



Spider 2 AMR

User Manual

Models HAM-050, HAM-051

Date September 2026

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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. You set up and use the system with any standard web browser. No special software is needed. You can connect locally by direct cable or WiFi, or remotely over the internet.



Typical applications:

- Utility billing per tenancy or cost centre — water, electricity and gas
- Water efficiency monitoring
- NABERS Water and Energy ratings support
- Large building and campus metering
- Wired and smart meter integration, including Modbus energy meters
- BMS and facilities integration
- Water audit and sub-metering
- Waste management and remote monitoring

Typical sites: shopping centres, retail precincts, high-rise apartment buildings, high-rise commercial buildings, education campuses, factories, industrial sites, airports, hospitals and golf courses. The system suits new buildings, existing premises and new fit-outs.

For gas meters, see the warning in section 5.3.

1.2 Package Contents

The Spider 2 AMR base station package includes everything required for a standard base station 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
Mobile whip antenna (main)	4G 5dB, 5m cable, SMA — mount externally for best signal
Mobile 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: a mains power point (GPO) within reach of the power supply lead, or a solar panel if there is no mains supply. The installer also provides the SIM card and the 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.

All variants support wired Modbus inputs (RIMs via RS-485). An optional Modbus Server add-on is available on both HAM-050 and HAM-051. It gives a Modbus TCP/IP server over LAN for BMS, SCADA, PLC and similar systems.

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

1.4 Accessories

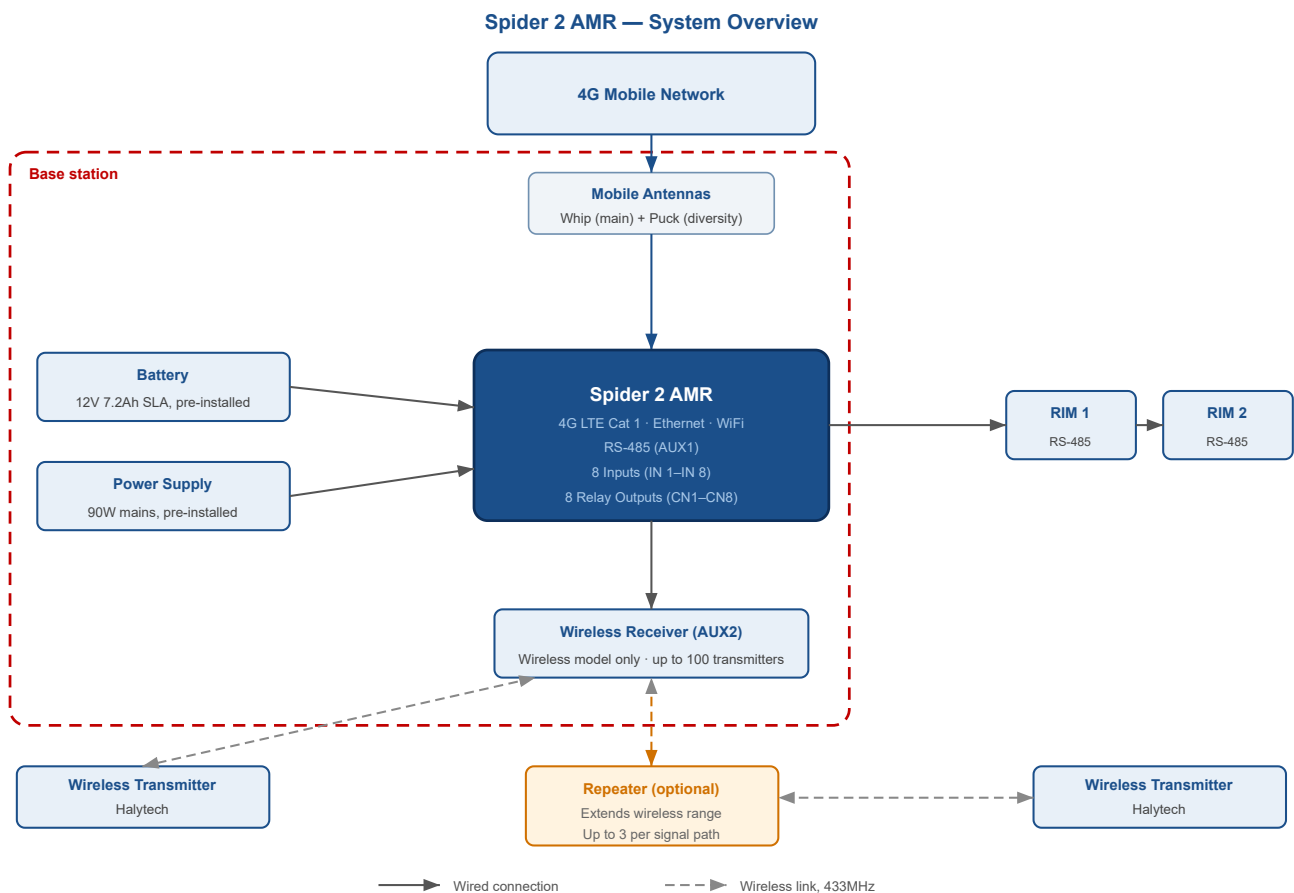
Wired and wireless devices that extend the system:

Component	Item code	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
RIM Power Supply	HRM-005	90W mains power supply for a RIM, with wall bracket. One per RIM
3rd Party Modbus devices		Any device with RS-485 Modbus out or Ethernet Modbus output

2. System Overview

Audience: Installer

The diagram shows how a Spider 2 AMR system fits together. The red dashed boundary marks the base station. Everything inside the boundary arrives pre-installed in the enclosure. Everything outside it is a field device, a network, or a PC you connect to.



The Spider 2 AMR is the central base station for an automatic meter reading installation. It polls the connected devices on a regular schedule and collects consumption data from meters in the field.

Meters reach the base station in two ways. Wired meters connect through Remote Input Modules (RIMs) or other Modbus RS-485 devices, such as smart meters. These are daisy-chained on an RS-485 bus back to the base station. Wireless meters connect through battery-powered or mains-powered Halytech Wireless Transmitters, mounted at each meter. The transmitters talk to the wireless receiver built into the base station. One Spider 2 AMR can handle both wired and wireless devices at the same time.

The base station logs the collected data internally. It sends the data automatically on a schedule you set. It sends by email or FTP, over the mobile network or a local LAN connection. An optional Modbus Server variant also serves the collected data over LAN to a BMS, SCADA or PLC.

What each part does

Part	Where it sits	What it does
Spider 2 AMR logger	Base station	Polls devices, logs data, raises alarms, sends reports
Battery and charger	Base station	Keeps the unit running when mains power fails
Antennas	Base station	Main and diversity antennas for the 4G connection
Native inputs IN 1 to IN 8	Base station	Direct wired inputs on the logger terminals
Relay outputs CN1 to CN8	Base station	Switched outputs for control, 30V AC or DC / 1A
Wireless receiver (AUX2)	Base station, HAM-051 only	Receives from up to 100 wireless transmitters
RIM	Field	Reads pulse meters, connects on the RS-485 bus
Halytech Wireless Transmitter	Field	Reads a pulse meter, sends readings by 433MHz radio
Repeater	Field, optional	Extends wireless range, up to 3 in one signal path
LAN / PC	Site network	Local access to the web interface

3. Installation

Audience: Installer

3.1 Mounting

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

1. Fit the supplied wall brackets to the enclosure.
2. Ask a second person to hold the enclosure against the wall in the chosen position.
3. Mark the mounting points on the wall.
4. Fit the wall fixings at the marked points.
5. Mount the base station on the fixings.
6. Mount the antennas. See section 3.9.

