impro technologies®

COMPONENT CODES:

HMS900-1-0-NN-XX HMS901-1-0-NN-XX

S4 Reader Module

INSTALLATION MANUAL

Specifications

The S4 Reader Module is (when clustered with a Cluster Controller Module) offers full, anti pass-back control of up to 4 doors. It has eight digital inputs, four output relays and an S-Bus Host terminal that supports up to 8 S-Bus readers. The S4 may only be used in Access Portal systems.

Working Environment

Plastic Housing (HMS900)	Designed to work in an indoor (dry) environment similar to IP20, the Module is not sealed against water.
PCB Card for IPS enclosure (HMS901)	Designed to work in an indoor (dry) environment similar to IP20, the Card is not sealed against water.

Power

Input Voltage	12 V DC to 15 V DC, polarity protected.	
Power Requirements	**Current (mA)**	**Power (W)**
Input Voltage 12 V DC, Relays off	50	0.6
Input Voltage 12 V DC with all 4 relays activated	230	2.7
Relay Power Requirements	~0.4 W per Relay in use.	
Max S-Bus Host power	Additional 6W. (500 mA)	

Communication with the Cluster Controller Module

Direct Communications — The S4 MUST always be clustered (plugged side-by-side) directly into the Cluster Controller Module, or into an existing Cluster.

Electrical Interface	Propriety Cluster-Bus
Baud Rate	115 200
Encryption	AES Encryption

Communication with S-Bus Devices

S-Bus Host Port

Electrical Interface	Propriety S-Bus
Baud Rate	9600
Encryption	AES Encryption
S-Bus Capacity	Maximum of 8 S-Bus Addresses

Inputs

Type	8 Dry-contact inputs with End-of-line (EOL) Sensing.
Detection Resistance Range	< 2 kΩ.
Protection Range	+15 V continuous.

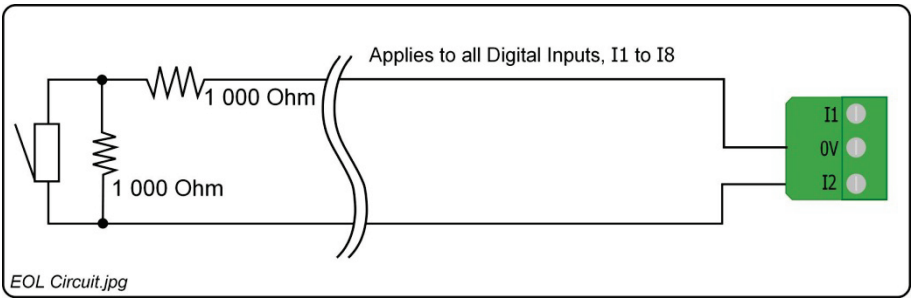

Figure 1: End-of-Line (EOL) Sensing Circuit

Relays

Relay Output	4 Independent, single-pole, double-throw (SPDT) Relays, each with NO, COM and NC contacts.
Relay Contact Ratings.....	10 A at 28 V DC, 5 A at 220 V AC, 12 A at 120 V AC.
Operations.....	100 000 Minimum.

LED Status and Diagnostic Indicators

Status LED (RED)	
Supply Voltage Status.....	Off when supply voltage is too high, or too low
Upgrade Mode	Flashing at a steady rate during upgrade
Communications Failure	Two brief flashes, repeating
Data LED (GREEN)	Flashing Green during communication
Inputs (1-8)	Continuous Green on detected contact closure
Relays (1-4)	Continuous Red on activation of the Relay

INSTALLATION INFORMATION

Accessories

CAUTION: DO NOT use the Metal-oxide Varistors (25 Vrms, 500 A, 77 V max clamping) with mains power applications.

Find the following when unpacking the S4:

Plastic Cluster Module Housing (HMS900)

A customisable black, ABS plastic housing with the following features/components:

- Housing, consisting of a Base, a Cover and a selection of Cable Entry Gland Plates.
- The Housing Base has:
  - Two slots to hold the User-Selectable Cable Entry Plates
  - Six knock-out Cable Entry Points
  - Four Drill-out Cable Entry Points
- The Housing Cover and Base are held together with two Allen Head Screws (M4 x 10 mm) through the cover of the housing.
- Five Ziploc bags, containing the following:
  - Four Stand-Offs (for spacing the S4 away from the mounting surface) and two Cluster Connector Covers (for closing off the cluster connectors when not in use.)
  - Four Metal-Oxide Varistors 25 Vrms, 500 A, 77 V max clamping.
  - A 2mm Allen Key and a spare Hex Head Screw
  - Two extra gland plates
  - An extra Fixed Address Label, for installation site mapping

NOTE: The installer needs to obtain fasteners (< 5 mm Diameter to fit through the supplied Stand-Offs) that are suitable for securing the Module to the mounting surface – these are NOT supplied in the kit.

Module for IPS Housing (HMS901)

Included in the packaging is:

- Impro S4 Reader PCB on a plastic base plate.
- An extra fixed address label, for installation site mapping
- Four Metal-Oxide Varistors 25 Vrms, 500 A max clamping

General

Remember the following when installing the S4:

- The S4 must be plugged directly into its associated Cluster Controller Module.
- The S4 is powered and controlled via its Cluster Connector.

