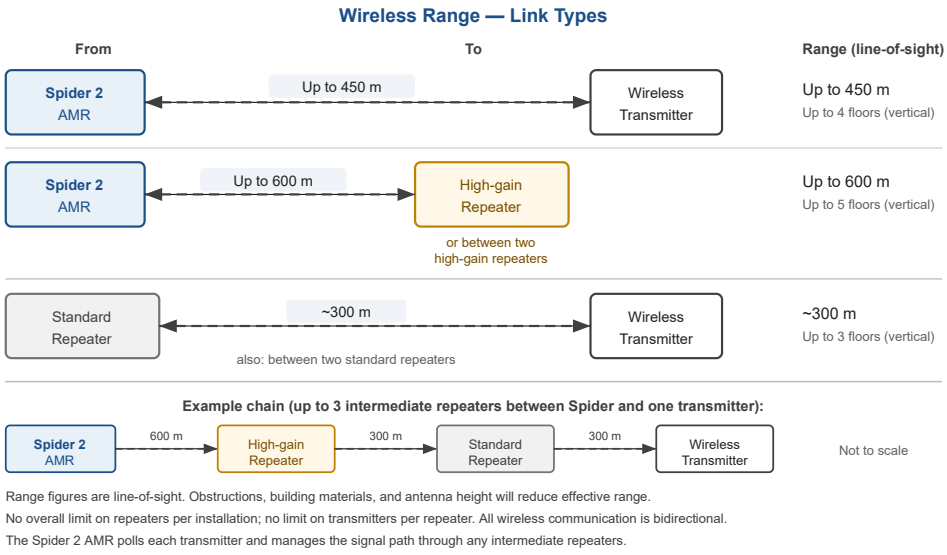
Horizontal ranges assume a clear, unobstructed line-of-sight path. Floor counts indicate typical vertical range through concrete floor slabs in high-rise buildings.

Materials that reduce signal range:

- **Large impact:** Metal, earth (hills), plant foliage, reinforced concrete
- **Low impact:** Brick, dry wood

Verify signal strength using Wireless Diagnostics (see section 6.5) during installation. A minimum of 50% signal strength at install is recommended. Transmitters will function reliably down to approximately 30%; below this, data may be lost.

If signal is insufficient, wireless transmitters or high-gain repeaters can extend range or route around obstructions. Up to 3 intermediate repeaters may be used in a chain between the Spider 2 AMR and a single transmitter. There is no limit on the number of transmitters per repeater, and no overall limit on the number of repeaters in an installation. Use high-gain repeaters where longer legs are required. Check signal strength on each hop separately.



4.3 Gas Meter Installations

> **Warning:** Gas meter installations may require approval or the use of hazardous area isolation barriers. Confirm applicable compliance requirements before proceeding with installation.

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5. System Configuration

> **Audience: Installer / advanced user**

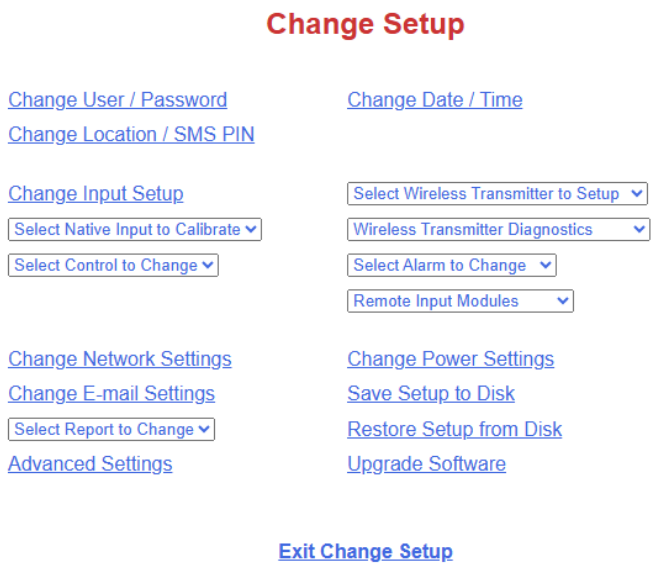
5.1 Connecting for the First Time

Connect to the Spider 2 AMR using a web browser as described in Appendix A.

The Alarms page is displayed automatically after a successful login.

Click **VIEW SETUP** in the menu to inspect current settings without making changes.

Click **CHANGE SETUP** to enter configuration mode.



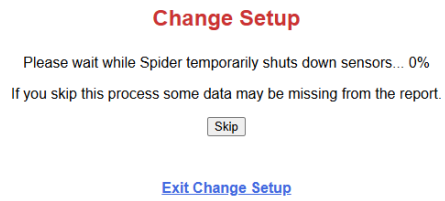
> **Note:** Entering Change Setup mode disables logging and alarm generation, and resets all active alarms. Exit this mode as soon as configuration is complete.

Change Setup mode exits automatically after 10 minutes of inactivity.

Wireless transmitter shutdown

If wireless transmitters are configured, entering Change Setup triggers a transmitter shutdown process:

```
Please wait while Spider temporarily shuts down sensors... 0% -> 100%
```



An option to **Skip** this process is offered:

Situation	Skip?
Making changes to wireless transmitter settings	No — do not skip
Making other changes only (inputs, alarms, network, etc.)	Yes — safe to skip
Re-entering Change Setup in the same session	Yes — safe to skip

> **Note:** If you skip, some data may be missing from the next automatic report.

5.2 Setting Location Name

Each Spider 2 AMR must be given a unique location name. This name is included at the start of every SMS and email transmission to identify the unit.

1. In Change Setup, click **Change Location / SMS PIN**.
2. Enter a unique name of up to 16 characters.
3. Click **Save**.

This page also sets the PIN used to protect SMS control commands. Set PIN to `0000` to disable PIN protection.

5.3 Setting Date and Time

1. In Change Setup, click **Change Date/Time**.
2. Confirm or update the displayed date and time.
3. Set the correct timezone for the installation location.
4. Click **Save**.

5.4 Setting Username and Password

Two access levels are supported:

Level	Default username	Default password	Permissions
Administrator	`user`	`changeme`	Full access
Normal user	`user`	`user`	View only — no changes

> **Important:** Change both usernames and passwords before the unit goes into service.

Sessions time out after 10 minutes of inactivity.

To change credentials:

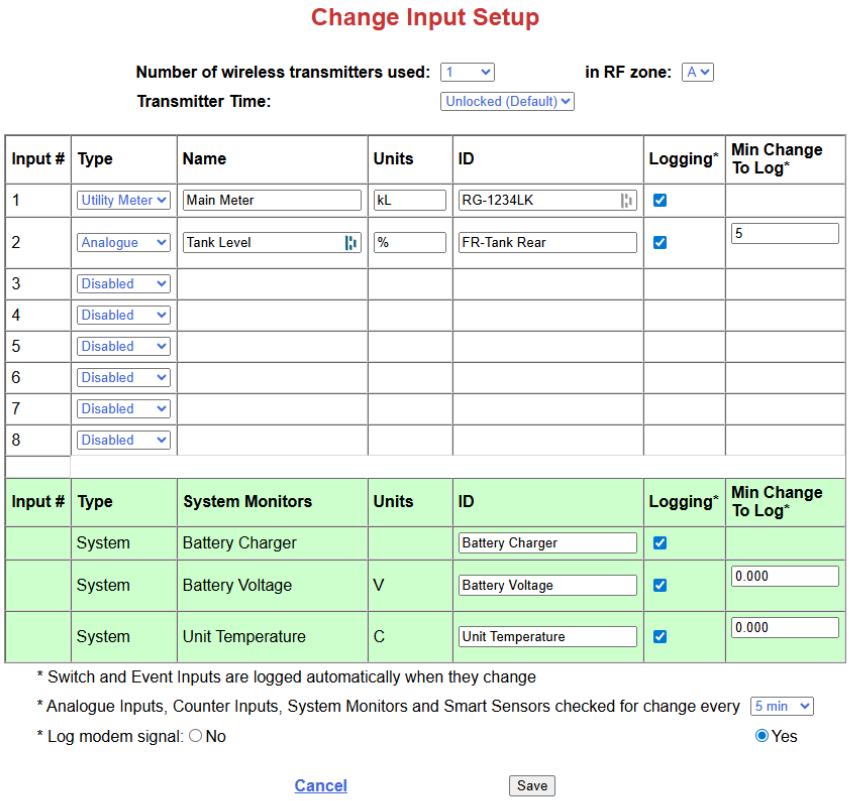
1. In Change Setup, click **Change User / Password**.
2. Enter new usernames and passwords.
3. Click **Save**.