If you mount the enclosure outdoors, check that the cable entries and the door seal are intact.

Position the unit to allow:

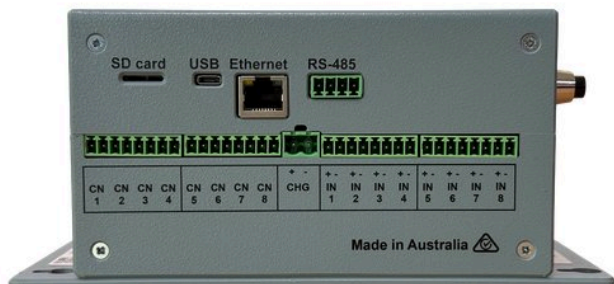
- Clear access to the door for commissioning and maintenance
- Cable entry from below where possible to reduce water ingress risk
- A clear external surface or mast nearby for the mobile whip antenna

3.2 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 power supply has a mains lead with a plug fitted. Section 3.10 tells you when to plug it into the mains power point (GPO).

If mains power is not available, disconnect the mains power supply and connect an external solar panel to the Charger connector. The Charger input needs 16–24V DC. The unit can draw up to 3A while the backup battery is flat, so size the panel and regulator for this.



Connector end



Switch and antenna end

Note: If the battery is larger than 10Ah, connect it to **Batt** only and leave **CHG** unconnected. Charge it with an external charger. Battery voltage monitoring and logging still work.

3.3 Native Inputs (IN 1 – IN 8)

Eight native inputs are provided on two multi-pole connectors, four inputs per connector. The case prints them **IN 1** to **IN 8**. Each input has two screw terminals. Use wire up to 1.5mm².

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 3 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 meter consumption. Typical use: water, electricity, and gas meters (up to 10Hz). Section 6.5 explains how it differs from Counter.
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):

Each current loop input needs a 120Ω 1% 0.6W metal film resistor. The connector kit has eight, one per input.

To wire a 2-wire sensor:

1. Connect the power supply positive to the sensor positive.
2. Connect the sensor negative to the input terminal (+).
3. Connect the power supply negative to system ground (–).

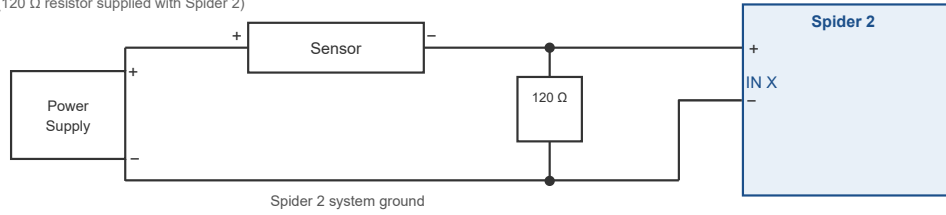
To wire a 4-wire sensor:

1. Connect the power supply to the sensor power pins.
2. Connect the sensor output positive to the input terminal (+).
3. Connect the sensor output negative to system ground (–).

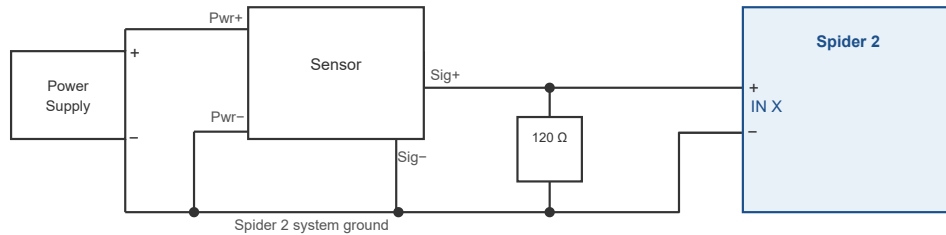
For both sensor types, fit the 120Ω resistor across the input terminals (+ and –).

Analogue Input Wiring — Current Loop

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



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



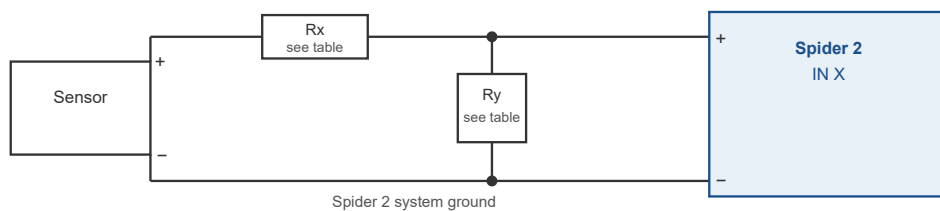
Analogue inputs — voltage (0–5V and 0–10V):

Inputs above 2.5V need voltage divider resistors. These are not supplied. The installer must get them.

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

Analogue Input Wiring — Voltage Input

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



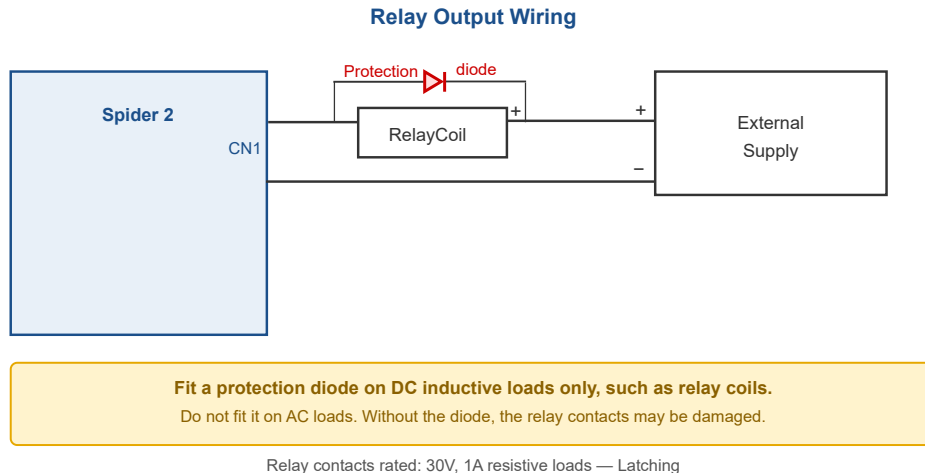
Sensor Range	Value of Rx	Value of Ry
0 – 2.5 V	None required	Leave out
0 – 5 V	1 k Ω ¼ W metal film	1 k Ω ¼ W metal film
0 – 10 V	3.3 k Ω ¼ W metal film	1 k Ω ¼ W metal film

Note: the 12V Output on RS-485 Pin 1 can power analogue sensors

Tip: To power analogue sensors from AUX1, see section 3.5.

3.4 Relay Outputs (CN1–CN8)

Eight relay outputs are provided on two multi-pole connectors (four per connector), labelled CN1 to CN8. Each output provides voltage-free latching relay contacts rated at 30V AC or DC / 1A, non-inductive. Low voltage and low current loads only.*



You can control the outputs:

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.

* Do not connect directly to mains loads, contactors, or motors. For **DC** inductive loads, such as relay coils, fit the supplied protection diode across the load. Protection diodes work on DC only. **Do not fit them on AC loads.**

Mount intermediate relays and other inductive coils next to the unit. Keep CN-to-coil leads short. Fit the diode at the coil.