5.5 Configuring Native Inputs

1. In Change Setup, click **Change Input Setup**.
2. Set the number of wireless transmitter modules (if any).

- ☐ CONFIRM: wireless transmitter module count setting 99 or 100

3. Set each input type: Switch, Analogue, Counter, Utility Meter, or Disabled.
4. Enter a descriptive name for each active input (e.g. "Pump 3 status", "Tank level").
5. For analogue and counter inputs, set measurement units, logging period (scan period, shared across all inputs), and minimum change to log.
6. Click **Save**.



Switch inputs are logged automatically on state change.

Analogue, counter, and system monitor inputs use significant-change logging: checked every scan period, logged only if the value has changed by at least the configured minimum. All enabled inputs of these types are also logged once at midnight regardless of change.

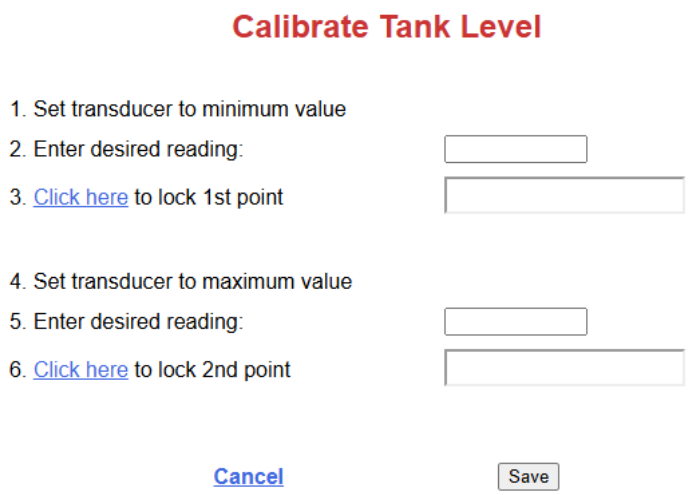
Utility Meter inputs are logged every scan period.

5.6 Calibrating Analogue Inputs

Two methods are available:

2-point calibration (recommended):

1. In Change Setup, select the input to calibrate from **Select Native Input to Calibrate or Scale**.
2. Select **2-point calibration** and click **Proceed**.
3. Follow the on-screen steps. The two calibration points must be at least half the sensor range apart.
4. Click **Save**.



Manual calibration:

Calibrated value = Scaler × Raw Value + Offset

Enter Scaler and Offset directly.

5.7 Calibrating Counter and Utility Inputs

Two options are available:

- **Scaling:** Set a scaler to convert pulses to engineering units. Example: 1 pulse = 5 litres → scaler = 5 to read in litres.
- **Preset (offset):** Set the counter to a specific starting value, e.g. to match the existing meter reading.

Counters roll over after 999,999.999 regardless of scaler.

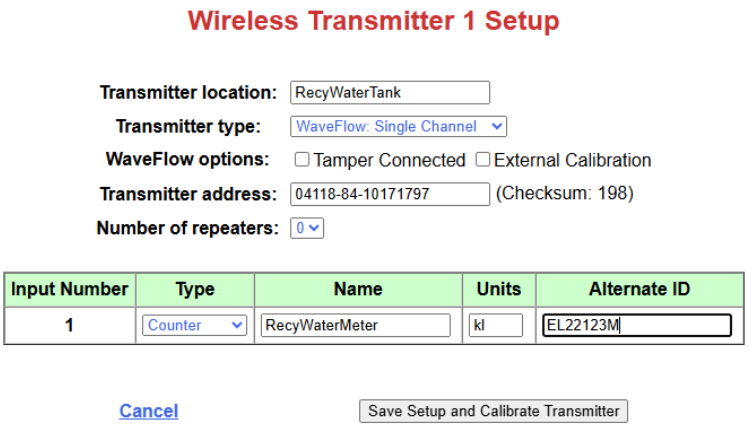
5.8 Configuring Wireless Transmitters

> **Applies to:** HAM-051

Each wireless transmitter must be configured separately.

1. In Change Setup, set the number of wireless modules in **Change Input Setup**.
2. If two or more Spider 2 AMR units are within radio range of each other, set each to a different RF zone. Otherwise leave set to Zone A.
3. Click **Select Wireless Transmitter to Setup** and select the module number.

4. Enter a location description (e.g. "North Water Main").
5. Select the transmitter type (Single, Dual, or Quad channel).
6. If tamper wires are connected, tick **Tamper Connected**.
7. Enter the transmitter address. The system displays a checksum — verify it matches the checksum on the transmitter label.



8. If repeaters are in use, enter the number of repeaters and their addresses.
9. For each meter channel, set the input type, name, unit, and Alternate ID:

Input type	Records
Wireless Counter	Cumulative meter reading at each logging period
Wireless Utility Meter	Consumption during each logging period, plus one cumulative meter reading per day (recorded with `_reading` appended to the channel name)

   Alternate ID is an optional field for each channel. Enter the physical meter serial number or site meter reference — this appears alongside the channel name in filtered reports and makes it easier to cross-reference Spider data with the site's meter register.

10. Click **Save Setup and Calibrate Module**.

Calibrating wireless inputs:

All inputs on a transmitter are calibrated together.

For wireless transmitters:

- Set the **multiplier** (pulses to engineering units). Example: 1 pulse = 0.005kL → multiplier = 0.005.
- Optionally enter the **current meter reading** to synchronise the Spider display with the physical meter.

Click **Save**.

5.9 Setting Control Names and Timer Schedules

Setting control names:

1. In Change Setup, click **Change Control Names**.
2. Enter descriptive names for each control in use (e.g. "Valve 4 ON", "Main Pump").
3. Click **Save**.

Controls need not be used sequentially — unused controls may be interspersed with active ones.

Setting timer schedules:

Each control (CN1–CN8) has an independent 7-day timer schedule.

1. In Change Setup, select the control to schedule from **Select Control to Change**.
2. Set the 7-day schedule using the timer grid — 15-minute resolution, 96 blocks per day.
3. Enable the timer for that control.
4. Click **Save**.

Timer feature	Detail
Schedule resolution	15-minute blocks
Days	7-day grid (Mon–Sun)
Transitions per day	Unlimited ON/OFF transitions
Override	Manual command overrides timer; override clears when timer reaches matching state
Enable/disable	Timer can be enabled or disabled per control

> **Note:** Timer overrides active before entering Change Setup are not reinstated on exit.

5.10 Setting Up Alarms

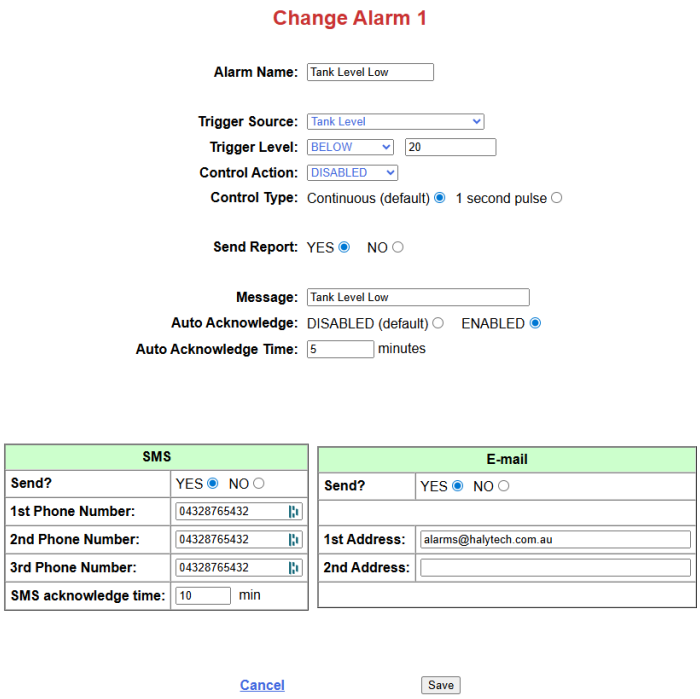
Each alarm has:

- Name
- Trigger source (any input, system monitor, or wireless status)
- Trigger condition (ON/OFF for switch; above/below/rate-of-change for analogue)
- SMS text and up to 3 phone numbers
- Up to 2 email addresses (if email option installed)
- Optional control action (continuous or pulsed)
- SMS acknowledge time (0–60 minutes, default 30)

- Optional auto-acknowledge

To configure:

1. In Change Setup, select **Change Alarm 1** (through 16) from the alarm list.
2. Fill in all required fields.
3. Click **Save**.