3.5 AUX1 — RS-485 and 12V Output

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

Pin	Function
1 (left, nearest LAN)	12V Output
2	RS-485 D+
3	RS-485 D–
4	Ground

Caution: The 12V Output on Pin 1 is unprotected. A short to ground may damage the unit. Do not run Pin 1 in the RS-485 cable to the RIMs. Use it only for local sensor power.

The 12V Output characteristics:

- Voltage: the larger of battery voltage or charger voltage
- Maximum current: 500mA
- The output is not software controllable. It follows the CPU board.
- In low power mode the unit sleeps between logging times. The output is off while it sleeps.

If AUX1 is not used for Modbus, the 12V Output can power analogue sensors wired to native inputs.

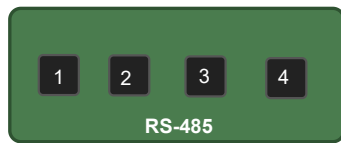
To wire a 2-wire 4–20mA sensor to Pin 1:

1. Connect Pin 1 to the sensor positive.
2. Connect the sensor negative to the input terminal (+).
3. Fit the 120Ω resistor across the input terminals (+ and –).

Powering a 4–20mA sensor from Pin 1:

- The unit is a 12V system.
- Size a 2-wire loop on the battery voltage, about 12V. Do not rely on the higher voltage while the battery charges.
- The 120Ω resistor takes 2.4V at 20mA. About 9.6V is left, so a 2-wire sensor on Pin 1 must work from 9V or less.
- If the sensor needs more than about 9V, use the 4-wire version of the sensor. If there is no 4-wire version, power the sensor from an external 24V supply.
- Add up every sensor and other load on Pin 1. Keep the total well under 500mA.

RS-485 Connector Pinout



1 — 12V Output ⚠

2 — RS-485 D+

3 — RS-485 D-

4 — Ground

⚠ Pin 1 is unprotected — do not route into an RS-485 cable run

3.6 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.

Antenna installation is described in section 3.9.



3.7 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 email, automatic reports, and NTP time sync
The data APN name	Entered in Change Setup, then Network. Get the name from the carrier
Public dynamic IP address	Required for remote browser access — contact your carrier to enable this on the SIM.

Before installing the SIM:

Most SIM cards are issued without a PIN. If your SIM has a PIN, remove it before installation. Put the SIM in a phone and remove the PIN in the phone's SIM security settings. The Spider 2 AMR cannot ask for a PIN. It does not connect if a PIN is active.

iPhone users: If you use an iPhone to remove the PIN, turn off iMessage before you insert the SIM. If iMessage is on when you insert the SIM, Apple registers that number with iMessage. Messages from other iPhone users may then go to the iPhone as iMessages. They do not arrive at the Spider 2 AMR as SMS. After you remove 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.

To test: send a text from an **iPhone** to the SIM number. A green bubble means the message went as SMS and will reach the Spider 2 AMR. A blue bubble means Apple still holds the number for iMessage, and SMS will not arrive. The sender must use an iPhone — an Android phone always sends SMS, so it always shows green.

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 the same direction as the LCD.
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.

3.8 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 6.11.

For connection procedures, see section 6.1.

3.9 Antenna Installation

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

Caution: Hand-tighten SMA antenna connectors only. Using tools to tighten SMA connectors may damage the connector and void the warranty.

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

Mobile whip antenna (main) — all models

Mount the whip antenna outside, on the supplied antenna bracket, for the best mobile signal.

1. Fix the antenna bracket to the wall or pole next to the enclosure.
2. Hold the whip antenna where you plan to mount it.
3. Read the signal strength on the LCD.
4. Move the antenna until the signal is 50% or better.
5. Mount the whip antenna on the bracket.

Note: Steps 2 to 4 need the unit powered and awake. See section 3.10.

Directional mobile 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.

If you cannot mount the antennas in a good position, Halytech has extension cables.

3.10 Power On

1. Plug the power supply lead into the mains power point (GPO), or connect the solar panel.
2. The Spider 2 AMR boots. The LCD starts up.
3. If the unit is in low power mode, press the black button to wake it. The LCD shows **Please Wait...** The unit can take up to 30 seconds to wake.
4. The unit runs from the supply and charges the SLA battery.

Important: The LCD backlight must be on before a browser can connect. If the backlight is off, press and hold the black button until it turns on.

4. RIM Installation

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

4.1 Mounting and Wiring a RIM

Each RIM needs its own 18–24V DC mains power supply. This supply is not provided with the Spider 2 AMR. Halytech sells a RIM power supply — see the Accessories table in Section 1.4 for the item code. Each RIM holds 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: For gas meters, see the warning in section 5.3.

Reading the blue LED. A RIM has no screen. It has one blue LED.

Flash rate	Meaning
About once every 5 seconds	Healthy
About once every 2 seconds	The backup battery is flat
Not flashing	No 18–24V DC supply

The rotary address switch is marked **1 to F**. The address is hex. Do not use address 0. No two RIMs on the bus may share an address.

4.2 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 to F)
- Fit the 120Ω terminator jumper on the last RIM in the chain

The RS-485 cable carries only D+, D– and Ground. See the Pin 1 caution in section 3.5.

4.3 Adding RIMs to the System

When the RIMs are cabled and powered, configure each RIM address in the Spider 2 AMR software. Enter the address as two hex digits. For example, switch position A is **0A** and switch position F is **0F**. Do not type **10** for switch position A. The unit reads 10 as hex, which is address 16. The Spider then polls each RIM automatically and collects the meter data. See the system configuration guide for setup steps.

5. Wireless Transmitters

Audience: Installer Applies to: HAM-051

New transmitters: the battery ships fitted but not connected. Connect the transmitter battery and reset the unit before use. The transmitter quick start has the steps.

5.1 Halytech Wireless Transmitter

The Halytech wireless transmitter is a self-contained 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.

Pick the transmitter to suit the location. The potted unit is rated IP68 and its battery cannot be replaced. The outdoor unit is not submersible and its battery can be replaced. The indoor unit is for indoor installation and its battery can be replaced.

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 gives the longest transmitter battery life.

Each transmitter has a unique address on a label on the unit. The address is 15 digits with dashes, for example **00278-04-03153276**. The label adds a 3-digit checksum after a dash, for example **00278-04-03153276-123**. Before installation, record the 15-digit address and the 3-digit checksum of each transmitter. You need both during setup.

For utility metering, the meter may need a pulse probe or pickup. If one is not fitted, get one from the meter manufacturer or from Halytech.



5.2 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
High-gain repeater to transmitter	Up to 450 m	Up to 4 floors
Transmitter acting as 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.