Alarm behaviour:

- On trigger, SMS is sent to the first phone number. If acknowledged within the acknowledge time window, sending stops.
- If not acknowledged, SMS is sent to the next number. One attempt per number, 3 numbers maximum (3 SMS total).
- After 3 attempts without acknowledgement, the unit stops sending and waits for the trigger to reset.
- Email is sent simultaneously to up to 2 addresses (3 attempts at 3-minute intervals).

Acknowledging alarms:

- Click the alarm on the Alarms page
- Reply to the alarm SMS (reply with the received message, or send `RST AL`*x*)
- Send `RST ALL` to reset all active alarms

> **Note:** If a trigger is still active when an alarm is acknowledged, the alarm will not re-trigger until the source goes inactive first.

Wireless input alarms:

If any wireless input is enabled, two additional alarm triggers are available:

- **Wireless low battery** — triggers if any enabled transmitter battery is nearing end of life
- **Wireless tamper** — triggers if tamper (wire-cut) is detected on any enabled transmitter

> **Note:** Wireless input alarms can only trigger when the Spider polls the transmitter, which is less frequent than the logging period. Contact Halytech if faster alarm response is required (increased transmitter battery consumption applies).

5.11 Network Configuration

In Change Setup, click **Change Network Settings**.

Easy Connect

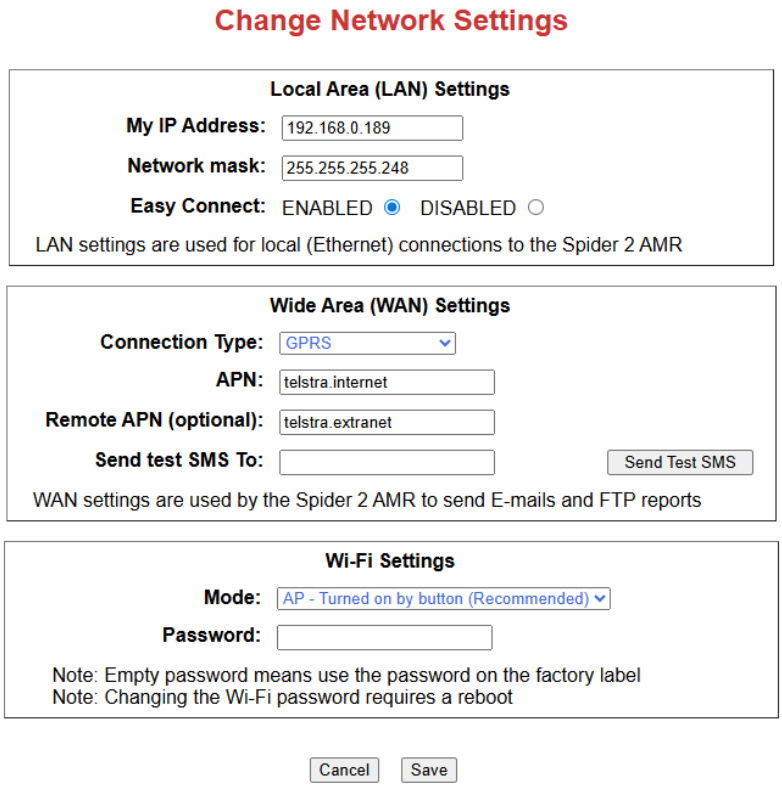
Setting	Use
Enabled	Use for direct PC connection — factory default
Disabled	Use where the Spider is connected to a LAN

Easy Connect allows direct PC connection without manually matching IP addresses. Disable it once the Spider is integrated into a network.

LAN settings

Field	Description
IP address	The Spider's IP address on the local network. Also shown on the front panel display.
Network mask	Subnet mask for the local network.
Gateway	IP address of the router providing internet access. Required for email/FTP via LAN.
Primary DNS	IP address of the primary DNS server. Required for email/FTP via LAN.
Secondary DNS	IP address of the secondary DNS server. Used if the primary does not respond.

Obtain IP address, gateway, and DNS values from your network administrator.



> **Note:** IP address and mask can also be changed via the front panel — see Appendix A. New values take effect after a power cycle.

Connecting the Spider 2 AMR to a LAN

To integrate the Spider into a local area network:

1. Disable **Easy Connect** (see above).
2. Set the **IP address** to a unique address on the network — obtain from your network administrator.
3. Set the **Network mask** — obtain from your network administrator.
4. Set the **Gateway** — obtain from your network administrator.
5. Click **Save** and exit Change Setup.
6. Reconnect the LAN cable. The unit will reboot if required to apply the new settings — a warning is displayed on the web page before the reboot occurs.

WAN settings (4G LTE)

The Spider 2 AMR uses 4G LTE as the primary WAN connection for sending emails and FTP reports.

The key setting is the **Access Point Name (APN)**, provided by the SIM card supplier. Common Australian carrier APNs are listed below — verify with your carrier before commissioning, as these may change.

Carrier	APN
Telstra	`telstra.internet`
Optus	`yesinternet`
Vodafone	`vfinternet.au`

> **Note:** Halytech accepts no responsibility for the accuracy of carrier APN settings. Always confirm with your carrier.

WiFi settings

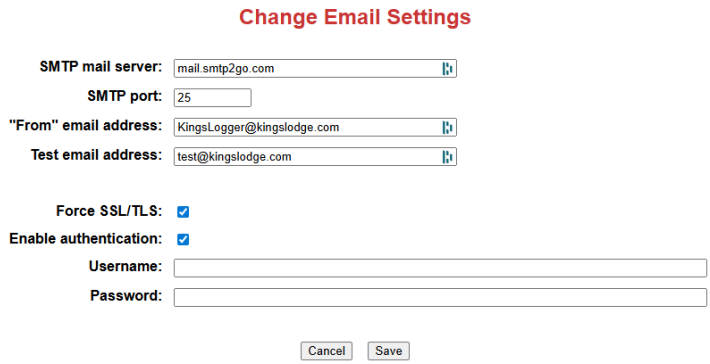
The Spider 2 AMR operates as a WiFi hotspot (access point). It creates its own wireless network — no router or existing WiFi infrastructure is required. WiFi must be manually activated using the front panel button each session (see Appendix A).

The network name (the name that appears in your device's list of available networks) is in the format `[IP address]_Spider2_[serial number]`, for example `192.168.10.1_Spider2_2403002`. The IP address to use in your browser is shown at the start of this name. The factory-set password is printed on the label on top of the unit.

5.12 Email Configuration

In Change Setup, click **Change E-mail Settings**.

Field	Description
SMTP mail server	Address of the email relay server. Can be a hostname or dotted IP address.
My email address	The "From" address used in all outgoing emails. Must be valid and acceptable to your mail host. Delivery failure notices are returned to this address.
Test email address	Address used when sending a test email.
SMTP authentication	Leave **Disabled** unless your mail server requires authentication. If required, select **Enabled** and enter the username and password provided by your network administrator.



Obtaining SMTP settings

Most organisations obtain SMTP settings from their IT department or email provider.

For sites without IT support, a dedicated SMTP relay service such as SMTP2GO provides a reliable and straightforward option. These services typically provide a server address, username, and password that can be entered directly into the fields above.

> **Note:** Carrier-provided SMTP servers (e.g. Telstra, Optus, Vodafone) are generally no longer supported for third-party use. Do not rely on carrier SMTP servers — use your organisation's mail server or a dedicated relay service.

Testing email:

After configuring email settings, send a test email:

1. Exit Change Setup.
2. Press the front panel button until the **Send test email?** screen is displayed.
3. Hold the button for more than 3 seconds. The display will show **Email sent OK!** on success, or **Email failed!** if the email could not be sent.
4. If the test fails, re-enter Change Setup and check your network and email settings.

5.13 Saving and Loading Settings

Settings can be saved to a file on your computer as a backup, or to use as a template for other units.

- **Save:** In Change Setup, click **Save Settings to Disk**.
- **Load:** In Change Setup, click **Load Settings from Disk**, then browse to the settings file.

> **Warning:** Loading settings from disk overwrites all current settings.

5.14 Exiting Change Setup

Click **EXIT CHANGE SETUP** at the bottom of the Change Setup page. Logging, alarm generation, and all enabled timers restart immediately.

> **Note:** Timer overrides active before entering Change Setup are not reinstated on exit.

---

6. Normal Operation

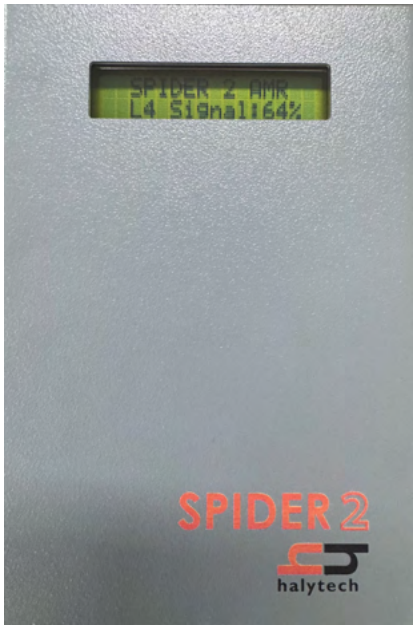
> **Audience: End user**

6.1 Front Panel Display

The Spider 2 AMR has a two-line display and a single button. Use these for quick status checks without needing a computer.

The default display shows cellular signal strength:

```
SPIDER 2 AMR
L4 Signal:64%
OR
SPIDER 2 AMR
S4 Signal:64%
```



A value of 41% or above is generally acceptable. `??` or `—` indicates no mobile coverage, no valid SIM, or the cellular module is not responding — check that the antenna is connected.

An `L` in the lower left corner indicates the unit is polling wireless transmitters.

Press the button briefly to cycle through display screens:

Screen	Shows
1	Date and time
2	Current input readings (e.g. meter values, switch states)
3	Battery charger status and battery voltage
4	System temperature
5	Alarm states 1–4 (A = active with code, I = inactive, D = disabled)
6	Alarm states 5–8
7	Alarm states 9–12
8	Alarm states 13–16
9	Control states CN1–CN4 (1 = active, 0 = inactive)
10	Control states CN5–CN8
11	LAN IP address and subnet mask
12	Easy Connect status
13	Send test email (hold button to trigger — see section 5.12)

Manual wireless refresh from the front panel: Press and hold the button for approximately 5 seconds from the signal strength screen to trigger a manual poll of all wireless transmitters.

6.2 Connecting via Web Browser

Connect to the Spider 2 AMR using any standard web browser. No special software is required.

Three connection methods are available:

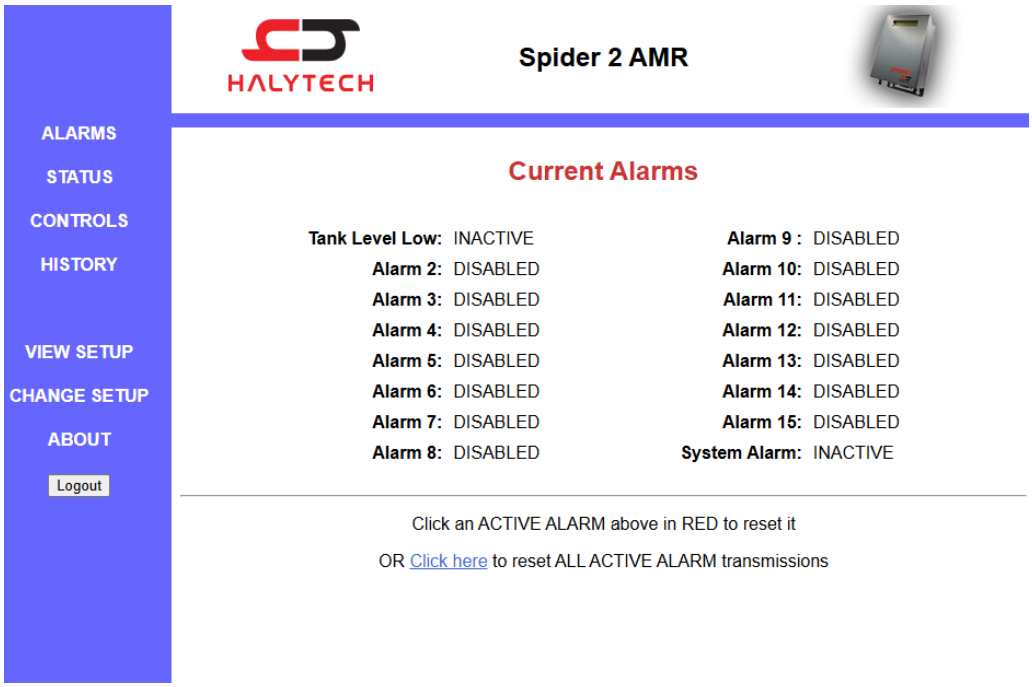
Method	When to use
Direct cable	Initial setup or troubleshooting — no network required
WiFi	Local wireless access — connect to the Spider's built-in WiFi hotspot (no router needed)
Remote (internet)	Access via 4G LTE from anywhere

See Appendix A for connection procedures.

After login, the Alarms page is displayed automatically.

6.3 Alarms Page

The Alarms page shows the current state of all alarms, identified by their programmed names. The page refreshes every 10 seconds.



Active alarms show a numerical status code:

Code	Meaning
1	Sending SMS to first phone number
2	Sending SMS to second phone number
3	Sending SMS to third phone number
4	Maximum SMS attempts reached — waiting for reset
RST	Acknowledged but trigger still active — waiting for trigger to go inactive

To acknowledge alarms:

- Click an individual alarm to acknowledge it
- Click **Acknowledge All** to acknowledge all active alarms at once

SMS alarm message format

When an alarm triggers, the SMS sent to each phone number has the following format:

```
Location: SMS text (Send 'RST ALx' to reset)
```

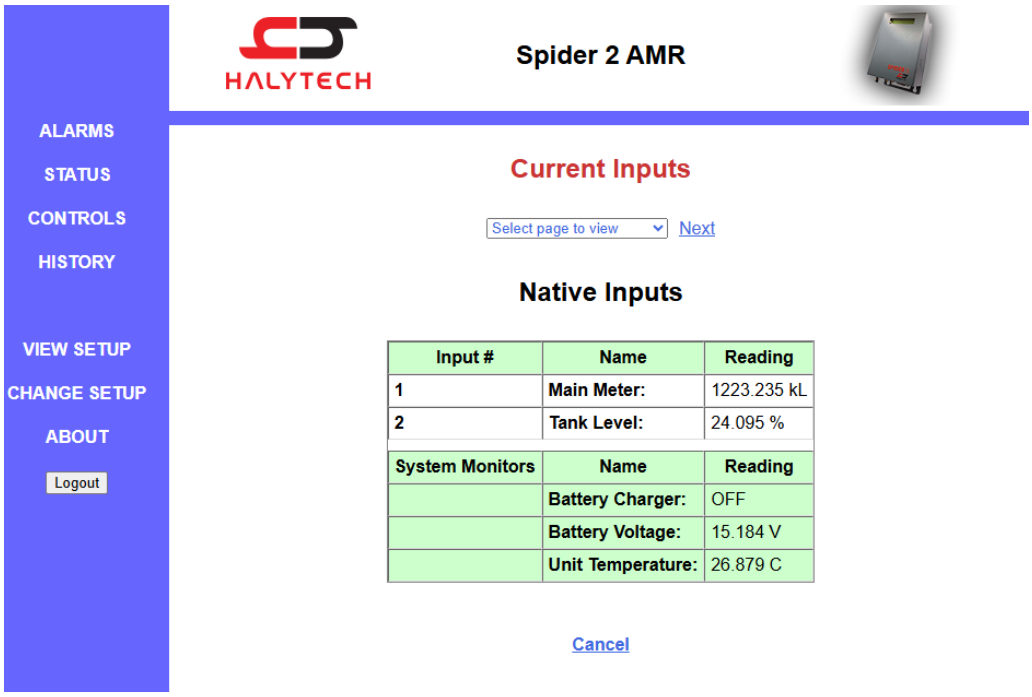
Where `Location` is the programmed unit name, `SMS text` is the alarm message, and `x` is the alarm number (1–16).