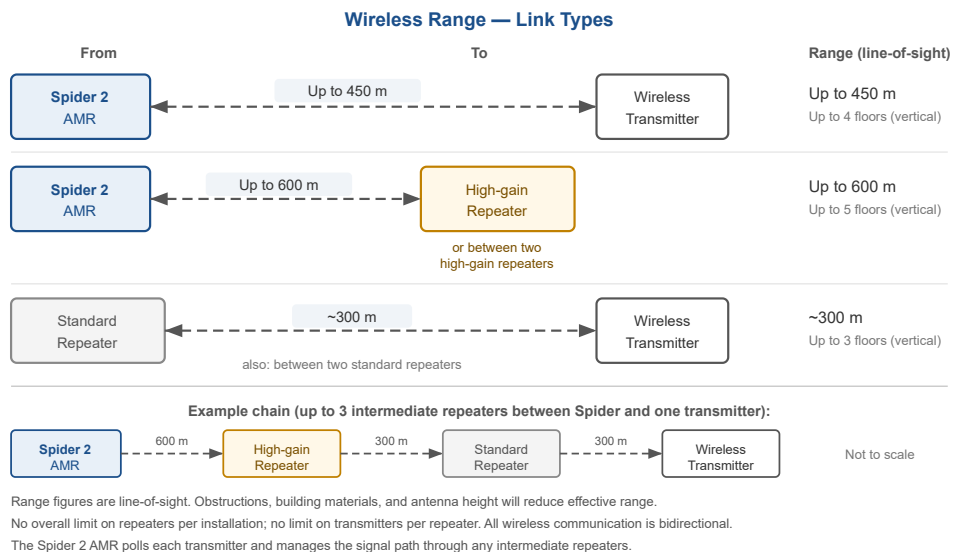
Materials that reduce signal range:

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

Bench test one transmitter first. On a new installation, set up one transmitter next to the base station. Get it reading there before you go out to the meters. This checks the receiver, the address, the checksum and the input type together. At that distance, the radio path cannot cause a fault. If it works on the bench and fails at the meter, the fault is the radio path.

During installation, check the signal strength with Wireless Transmitter Diagnostics (see section 7.5). Aim for at least 50%. Transmitters work reliably down to about 30%. Below 30%, data may be lost.

If the signal is too low, add wireless transmitters or high-gain repeaters as repeaters. They extend the range or route around obstructions. You can use up to 3 repeaters in a chain between the Spider 2 AMR and one 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.



5.3 Gas Meter Installations

Warning: Gas meter installations may need approval or hazardous area isolation barriers. Before you install, check the compliance rules with the local authorities.

6. System Configuration

Audience: Installer / advanced user

6.1 Connecting for the First Time

Connect to the Spider 2 AMR with a web browser. There are two ways in, by cable or by WiFi.

First, wake the unit. Look at the LCD. If the backlight is off, press and hold the black button until it turns on. Waking the unit starts both the WiFi and the LAN port. A browser cannot connect to a sleeping unit.

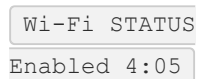
Option A — Easy Connect (LAN cable)

1. Connect the supplied LAN cable between your laptop's LAN port and the **LAN** port on the Spider 2 AMR.
2. Open a browser and go to **192.168.0.189** in the address bar. The LCD also shows the unit's address. Press the black button until you see it.

Note: The login page should open. If the browser shows an error page instead, see Appendix F.

Option B — WiFi

1. Press the black button briefly until the LCD shows the WiFi screen:



Wi-Fi STATUS
Enabled 4:05

The countdown is the time the WiFi has left.

2. On your laptop or tablet, open the WiFi settings.
3. Look for a network named **192.168.10.1_Spider2_[serial]**, where the serial is the unit's serial number. The factory-set password is printed on the label on top of the unit.
4. Open a browser and go to **192.168.10.1** in the address bar. It is the address at the start of the network name.

Note: The WiFi times out. Wake the unit again to restart it.

Note: The login page should open. If the network does not appear in your WiFi list, if the password is rejected, or if the browser shows an error page, see Appendix F.

Then log in. From here the two options are the same. Log in with the default credentials — see section 6.4.

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.

Change Setup

Change User / Password	Change Date / Time
Change Location / SMS PIN	
Change Input Setup	Select Wireless Transmitter to Setup ▾
Select Native Input to Calibrate ▾	Wireless Transmitter Diagnostics ▾
Select Control to Change ▾	Select Alarm to Change ▾
	Remote Input Modules ▾
Change Network Settings	Change Power Settings
Change E-mail Settings	Save Setup to Disk
Select Report to Change ▾	Restore Setup from Disk
Advanced Settings	Upgrade Software
Exit Change Setup	

Note: Change Setup mode stops logging and alarm generation. It also resets all active alarms. Exit Change Setup as soon as you finish.

Change Setup mode exits automatically after 10 minutes of inactivity.

Wireless transmitter shutdown

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

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

Change Setup

Please wait while Spider temporarily shuts down sensors... 0%

If you skip this process some data may be missing from the report.

Skip

[Exit Change Setup](#)

You can **Skip** this process:

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.

6.2 Setting Location Name

Give each Spider 2 AMR a unique location name. The unit puts this name at the start of every SMS and email it sends.

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.

6.3 Setting Date and Time

1. In Change Setup, click **Change Date / Time**.
2. Confirm or update **Current Date** and **Current Time**. **Set from computer** copies both from the computer you are using.
3. Set the **Timezone** for the installation location. Timezone is two dropdowns, hours then minutes.
4. Enter an NTP server address in the **NTP Server** field. There is no NTP tick box. An address in this field turns NTP on.
5. Click **Set**.

There is no daylight saving control on this page. The Timezone value handles daylight saving.

Important: NTP must always be enabled — the clock must stay accurate without manual adjustment. Do not enable daylight saving on the Spider 2 AMR. Daylight saving causes a one-hour data gap (clocks forward) and a one-hour overlap (clocks back) in logged data, which corrupts time-series records. Always log in fixed standard time.

6.4 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.

Lost credentials. There is no way to log in without the username and password. Contact Halytech or your agent.

To change credentials:

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

6.5 Configuring Native Inputs

1. In Change Setup, click **Change Input Setup**.
2. Set the number of wireless transmitter modules. This is what turns the wireless pages on.
Leave it at zero if the site has no wireless transmitters.
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**.

Change Input Setup

Number of wireless transmitters used: in RF zone:

Transmitter Time:

Input #	Type	Name	Units	ID	Logging*	Min Change To Log*
1	Utility Meter	Main Meter	kL	RG-1234LK	☒	
2	Analogue	Tank Level	%	FR-Tank Rear	☒	5
3	Disabled					
4	Disabled					
5	Disabled					
6	Disabled					
7	Disabled					
8	Disabled					

Input #	Type	System Monitors	Units	ID	Logging*	Min Change To Log*
	System	Battery Charger		Battery Charger	☒	
	System	Battery Voltage	V	Battery Voltage	☒	0.000
	System	Unit Temperature	C	Unit Temperature	☒	0.000

* Switch and Event Inputs are logged automatically when they change

* Analogue Inputs, Counter Inputs, System Monitors and Smart Sensors checked for change every

* Log modem signal: ☐ No ☒ Yes

[Cancel](#)

Switch inputs are logged automatically on state change.

Analogue, counter and system monitor inputs use significant-change logging. The unit checks them every scan period. It logs a value only if it has changed by at least the set minimum. It also logs every enabled input of these types once at midnight.

Utility Meter inputs are logged every scan period.

Which type to use for a meter

Two input types read a meter, and they record different numbers. Pick the one the customer's billing system needs. Ask the customer before you set the type.

Type	What it records	Example
Utility Meter	Consumption during each logging period. It also gives one meter reading per day	0.115 kL used in the period
Counter	A running total that matches the number on the meter itself	The same figure a person would read off the meter

The daily meter reading appears as a second row. At midnight a Utility Meter input logs two values. One is the consumption, under the input name. The other is the meter reading, under the same name with **_reading** added. An input named **Main Meter** gives **Main Meter** and **Main Meter_reading**.

Tell the customer about the second row before they read a report. Otherwise it can look like a fault.

6.6 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**.