Example: `Mudgee STP: Pump 1 has failed (Send 'RST AL1' to reset)`

To reset the alarm, reply with the received message (no re-typing required), or send `RST AL1` directly.

6.4 Inputs Page

Click **INPUTS** in the menu to view current native input readings. All inputs are shown by their programmed names. The page refreshes every 10 seconds.



System Monitors

Three built-in system monitors are always present and available alongside native inputs:

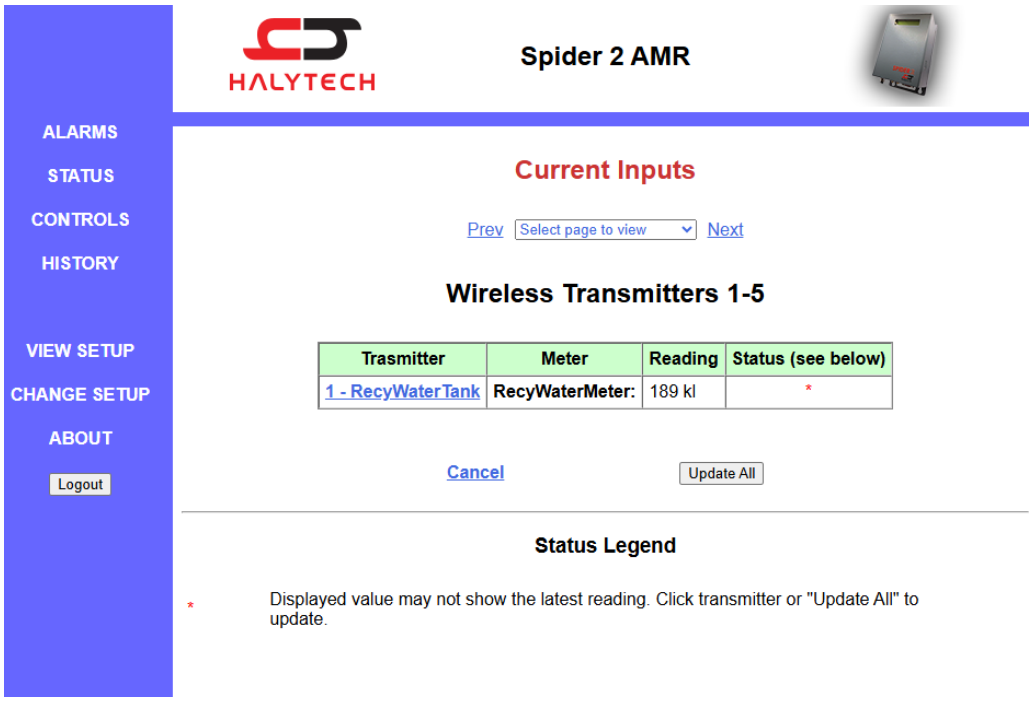
Monitor	Description
Battery voltage	Voltage of the external battery connected to the Battery connector
Battery charger status	Current charger state: ON or OFF
System temperature	Temperature inside the Spider 2 AMR enclosure

System monitors can be logged and used to trigger alarms in the same way as native inputs. Use the `GET SYS` SMS command to retrieve the current state of all system monitors remotely.

6.5 Wireless Inputs Page

> **Applies to:** HAM-051

Click **WIRELESS** to view the most recently available wireless input readings. Use the menu at the top to select which transmitter to view.



Status indicators displayed next to each reading:

Indicator	Meaning
*	Reading not yet updated since wake-up (not an error)
T	Tamper detection tripped
B	Transmitter internal battery is low
?	Last communication with the transmitter failed

Wireless inputs are not refreshed automatically (to preserve transmitter battery life).

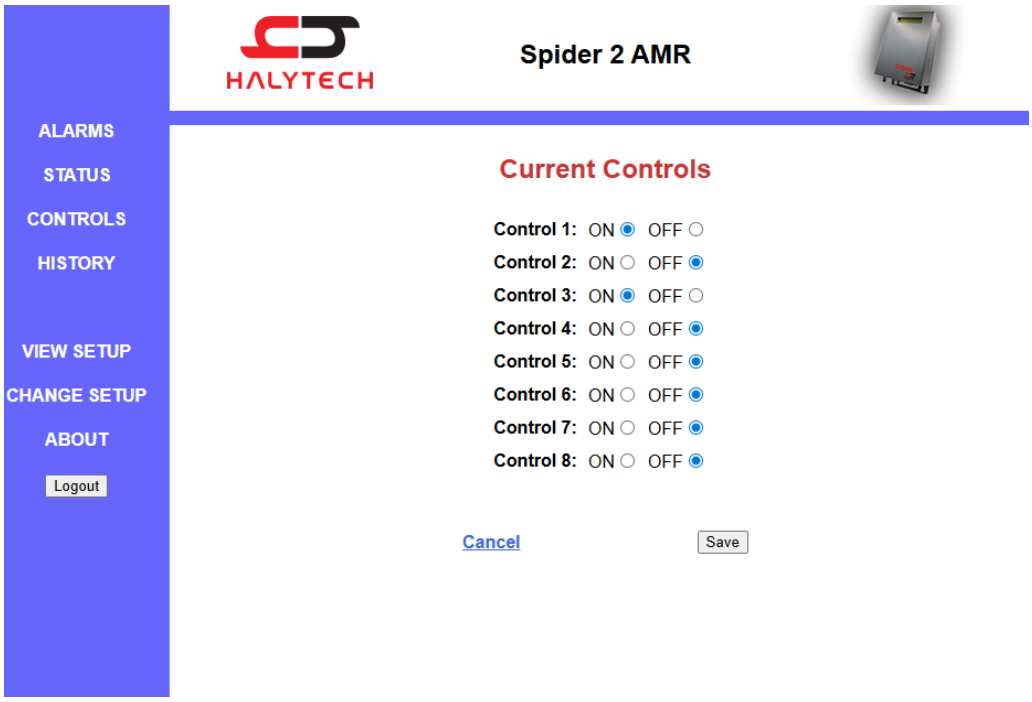
To manually refresh: click **Update Display**. The Spider will poll all transmitters — this may take several minutes. Clicking Update Display also resets tamper status.

Wireless Diagnostics: To check signal strength or diagnose communication problems, access **CHANGE SETUP** and select from the **Wireless Sensor Diagnostics** menu. Available queries:

1. **Detect Rx Unit** — confirms the wireless receiver is connected and working
2. **Raw count and battery status** — confirms connectivity with a specific transmitter
3. **Signal strength** — measures communication quality between the Spider, any repeaters, and a transmitter (check each hop separately when repeaters are in use)

6.6 Controls Page

Click **CONTROLS** to view and change relay output states. Select ON or OFF for each output as required, then click **Save**.