Calibrate Tank Level

1. Set transducer to minimum value	
2. Enter desired reading:	
3. Click here to lock 1st point	
4. Set transducer to maximum value	
5. Enter desired reading:	
6. Click here to lock 2nd point	
Cancel	Save

Manual calibration:

Calibrated value = Scaler × Raw Value + Offset

Enter Scaler and Offset directly.

6.7 Calibrating Counter and Utility Inputs

Two options are available:

- **Scaling:** Set a scaler to convert pulses to engineering units. Example: 1 pulse = 5 litres, so the scaler is 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.

6.8 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 it at 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 15-digit transmitter address. Do not type the checksum.
8. Check that the checksum on screen matches the 3 digits on the label. If the two differ, the address has a typing error.

Wireless Transmitter 1 Setup

Transmitter location: RecyWaterTank

Transmitter type: WaveFlow: Single Channel

WaveFlow options: ☐ Tamper Connected ☐ External Calibration

Transmitter address: 04118-84-10171797 (Checksum: 198)

Number of repeaters: 0

Input Number	Type	Name	Units	Alternate ID
1	Counter	RecyWaterMeter	kl	EL22123M

Cancel

Save Setup and Calibrate Transmitter

9. If repeaters are in use, enter the number of repeaters and their addresses.

10. For each meter channel, set the input type, name, unit, and Alternate ID:

Input type	Records
Wireless Counter	A running total, the same as Counter (see section 6.5)
Wireless Utility Meter	Consumption, the same as Utility Meter (see section 6.5)

Alternate ID is optional for each channel. Enter the physical meter serial number or the site meter reference. It appears beside the channel name in filtered reports. This helps you match Spider data to the site's meter register.

11. 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, so the multiplier is 0.005.
- If you want, enter the **current meter reading** so the Spider display matches the physical meter.

Click **Save**.

Log one reading every 12 hours. This is the recommended setting. It gives the longest transmitter battery life.

6.9 Setting Control Names and Timer Schedules

Each control (CN1–CN8) has its own page. The control name and its 7-day timer schedule are both set there.

1. In Change Setup, select the control from **Select Control to Change**.
2. Enter a descriptive name for the control (e.g. "Valve 4 ON", "Main Pump").
3. Set the 7-day schedule using the timer grid — 15-minute resolution, 96 blocks per day.
4. Enable the timer for that control.

5. Click **Save**.
6. Repeat for each control in use.

You do not have to use the controls in order. You can leave any control unused.

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.

6.10 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
- 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. Alarm 16 is set to the System Alarm at the factory. Change it only if you need the sixteenth alarm.
2. Fill in all required fields.
3. Click **Save**.

Retiring an alarm you no longer need:

1. Set the trigger source to **DISABLED**.
2. Set the name back to **Alarm** and its number, for example **Alarm 7**.

Reset the name, or the Alarms page still shows the old name for an alarm that no longer monitors anything.

Change Alarm 1

Alarm Name:

Trigger Source:

Trigger Level:

Control Action:

Control Type: Continuous (default) ☒ 1 second pulse ☐

Send Report: YES ☒ NO ☐

Message:

Auto Acknowledge: DISABLED (default) ☐ ENABLED ☒

Auto Acknowledge Time: minutes

SMS	
Send?	YES ☒ NO ☐
1st Phone Number:	04328765432
2nd Phone Number:	04328765432
3rd Phone Number:	04328765432
SMS acknowledge time:	10 min

E-mail	
Send?	YES ☒ NO ☐
1st Address:	alarms@halytech.com.au
2nd Address:	

Cancel
Save

Alarm behaviour:

- When an alarm triggers, the unit sends an SMS to the first phone number.
- If the send works, the unit waits for the SMS acknowledge time. If the alarm is acknowledged in that time, sending stops. If not, the unit sends the SMS to the next number.
- If the send fails, for example from network congestion, the unit tries the same number again after 1 minute. It makes up to 3 attempts per number, then moves to the next number.
- After the last number, the unit stops sending SMS. It waits with no time limit for the alarm to be acknowledged.
- When sending works, this is 1 SMS per number, so 3 SMS at most. When sending keeps failing, it is up to 9 SMS.
- The unit also sends one email, with up to 2 recipients. It makes 3 attempts, 3 minutes apart.

Acknowledging alarms:

- Click the alarm on the Alarms page
- Reply to the alarm SMS (reply with the received message, or send **RST ALx**)

- Send **RST ALL** to reset all active alarms

Note: If the trigger is still active when you acknowledge an alarm, the alarm cannot trigger again until the source goes inactive.

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: A wireless input alarm can trigger only when the Spider polls the transmitter. Polls are less frequent than the logging period. If you need a faster alarm response, contact Halytech. A faster response uses more transmitter battery.

6.11 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 lets you connect a PC directly without setting matching IP addresses. Disable it when the Spider is part of a network.

LAN settings

Field	Description
IP address	The Spider's IP address on the local network. Also shown on the LCD.
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.

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

Change Network Settings

Local Area (LAN) Settings

My IP Address:

Network mask:

Easy Connect: ENABLED ☒ DISABLED ☐

LAN settings are used for local (Ethernet) connections to the Spider 2 AMR

Wide Area (WAN) Settings

Connection Type:

APN:

Remote APN (optional):

Send test SMS To:

WAN settings are used by the Spider 2 AMR to send E-mails and FTP reports

Wi-Fi Settings

Mode:

Password:

Note: Empty password means use the password on the factory label
Note: Changing the Wi-Fi password requires a reboot

Note: You can also change the IP address and mask with the black button. See Appendix A. New values take effect after a power cycle.

Connecting the Spider 2 AMR to a LAN

To connect the Spider to a local area network:

1. Disable **Easy Connect** (see above).

2. Set the **IP address** to a unique address on the network. Get it from your network administrator.
3. Set the **Network mask**. Get it from your network administrator.
4. Set the **Gateway**. Get it from your network administrator.
5. Click **Save**.
6. Exit Change Setup.
7. Reconnect the LAN cable. The unit reboots if it needs to apply the new settings. The web page shows a warning before the reboot.

WAN settings (mobile network)

The Spider 2 AMR uses its 4G LTE Cat 1 modem as the primary WAN connection for sending emails and FTP reports.

The key setting is the **Access Point Name (APN)**. Your SIM card supplier provides it. Confirm the correct value with your carrier before commissioning.

Warning: Never enter the remote access APN, for example **telstra.extranet**, in the main APN field. The remote access APN gives the unit a public IP address. As the main APN, it leaves the unit on the open internet all the time. Enter it only in the Remote APN field.

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. Start the WiFi with the black button each time you need it (see section 6.1).

The network name (the name that appears in your device's list of available networks) is in the format **[IP address]_Spider2_[serial number]**. An example is **192.168.10.1_Spider2_2403002** for serial number 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.

6.12 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 come back 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.

Change Email Settings

SMTP mail server:

SMTP port:

"From" email address:

Test email address:

Force SSL/TLS: ☒

Enable authentication: ☒

Username:

Password:

Obtaining SMTP settings

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

For sites without IT support, a dedicated SMTP relay service, such as [SMTP2GO](#), is a reliable and simple option. These services usually give you a server address, username, and password. Enter them in 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 black button until the LCD shows the **Send test email?** screen.

3. Hold the black button for more than 3 seconds.
4. Wait while the LCD shows **Sending email....** This can take up to 30 seconds. The black button does not respond during this time.
5. Read the result on the LCD. A failure reads **Email Failed.**
6. If the test fails, enter Change Setup again and check your network and email settings.

What the test does not tell you. The same failure message appears for a missing SIM, a wrong APN, no coverage, a DNS failure, or a mail server that refuses the login. The test proves the whole path works or does not. It does not say which step failed.

6.13 Saving and Restoring Settings

You can save the settings to a file on your computer. Use it as a backup, or as a template for other units.

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

Warning: Restoring settings from disk overwrites all current settings.

6.14 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.

6.15 Commissioning Checklist

Confirm all of these before you leave site.

- Mobile signal is 40% or better. 50% or better is good. Read it on the LCD
- Date and time are correct, with an NTP server address set and no daylight saving
- Location name is set and unique
- All active inputs show the expected readings in the web interface

- Alarms are configured and tested
 - The administrator password is changed from the factory default
 - The APN is confirmed and the mobile connection is active
 - Automatic reports are verified, with data received at the destination, if reporting is used
 - SMS operation is verified, by a test alarm, if SMS is used
 - Email operation is verified, by the LCD test email, if email is used
 - Settings are saved to disk, from Change Setup, then **Save Setup to Disk**
-

7. Normal Operation

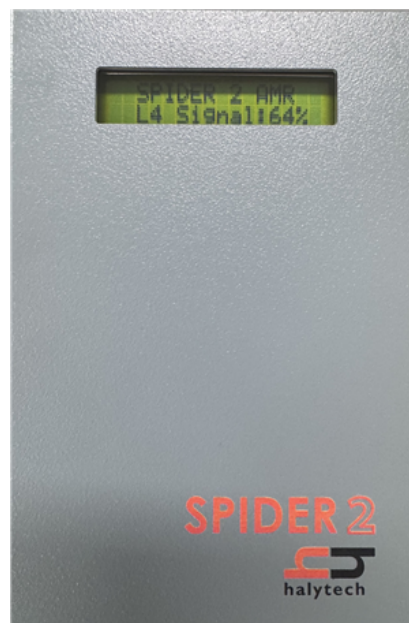
Audience: End user

7.1 LCD

The Spider 2 AMR has a two-line LCD and the black button. Use them for quick status checks without a computer.

The default LCD screen shows mobile signal strength:

```
SPIDER 2 AMR  
L Signal:65%
```



≥40% is acceptable, ≥50% is good, ≥75% is excellent. If the signal is below 40%, move the antenna. ?? or — means no mobile coverage, no valid SIM, or the mobile module is not responding. Check that the antenna is connected.

The letter before **Signal** is **L** or **S**. It shows which modem is fitted. It is not a status indicator.

Press the black button briefly to step through the LCD screens:

Screen	Shows
1	Date and time
2	Easy Connect status
3	Wi-Fi status, with the minutes left before Wi-Fi turns off
4	Current input readings, one screen per enabled input. Wireless inputs also show a status letter — see section 7.5
5	Battery voltage and charger status
6	System temperature
7	Alarm states 1–4 (A = active, I = inactive, D = disabled)
8	Alarm states 5–8
9	Alarm states 9–12
10	Alarm states 13–16
11	Control states CN1–CN4 (1 = on, 0 = off)
12	Control states CN5–CN8
13	LAN IP address (I) and subnet mask (M)
14	Send test email (hold the black button to send, see section 6.12)

Manual wireless refresh with the black button: Press and hold the black button for about 5 seconds from the signal strength screen. The Spider 2 AMR polls every transmitter, and the readings shown become current.

7.2 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 the mobile network from anywhere

See section 6.1 for connection procedures.

After login, the Alarms page is displayed automatically.

7.3 Alarms Page

Click **ALARMS** to see the current state of all alarms. The page title is **Current Alarms**. Alarms are identified by their programmed names. The page refreshes every 10 seconds.

The page lists Alarm 1 to Alarm 15, then a sixteenth slot. That slot shows **System Alarm** until you change alarm 16 to a normal alarm. The System Alarm reports internal fault conditions.

Spider 2 AMR

Current Alarms

Tank Level Low: INACTIVE	Alarm 9 : DISABLED
Alarm 2: DISABLED	Alarm 10: DISABLED
Alarm 3: DISABLED	Alarm 11: DISABLED
Alarm 4: DISABLED	Alarm 12: DISABLED
Alarm 5: DISABLED	Alarm 13: DISABLED
Alarm 6: DISABLED	Alarm 14: DISABLED
Alarm 7: DISABLED	Alarm 15: DISABLED
Alarm 8: DISABLED	System Alarm: INACTIVE

Click an ACTIVE ALARM above in RED to reset it
OR [Click here](#) to reset ALL ACTIVE ALARM transmissions

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, shown in red, to reset it

- Click the **Click here** link below the list to reset all active alarm transmissions

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: **123 King St: Power off (Send 'RST AL1' to reset)**

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

7.4 Status Page

Click **STATUS** in the menu to view current native input readings. The page title is **Current Status**. All inputs are shown by their programmed names. Inputs set to Disabled do not appear.



Spider 2 AMR



ALARMS

STATUS

CONTROLS

HISTORY

VIEW SETUP

CHANGE SETUP

ABOUT

Logout

Current Inputs

Select page to view

Next

Native Inputs

Input #	Name	Reading
1	Main Meter:	1223.235 kL
2	Tank Level:	24.095 %
System Monitors		
	Battery Charger:	OFF
	Battery Voltage:	15.184 V
	Unit Temperature:	26.879 C

Cancel

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

You can log system monitors and use them to trigger alarms, the same as native inputs. Use the **GET SYS** SMS command to retrieve the current state of all system monitors remotely.

7.5 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.

The WIRELESS menu item appears only after you set the number of wireless transmitter modules in Change Input Setup. See Section 6.5. The wireless receiver must also be fitted for the readings to arrive. The receiver ships with the wireless model.



Spider 2 AMR



ALARMS

STATUS

CONTROLS

HISTORY

VIEW SETUP

CHANGE SETUP

ABOUT

Logout

Current Inputs

[Prev](#)

Select page to view

[Next](#)

Wireless Transmitters 1-5

Trasmitter	Meter	Reading	Status (see below)
1 - RecyWaterTank	RecyWaterMeter:	189 kl	*

[Cancel](#)
[Update All](#)

Status Legend

* Displayed value may not show the latest reading. Click transmitter or "Update All" to update.

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 reported as low. Do not act on this alone — see the note below
?	Last communication with the transmitter failed

These same letters also appear on the LCD when you view that input.

About the B low battery indicator. Treat it as a prompt to check, not as a fault. Confirm the battery state with the **Raw count and battery status** query in Wireless Transmitter Diagnostics before you replace anything.

The page does not refresh wireless inputs automatically. This saves transmitter battery life.

To refresh by hand, click **Update Display**. The Spider polls all transmitters. This can take several minutes. Update Display also resets the tamper status.

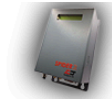
Wireless Diagnostics: To check signal strength or find communication problems, open **CHANGE SETUP** and select from the **Wireless Transmitter Diagnostics** menu. Available queries:

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)

The no-response message names the unit at fault. When a transmitter or a repeater does not answer, the message reads **No response from**. The name of the transmitter or repeater at fault follows. On a repeater chain this tells you which hop failed, so you only check that leg.