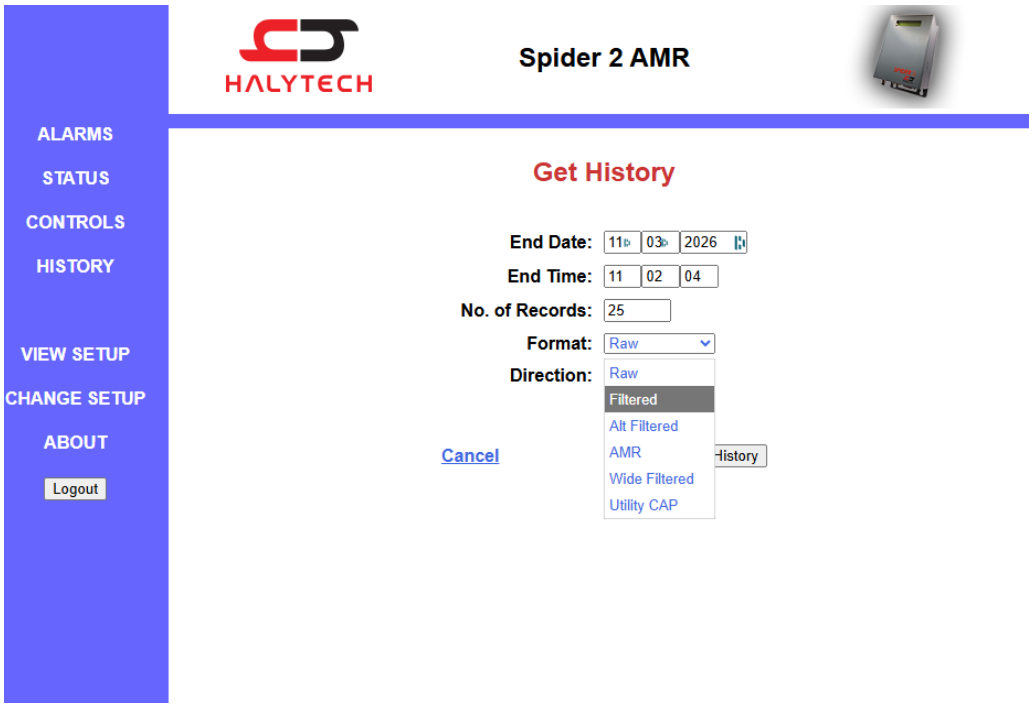
6.7 History (Logged Data)

The Spider 2 AMR logs the following event types:

Event type	Notes
Input changes	Switch inputs logged automatically on state change
System monitor changes	Battery voltage, charger status, temperature
Control changes	Relay output activations and deactivations
Alarm activations and resets	Including alarm acknowledgements
SMS transmissions	Command and outcome for each attempt
SMS command reception	All received commands
Email transmissions	Command and outcome for each attempt
System messages	Power-up, configuration changes, and other system events

All records are date/time stamped to 1-second resolution.

Click **HISTORY** to download logged data as a CSV file, compatible with spreadsheet programs.



Specify the date, time, and maximum number of records to download. Data is downloaded in reverse chronological order (most recent first).

> **Note:** If the logging period is less than 1 hour and wireless inputs are in use, the downloaded file may be missing up to 1 hour of wireless input data. Automatic reports are always sent after the latest data is received and are therefore complete.

6.8 Automatic Reports

Spider 2 AMR can send automatic reports by email and/or FTP without user intervention. Three report types are available:

Type	Schedule	Contents
Daily	Once per day at a user-set time	All data from the previous 24 hours
Periodic	Every 1, 3, 6, or 12 hours, aligned to real time	Data from the previous reporting period
Ad-hoc	On demand via SMS (`RESEND REP`) or triggered by an alarm	Current day's data (or up to 7 days past)

Reports are available in the following formats:

- **Raw** — full logged data including system events, SMS outcomes, and alarm activity
- **Filtered** — input data only
- **Alt Filtered** — input data only uses Channel ID rather that Channel Name
- **AMR** — input data reported in customer format
- **Wide Filtered** — input data reported with both Channel name and ID fields

- **Utility CAP** — input data reported in custom format

Daily reports include recovery: if a report fails to send, the next day's report includes the previous day's data (up to 7 days).

Reports are sent to up to 3 email recipients or an FTP server. Up to 3 send attempts are made per report.

Reports can also be ordered in ascending or descending time order — select the preferred option when configuring report settings.

Report file naming

Report type	Filename format
Daily	`Location_DDMMYY.csv`
Periodic	`Location_DDMMYY_HHMMp.csv`
Ad-hoc (current day)	`Location_DDMMYY_HHMM.csv`
Ad-hoc (*n* days ago)	`Location_DDMMYY_2359.csv`

Where `Location` is the first 8 characters of the unit's location name (spaces replaced with `-`).

To configure: In Change Setup, click **Change Daily Report Settings**.

6.9 SMS Commands

Spider 2 AMR recognises the following SMS commands:

Command	Action
`HELP`	Returns list of supported commands
`GET ST`	Current reading of all native inputs (e.g. meter values, switch states) — does not include wireless channels
`GET SYS`	Current state of system monitors
`GET CN`	Current state of all controls
`RST AL` *x*	Reset alarm *x* (1–16)
`RST ALL`	Reset all active alarms
`ON CN` *x*	Activate control *x* (no PIN)
`yyyy ON CN` *x*	Activate control *x* (PIN = yyyy)
`OFF CN` *x*	Deactivate control *x*
`yyyy OFF CN` *x*	Deactivate control *x* (PIN = yyyy)
`PULSE CN` *x*	Pulse control *x* for 1 second
`yyyy PULSE CN` *x*	Pulse control *x* for 1 second (PIN = yyyy)
`GET REP`	Request current day's data report *(legacy command)*
`GET REP` *n*	Request data report for *n* days ago (1–7) — no space before *n* (e.g. `GET REP3`) *(legacy command)*
`RESEND REP`	Request data report — current command [CONFIRM WITH DM: full syntax]
`GPRS n,email@address.com`	Go online for *n* minutes; sends current public IP address to the specified email address and by SMS reply. No PIN required by default. If a PIN is set: `yyyy GPRS n,email@address.com`. Whitespace is significant — one space after `GPRS`, no space around the comma. If the command is malformed, the IP is sent to the last used email address.

Commands are not case-sensitive. Use a single space between words. Commands received during remote access are queued and processed after the session ends.

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

6.10 Power Management

Always-on mode (recommended for Spider 2 AMR): The unit remains continuously awake. This is the recommended setting for Spider 2 AMR installations, which are mains-powered and require reliable LAN access and consistent wireless polling.

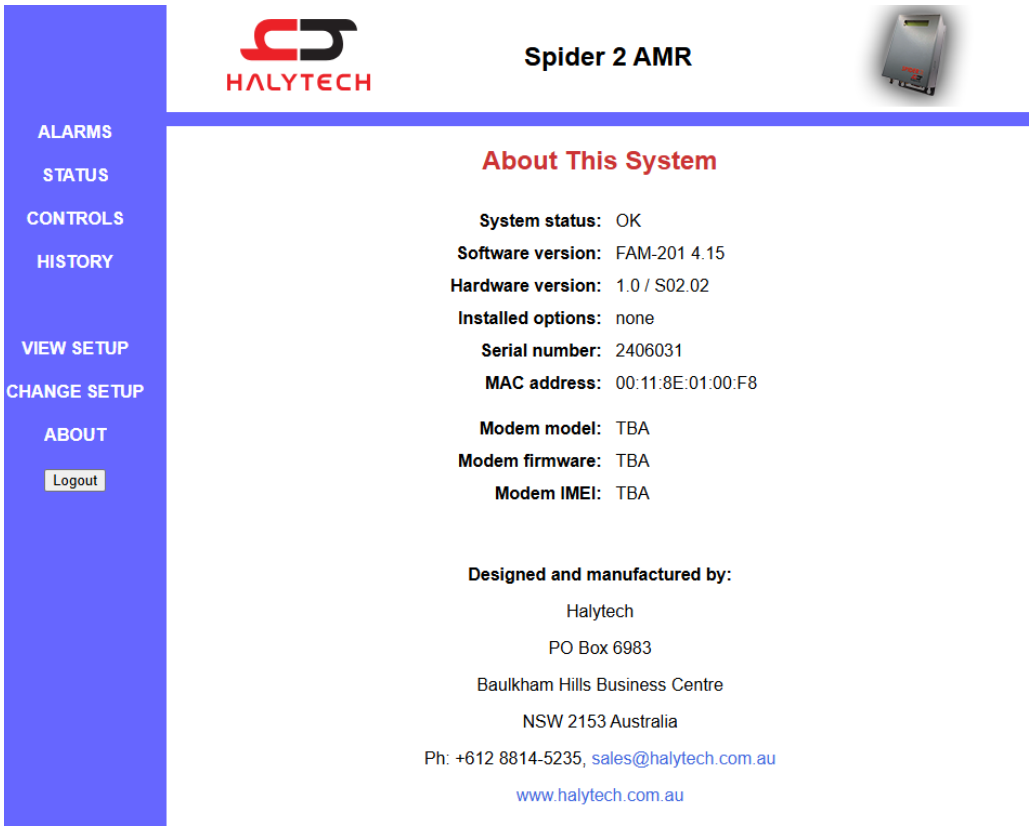
Low Power mode: The unit sleeps when not actively scanning, logging, or communicating. Not recommended for Spider 2 AMR — the LAN port is unavailable during sleep, which can disrupt wireless transmitter polling and remote access.