7.6 Controls Page

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



ALARMS

STATUS

CONTROLS

HISTORY

VIEW SETUP

CHANGE SETUP

ABOUT

Logout

Current Controls

Control 1: ON ☒ OFF ☐

Control 2: ON ☐ OFF ☒

Control 3: ON ☒ OFF ☐

Control 4: ON ☐ OFF ☒

Control 5: ON ☐ OFF ☒

Control 6: ON ☐ OFF ☒

Control 7: ON ☐ OFF ☒

Control 8: ON ☐ OFF ☒

[Cancel](#)

Save

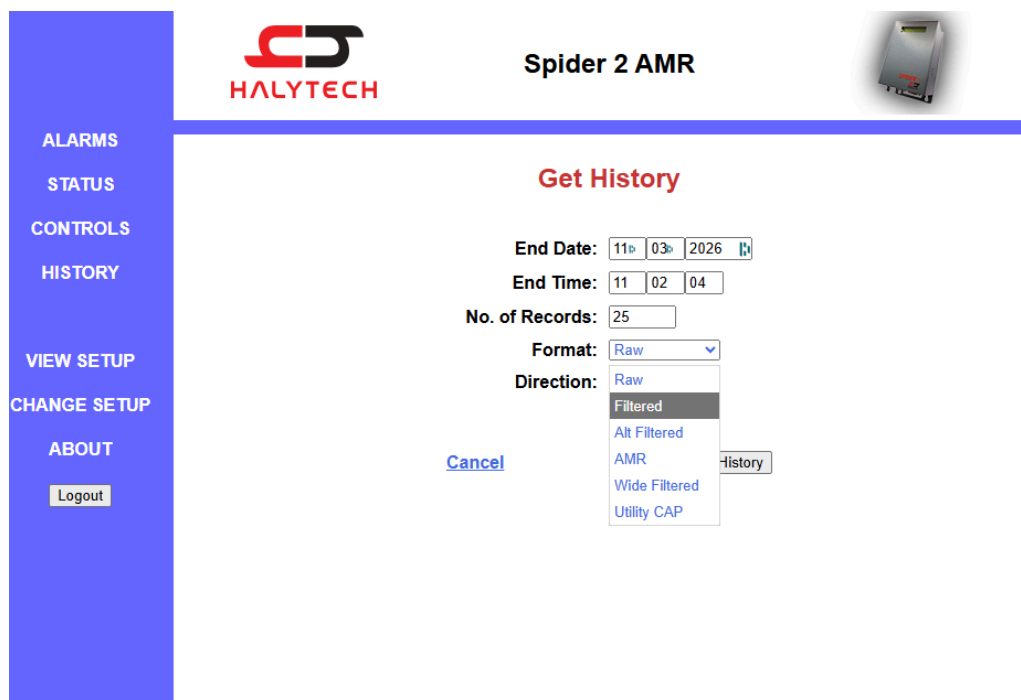
7.7 History (Logged Data)

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

Every record has a date and time stamp, to 1-second resolution.

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



The screenshot shows the Spider 2 AMR web interface. On the left is a blue sidebar with navigation links: ALARMS, STATUS, CONTROLS, HISTORY, VIEW SETUP, CHANGE SETUP, ABOUT, and a Logout button. The main header area includes the HALYTECH logo, the text 'Spider 2 AMR', and a small image of the device. The 'Get History' section contains the following fields and options:

- End Date:** 11/03/2026
- End Time:** 11:02:04
- No. of Records:** 25
- Format:** Raw (dropdown menu)
- Direction:** Raw (dropdown menu with options: Raw, Filtered, Alt Filtered, AMR, Wide Filtered, Utility CAP)
- Buttons:** Cancel, History

1. Set **End Date** and **End Time**. The download works backwards from that point.
2. Set **No. of Records** to include.
3. Choose a **Format**.

4. Set **Direction** to order the rows. **Decreasing** puts the newest record first, **Increasing** puts the oldest first. The factory value is Decreasing.
5. Click **Get History**.

Why a history download can look incomplete. Each wireless transmitter holds **24 records**. How many hours that covers depends on the logging period and on how many channels the transmitter has. For example, a 4-channel transmitter logging every hour uses 4 records an hour, so 24 records is 6 hours.

The base station polls each transmitter before its buffer fills, with time left to retry a failed poll. It does not poll all the time, because that would drain the transmitter battery. So a manual history download may not have the most recent wireless readings. Alarms on wireless inputs are affected the same way. Automatic reports are sent after the data arrives, so they are complete.

To get the latest wireless readings before you download by hand:

1. Click **Update Display** on the Wireless Inputs page, or hold the black button for about 5 seconds from the signal strength screen.
2. Wait for the poll to finish.

Tell the customer about this gap. It is normal, not a fault. Without a warning, someone who compares a manual download with a meter will report a fault.

7.8 Automatic Reports

Spider 2 AMR can send reports automatically by email, FTP, or both. 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, with Channel ID instead of 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 recover missed data. 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. The unit makes up to 3 send attempts for each report.

You can also order reports in ascending or descending time order. Select the order when you set up the report.

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 (<i>n</i> days ago)	Location_DDMMYY_2359.csv

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

To set up a report, go to Change Setup and select it from **Select Report to Change**.

7.9 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 ALx	Reset alarm x (1–16)
RST ALL	Reset all active alarms
ON CNx	Activate control x (no PIN)
yyyy ON CNx	Activate control x (PIN = yyyy)
OFF CNx	Deactivate control x
yyyy OFF CNx	Deactivate control x (PIN = yyyy)
PULSE CNx	Pulse control x for 1 second
yyyy PULSE CNx	Pulse control x for 1 second (PIN = yyyy)
RESEND REPr,p	Request a copy of report r , the one sent p periods ago. 0 is the most recent. Both numbers are required, with a comma and no space, e.g. RESEND REP1,0 .
GPRS n,email@address.com	Go online for n minutes and send the current public IP address by email and SMS reply. See Appendix A for the exact format and the PIN

Commands are not case-sensitive. Use a single space between words. The unit queues commands that arrive during remote access. It processes them after the session ends.

The unit replies to a valid command with this SMS: **Location: OK [command]**

7.10 Power Management

Always-on mode — recommended for Spider 2 AMR. The unit stays awake. AMR sites are mains powered and need reliable LAN access and steady wireless polling.

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

Low Power mode on Spider 2 also saves less power than it did on the first-generation Spider. **To cut power, use modem scheduling instead.**

To change the mode, go to Change Setup, click **Change Power Settings** and select the mode.

Warning: Change advanced power settings only if you understand the effect. The wrong setting can stop remote connection working, shorten battery life badly, or flatten the battery completely.

What Low Power mode gives up. While the unit sleeps, the LAN port is not available and analogue channels are not scanned. The unit still wakes on its own to scan, log, and send or receive SMS and email.

Modem scheduling. The modem uses about 90% of the power drawn while the LCD is blank. You can set the hours of the day when it is powered up. Scheduling is off by default, so the modem is always on.

In Change Setup, click **Change Power Settings**. If the daily schedule is not shown, click **CONTROLLED BY SCHEDULE**. Click a box for each hour the modem should be on.

During scheduled off hours only remote access stops. Alarm SMS and email still go out normally.