To change: In Change Setup, click **Change Power Settings** and select the required mode.

Modem scheduling: The internal modem can be scheduled to power down during set hours to further reduce power consumption. During scheduled off periods, alarm SMS and email still operate normally — only remote access is unavailable.

6.11 About Page

Click **ABOUT** in the menu to view system information including the current software version and Halytech contact details.



7. Maintenance

7.1 Battery Maintenance

The Spider 2 AMR is supplied with a 12V 7.2Ah sealed lead acid (SLA) battery pre-installed inside the enclosure.

Checking battery condition

Battery voltage is available from the front panel display (screen 3) and the web interface system monitors. Use these readings to assess battery health:

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

A resting voltage is measured when neither charging nor under significant load. Check at dawn before solar charging begins, or after disconnecting the charger for 30 minutes.

Battery replacement

SLA batteries typically last 2–5 years depending on temperature, depth of discharge, and charge cycling. 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)

When replacing:

1. Open the enclosure and disconnect the mains supply (or solar panel) from the power supply first, then disconnect the battery.
2. Use a 12V SLA battery that fits within the enclosure. The standard replacement is a 12V 7.2Ah SLA. Replacement batteries are available from Halytech.
3. Reconnect battery first, then restore mains (or solar) supply.
4. Observe correct polarity — incorrect connection may damage the unit.

Charger and solar panel inspection

Inspect annually:

- Check all wiring connections for corrosion or loose terminals
- Clean solar panels and ensure they are free from shading and debris

7.2 Firmware Updates

Spider 2 AMR software can be updated both locally and remotely. Detailed update instructions are provided with each release.

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8. Specifications

8.1 Hardware Specifications

Spec	Value
Charger input	16–30V DC, minimum 1A
Battery	12V SLA, up to 10Ah
Native inputs	8 (INPUT1–INPUT8)
Relay outputs	8 (CN1–CN8), 30V / 1A, latching relay
Connectivity	4G LTE, Ethernet, WiFi
AUX1	RS-485 with switched power output (up to 500mA)
AUX2	RS-232 (wireless receiver connection)

8.2 Wireless Specifications

Spec	Value
Max transmitters	100
Max wireless inputs	400 (up to 4 inputs per transmitter)
Range — base station to transmitter (LoS / high-rise)	Up to 450 m / 4 floors
Range — base station to/from high-gain repeater, or between high-gain repeaters (LoS / high-rise)	Up to 600 m / 5 floors
Range — between standard repeaters or standard repeater to transmitter (LoS / high-rise)	~300 m / 3 floors
Repeaters	Up to 3
Recommended minimum signal at install	50%

8.3 Physical Specifications

Spec	Value
Enclosure	Halytech AMR enclosure
Dimensions	400mm (H) × 300mm (W) × 150mm (D)
IP rating	IP66 (IEC 60529)
Impact rating	IK10 (IEC 62262)
Material	Steel, epoxy-polyester powder coat
Suitability	Indoor and outdoor
Weight	10–15 kg approx. (includes battery and PSU)

9. Appendices

Appendix A — Connecting to a Spider 2 AMR

Local Connection (direct PC connection)

1. Connect the Spider 2 AMR to your PC using an Ethernet cable (crossover or straight-through — either works).
2. Ensure the Spider is powered on (display must be active).
3. Open a web browser and navigate to `192.168.0.189`.
4. Enter your username and password. Default: username `user`, password `changeme`.
5. The Alarms page is displayed after a successful login.

> **Tip:** Easy Connect must be enabled on the Spider (factory default). Check by pressing the front panel button until the Easy Connect screen is shown.

If you cannot connect:

- Ensure your PC is set to obtain an IP address automatically (DHCP)
- Disable proxy servers in your browser settings
- Disable automatic dial-up in your browser settings

Connecting to an Existing LAN

Obtain a static IP address and subnet mask from your network administrator.

To change the Spider's IP address using the front panel:

1. Press the button until the display shows the current IP address and mask.
2. Press and hold the button for 3 seconds to enter IP change mode.
3. Press and hold again to edit — brief press increments the current digit, long press moves to the next digit.
4. After the last digit, navigate to **Save?** and long-press to save.
5. Power cycle the Spider for the new address to take effect.
6. Disable Easy Connect in Network Settings via the web interface.

Connecting via WiFi

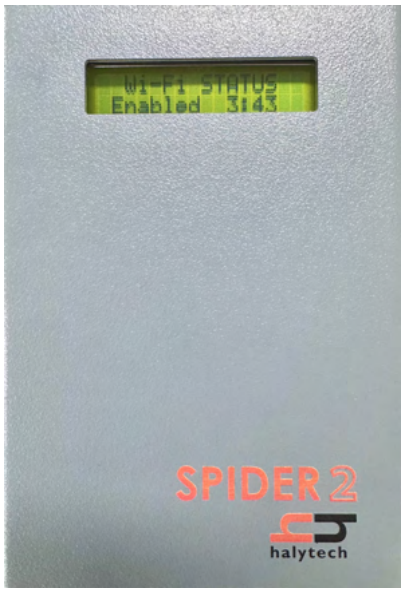
The Spider 2 AMR creates its own WiFi network — no router or existing network is required. WiFi must be activated manually each session using the front panel button.

Activating WiFi:

1. Press and hold the front panel button for 5 seconds until the LCD backlighting turns on.
2. Press the button briefly to cycle through the display screens until the WiFi screen appears:

```
Wi-Fi STATUS
Enabled 4:05
```

   The countdown shows how long WiFi will remain active.



Connecting your device:

3. On your device (phone, tablet, or laptop), open WiFi settings. Look for a network name in the format `192.168.10.1_Spider2_[serial number]`.
4. Connect using the password on the label on top of the unit.
5. Open a web browser and navigate to `192.168.10.1`.
6. Log in with your username and password.

Remote Connection

The Spider 2 AMR supports remote access over 4G LTE.

> **Prerequisite:** Remote access requires a public IP address on the SIM card. Most SIM cards do not include a public IP address by default — this must be requested from the SIM provider. Not all carriers offer this service. Confirm with your SIM provider before attempting remote access.

Most SIM cards with a public IP address are assigned a dynamic (changing) address, so an SMS command is used to request the current IP address before connecting.

Connecting remotely (dynamic IP):

1. Send the following SMS to the Spider's SIM number:

   ```
   GPRS 5,youraddress@example.com
   ```

   Replace `5` with the number of minutes you need to stay connected. Replace the email address with your own.

   > **Important:** Whitespace is significant — use exactly one space between `GPRS` and the number, and no space before or after the comma. If the command is malformed, the IP address is sent to the last used email address instead.

   If a PIN has been set on the unit, prefix the command with the PIN:

   ```
   yyyy GPRS 5,youraddress@example.com
   ```

2. The Spider will go online and send its current public IP address to the specified email address and by SMS reply.
3. Open a browser and navigate to the IP address received. You must connect within the time window you specified.
4. Log in with your username and password.

> **Note:** Keep the online duration to the minimum needed. While the Spider is in this mode, other users cannot connect remotely.

Static IP address

Static public IP addresses are not recommended for most installations. Contact your SIM provider if a static IP is required.

VPN

If your network uses a VPN, both dynamic and static IP addressing are supported. Contact your network administrator for connection details.

Appendix B — Modbus Register Map

> **Applies to:** Modbus Server option only

Spider 2 AMR supports Modbus over TCP/IP (port 502). The Spider acts as a Modbus slave. Only one connection is supported at a time. Approximately 10 requests per second can be handled.

For LAN access, the Spider must be in Always-on mode (see section 6.10).

Supported Function Codes

Function code	Use
01: Read Coils	Read on/off state of relay outputs
02: Read Discrete Inputs	Read on/off state of inputs (ignores input configuration)
03: Read Holding Registers	Read status information for inputs and alarms
04: Read Input Registers	Read current input values
05: Write Single Coil	Set relay output state (same priority as web interface)
43/14: MEI Read Device ID	Returns product name and software version

Control Outputs (Function 01 / Function 05)

Address 0–7 corresponds to CN1–CN8. Value `1` = closed (active).

Example: Control 3 → register address 2 (point address 000003)

Input Readings (Function 04: Read Input Registers)

Analogue values are returned as IEEE754 32-bit floating point. Counter and Utility values are returned as 32-bit integers (displayed value × 1000). Two consecutive 16-bit registers are used per input — reads must start on an even address and end on an odd address.

Disabled or invalid inputs return `-qNaN` (all bits set to 1).

Input	Register address (first of pair)
Native input *X* (1–8)	(*X* × 2) − 2
Charger status	16
Battery voltage	18
Unit temperature	20
Wireless input: transmitter *X*, channel *Y*	8182 + (*X* × 8) + (*Y* × 2)

Examples:

- Native input 3 → registers 4–5 (point address 300005)
- Wireless input: transmitter 5, channel 2 → registers 8224–8225 (point address 308225)

Input Status (Function 03: Read Holding Registers)

Input	Register address	Data
Native input *X* (1–8)	*X* − 1	Low byte = Type Code
Alarm *X* (1–8)	*X* + 127	Bits 3–0 = SMS status; Bits 11–8 = Email status; Bit 15 = Trigger active
Wireless input: module *X*, channel *Y*	4091 + (*X* × 4) + *Y*	Low byte = Type Code; Bit 8 = Comm error; Bit 9 = Low battery; Bit 10 = Tamper
Any wireless input (combined)	8191	Bit 8 = Any comm error; Bit 9 = Any low battery; Bit 10 = Any tamper

Type codes:

Code	Input type
0	Disabled
1	Switch (digital)
2	Counter
3	Analogue
7	Utility Meter
8	Wireless Counter
9	Wireless Utility Meter

> **Note:** A value greater than 511 in register 8191 indicates a fault with at least one wireless input. Check this register periodically.

Appendix C — Regulatory and Compliance Notes

Gas meter installations: Gas meter installations may require approval or the use of hazardous area isolation barriers.

Appendix D — Logged Data Format

Spider 2 AMR logs data internally in an efficient binary format. Before each download, the internal binary format is converted into a standard CSV (comma-separated values) file readable by most spreadsheet and database programs.

Each record in the CSV file consists of four fields:

1. Record date — e.g. `14/05/03`
2. Record time — e.g. `12:34:15`
3. Record numeric identifier
4. Record text description, or for analogue and counter inputs, the value of the input

The table below lists all possible values for the numeric identifier and text fields.

Numeric Identifier	Range	Text	Comment
32768	32768	`New File`	New log file created
32769	32769	`NORML ST`	Normal program start
0 + IN#	0–10	Numeric value of analogue / system input	Analogue / system input log record
20 + IN#	20–27	Numeric value of counter input	Counter input log record
50 + 2×IN# + STATE	50–65	`STx=y`	Digital input change
80 + IN#	80–87	Numeric value of event counter at time of event	Event input log record + event counter
100 + 2×CNT# + STATE	100–115	`CNx=y`	Control change
140 + IN#	140–147	Numeric value of event counter at midnight	Event input midnight check (no event occurred)
160 + IN#	160–167	Numeric value of daily rain total at time of event	Daily rain event log record
180 + IN#	180–187	Numeric value of daily rain total at midnight	Daily rain midnight check (no event occurred)
200 + AL#	200–207	`Alarm x`	Alarm activation
280 + AL#	280–287	`Almx RST`	Alarm reset
300 + 10×AL# + SEQ	300–379	`SMSxy OK`	SMS alarm transmission OK
500 + 10×AL# + SEQ	500–579	`SMSxy NG`	SMS alarm transmission failed
700 + AL#	700–707	`SMS ALxK`	SMS command — acknowledge an alarm
718	718	`SMS ALLK`	SMS command — acknowledge all active alarms
719	719	`SMS AL?K`	SMS command — acknowledge an invalid alarm number
720 + 2×CNT# + STATE	720–735	`SMS CxOF` or `SMS CxON`	SMS command — (de)activate a control

Numeric Identifier	Range	Text	Comment
758	758	`SMS BPIN`	SMS command — invalid PIN
759	759	`SMS C?OF` or `SMS C?ON`	SMS command — invalid control number
760	760	`SMS GTST`	SMS command — get inputs
761	761	`SMS GTCN`	SMS command — get controls
762	762	`SMS HELP`	SMS command — get help
763	763	`SMS GTSY`	SMS command — get system inputs
764	764	`SMS GTRP`	SMS command — get daily report
797	797	`SMS ROK`	SMS command acknowledgement sent OK
798	798	`SMS RNG`	SMS command acknowledgement send failed
799	799	`SMS ????`	Unknown SMS command
800 + 2×CNT# + STATE	800–815	`RMG CxOF`, `RMG CxON`, or `RMG CxPL`	Remote SMS command — (de)activate a control
820 + 2×CNT# + STATE	820–835	`RMB CxOF`, `RMB CxON`, or `RMG CxPL`	Remote SMS command — (de)activate a control outside allowable time
860 + CNT#	860–867	`SMS CxPS`	SMS command — pulse a control
900 + IN#	900–907	Numeric value of utility meter input	Utility meter input log record
1000 + 10×AL# + TRY	1000–1073	`EMLxz OK`	Email sent OK
1200 + 10×AL# + TRY	1200–1273	`EMLxz NG`	Email sending failed
1300 + TRY	1300–1302	`EMREP OK`	Automatic email report sending successful
1310 + TRY	1310–1312	`EMREP NG`	Automatic email report sending failed
1320 + TRY	1320–1322	`FREP OK`	Automatic FTP report sending successful
1330 + TRY	1330–1332	`FREP NG`	Automatic FTP report sending failed

Numeric Identifier	Range	Text	Comment
2000 + 10×TR# + IN#	2000–2993	Numeric value of wireless counter input	Wireless counter input log record. e.g. second input on transmitter 35 = 2341
3000 + 10×TR# + IN#	3000–3993	Numeric value of wireless utility meter input	Wireless utility meter input log record. e.g. third input on transmitter 17 = 3162
5000 + 10×TR# + IN#	5000–5993	Numeric value of wireless analogue input	Wireless analogue log record
4000 + TR#	4000–4099	`aaaab cccc`	Wireless transmitter communication status. Not all messages indicate an error — see wireless status codes below

Wireless Status Codes

Text	Meaning
`WINFO TIME`	Normal operation — Spider 2 AMR synchronises with all transmitters weekly
`WWARN TIME`	Normal operation — Spider 2 AMR had to synchronise this transmitter earlier than normal due to clock drift
`WWARN INIT`	Normal operation if it only occurs once per transmitter after a configuration change — Spider 2 AMR had to initialise this transmitter
`WERR1 cccc`	Non-serious error. May indicate a problem if occurring regularly. See error type codes below
`WERR0 cccc`	Error occurring twice in a row. Spider 2 AMR may still recover without data loss. See error type codes below
`WERR0 RX`	Fault with the wireless receiver or its cable
`WERR0 TX`	Fault or signal loss with the endpoint transmitter (on the meter)
`WERR0 REPd`	Fault or signal loss with repeater #d. Note: in some circumstances the fault may be the next transmitter in the chain
`WERR0 CFG`, `WERR0 COM`, `WERR0 FRM`, `WERR0 TOUT`	Unlikely errors — contact Halytech if occurring regularly

Field Definitions

Symbol	Definition
IN#	Input number: 0–7 = user inputs; 8 = battery charger status; 9 = battery voltage (V); 10 = system temperature (°C)
TR#	Wireless transmitter module number minus one (0–99)
STATE	Digital input state: 0 = OFF, 1 = ON
CNT#	Control number (0–7)
AL#	Alarm number (0–7)
x	Alarm number (1–8) — equals AL# + 1
SEQ	Alarm sequence step (0–10)
y	Alarm sequence number (1–9) — equals SEQ + 1
TRY	Email sending attempt (0–2)
z	Email sending attempt (1–3) — equals TRY + 1
aaaa	Wireless error severity
b	Wireless error retries remaining
cccc	Wireless error type code
d	Wireless error repeater number

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