7.11 About Page

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



ALARMS

STATUS

CONTROLS

HISTORY

VIEW SETUP

CHANGE SETUP

ABOUT

Logout

About This System

System status: OK

Software version: FAM-201 4.15

Hardware version: 1.0 / S02.02

Installed options: none

Serial number: 2406031

MAC address: 00:11:8E:01:00:F8

Modem model: TBA

Modem firmware: TBA

Modem IMEI: TBA

Designed and manufactured by:

Halytech

PO Box 6983

Baulkham Hills Business Centre

NSW 2153 Australia

Ph: +612 8814-5235, sales@halytech.com.au

www.halytech.com.au

8. Maintenance

8.1 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

The LCD battery screen and the web interface system monitors show the battery voltage. Use these readings to check 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

Measure the resting voltage when the battery is not charging and has no significant load. Check it at dawn before solar charging starts, or 30 minutes after you disconnect the charger.

Set a low battery alarm. Configure an alarm on the Battery Voltage system monitor. It then tells you when the voltage drops below the threshold you set.

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. Unplug the power supply from the mains power point, or disconnect the solar panel.
2. Open the enclosure.
3. Disconnect the battery.

4. Fit the new battery. Use a 12V SLA battery, up to 10Ah, that fits in the enclosure. The standard replacement is 12V 7.2Ah, available from Halytech.
5. Check the polarity. A wrong connection may damage the unit.
6. Connect the battery.
7. Close the enclosure.
8. Plug the power supply back in, or reconnect the solar panel.

Charger and solar panel inspection

Inspect annually:

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

8.2 Software Updates

Halytech supplies an update file for each release.

1. In Change Setup, click **Upgrade Software**. It is the last link in the right column.
2. Click **Choose File** and pick the update file.
3. Click **Upgrade**.
4. Click OK on the warning.

The unit reboots. The reboot takes a few minutes. An upgrade does not change the setup.

8.3 Troubleshooting — Mobile Connectivity

Symptom	Likely cause	Action
No signal strength shown (?? or —)	No antenna fitted, antenna loose at the SMA connector, SIM not seated in its tray, or SIM not activated	Check an antenna is fitted to Main and is hand-tight. Reseat the SIM in its tray. Confirm the carrier has activated the SIM
Mobile registration failed	Wrong APN, antenna fault, or SIM not activated	Check the APN matches your carrier. Check the antenna. Confirm the SIM is activated
Signal present but SMS not received	The SIM plan does not include SMS	Ask the carrier to enable SMS on the SIM
Signal present but email not delivered	APN, SMTP, or address setting is wrong	Confirm the APN is correct. Check the SMTP server settings. Check the to and from email addresses are valid

9. Specifications

9.1 Hardware Specifications

Spec	Value
Charger input	16–24V DC. The unit can draw up to 3A while the backup battery is flat
Battery	12V SLA, up to 10Ah
Native inputs	8, printed IN 1 to IN 8, on two 8-pole connectors
Relay outputs	8 (CN1–CN8), latching relay, voltage-free. 30V AC or DC / 1A, non-inductive. Low voltage and low current loads only — see Section 3.4
Connectivity	4G LTE Cat 1, Ethernet, WiFi
AUX1	RS-485 with 12V Output (up to 500mA)
AUX2	RS-232 (wireless receiver connection)

9.2 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 — transmitter acting as repeater, to transmitter (LoS / high-rise)	~300 m / 3 floors
Repeaters	Up to 3 in one signal path. No limit per installation
Recommended minimum signal at install	50%

9.3 Physical Specifications

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

10. Appendices

Appendix A — Remote and LAN Connection

Connecting to an Existing LAN

Get a static IP address and subnet mask from your network administrator. Set them on the unit, see section 6.11. Disable **Easy Connect** once the unit is on the LAN.

You can also change the IP address and mask from the LCD:

1. Press the black button until the LCD shows the current IP address and mask.
2. Hold the black button for more than 3 seconds to enter change mode.
3. Change each digit. A long press adds one to the digit under the cursor. A brief press moves to the next digit.
4. Go to **Save?** and long-press to save.
5. Power cycle the unit. The new address takes effect after the power cycle.

Remote Connection

The Spider 2 AMR supports remote access over the mobile network.

Prerequisite: Remote access needs a public IP address on the SIM. Not all carriers offer one. See section 3.7.

Most SIM cards with a public IP address get a dynamic (changing) address. Before you connect, send an SMS command to get the current IP address.

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: Spaces matter. Use exactly one space between **GPRS** and the number. Do not put a space before or after the comma. If the command is wrong, the unit sends the IP address 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 goes online. It sends its current public IP address to your email address and by SMS reply.
3. Open a browser and go to the IP address you 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. It supports one connection at a time. It can handle about 10 requests per second.

For LAN access, the Spider must be in Always-on mode (see section 7.10).

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 uses 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 $\times 1000$). Each input uses two consecutive 16-bit registers. 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)	$(X \times 2) - 2$
Charger status	16
Battery voltage	18
Unit temperature	20
Wireless input: transmitter X , channel Y	$8182 + (X \times 8) + (Y \times 2)$

Examples:

- Native input 3 uses registers 4–5 (point address 300005)
- Wireless input: transmitter 5, channel 2 uses 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	$4091 + (X \times 4) + Y$	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: see the warning in section 5.3.

Appendix D — Filtered Report File Format

A filtered report is a simplified version of the logged file. It holds only logged input values, as a standard CSV file that most spreadsheet and database programs can open.

Each record has three fields:

Field	Example
Input name	Temperature
Record date and time	23-Jan-06 13:00:00
Input value	123.445

The **Alternate ID** set for each wireless channel (see section 6.8) appears beside the channel name.

Appendix E — Logged Data Format

Spider 2 AMR logs data internally in an efficient binary format. Before each download, the unit converts it into a standard CSV (comma-separated values) file. Most spreadsheet and database programs can read it.

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

Numeric Identifier	Range	Text	Comment
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
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

Numeric Identifier	Range	Text	Comment
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
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

Appendix F — If You Cannot Connect

Use this if the WiFi network does not appear on your device, if the browser shows an error page instead of the login page, or if the login is refused. Check these in order.

- 1. The unit must be awake.** Look at the LCD. If the backlight is off, press and hold the black button until it turns on.
- 2. On WiFi, the network must be running.** If the Spider 2 AMR network is not in your device's WiFi list, the WiFi has stopped. It stops after a power cycle or sleep. Press and hold the black button to start it again.

3. On WiFi, the password must be right. Retype it from the label on top of the unit. If it still fails, someone has changed it and the label is out of date. Connect by LAN cable and set a new one in Change Network Settings, then Wi-Fi Settings.

4. The address must be right. By cable it is **192.168.0.189** unless someone has changed it — press the black button until the LCD shows the address the unit is using. Over WiFi it is usually **192.168.10.1**, the address at the start of the network name on the LCD.

5. By cable, give it ten seconds. Wait ten seconds, then reload the page. The laptop and the unit need that time to agree on an address.

6. By cable, the laptop must get its IP address automatically. The Spider 2 AMR acts as a DHCP server. It gives your laptop an address on its own network, so the two can talk without you setting anything. For that to work, the laptop's Ethernet adapter must be set to obtain an IP address automatically (DHCP). If DHCP is disabled, the laptop keeps its own fixed address and never reaches the unit. This is the usual cause on a laptop set up for a fixed office network.

7. Easy Connect must match how the unit is wired. Easy Connect must be enabled for a direct PC connection, and disabled where the unit sits on a LAN. Check by pressing the black button until the Easy Connect screen is shown.

8. If the login page opens but refuses you, check the credentials. The administrator factory default is **user / changeme**. The normal user factory default is **user / user**. See section 6.4.



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Full specifications, downloads and support

halytech.com.au/products/automatic-meter-reading

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