Reader count limitation

A maximum of 16 S-Bus readers may be connected to a cluster without exceeding the current capacity of the cluster bus power rail. So the following combinations are acceptable:

- Cluster Controller Module +Two S4s with 8 readers each. (supporting 8 APB doors)
- Cluster Controller Module + Four S4s with 4 readers each. (supporting 16 single-reader doors)*
- Any combination of dual reader and single-reader doors that does not exceed 16 readers.*

**NOTE:* *AP LITE can only support a maximum of 8 doors.*

Arc Suppression

Snubber devices are recommended for EMF Flyback and Arc Suppression when driving an inductive load with the Relay, see Figure 2.

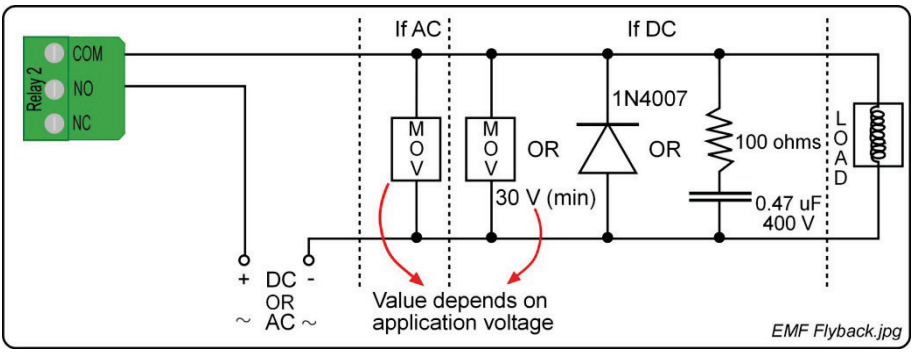

Figure 2: EMF Flyback and Arc Suppression

Mounting the Impro S4 Reader Module

CAUTION: Make certain that you mount the S4 on a vibration-free surface.

NOTE: The S4 can be mounted onto virtually any surface including metal.

The S4 may only be used when clustered with a Cluster Controller Module (see page 5 for maximum reader count considerations)

- Remove the housing cover from the S4 and plug the S4 into the cluster socket on the right hand side of the Cluster Controller – or that of the first S4.
- Remove the cluster connection cover on the last cluster module on the right hand side.
- Holding the S4 square against its neighbouring Module, mark the mounting hole locations through the mounting holes in the back of the Housing Base.
- Remove the S4, drill the mounting holes.
- Use the plastic Stand-Offs to provide space for cables behind the cluster, or if the other modules in the Cluster are already mounted with stand-offs.
- Mount the S4 Housing Base firmly to the mounting surface using fasteners (not included) appropriate for the mounting surface material.
- Select the gland plates that best suit the installation and/or knock out the cable entry points as needed.
- Connect the digital inputs and the relay terminals as necessary for the installation (See wiring diagrams from page 10)
- Commission the S4 via the menu options on the Access Portal Application.
- Replace the S4 Housing Cover and fasten closed with the two Allen head screws provided.
- Replace the Cluster connection cover on the last unit in the Cluster.

Blank Space

S-BUS CABLE CONSIDERATIONS

NOTE: This section of the manual must be considered for all new installations OR whenever S-Bus devices are being added to an existing installation.

About S-Bus

Impro S-Bus is a cost-effective, propriety, encrypted, bi-directional two-wire bus system that allows S-Bus devices to be installed up to 150 m (490 ft.) away from their Host.

There are TWO types of S-Bus Port

Host: There can only be one **Host** per S-Bus. An S-Bus Host always features "+", "-" and "D" terminals. The S4's Host also includes an "ETH" terminal – which is where the S-Bus Cable screen drain should be connected when screened S-Bus cables are used.

Device: Up to 8 S-Bus readers may be connected in parallel on the S-Bus. S-Bus readers have "+", "-" and "D" terminals.

S-Bus Network Topologies

S-BUS is very flexible and is not limited to a single network topology. The preferred topology would be a Star or Extended-Star network.

NOTE: Star, Extended-Star, Daisy-chain, Bus, Hybrid, Point-to-Point, Tree and Hierarchical network topologies are all acceptable.

Blank Space

Connecting S-Bus Readers to the S-Bus Host

The “D”, “-“ and “+” Terminals of the S-Bus devices MUST all be connected to those of the S-Bus host terminal, and the following rules apply:

1. No more than a total of 8 S-Bus readers may be connected to one S4’s host terminals.
2. The cable length from the Host Terminal to any S-Bus device may not exceed 150 m.
3. The cross sectional area of S-Bus cables should meet the minimum requirements listed in the table below. This is to prevent erroneous operation due to unwanted volt drops in the cables.

Cable thickness and length considerations

When powering S-Bus readers from the S4’s S-Bus host, this table makes it easy to choose cables. The table indicates the maximum current for given lengths and gauges of cable.

Conductor Size		Cable Length			
Area (mm^2)	AWG	25m (80 ft.)	50m (165 ft.)	100m (325 ft.)	150 m (490 ft.)
1.31	16	500 mA	500 mA	500 mA	490 mA
0.82	18	500 mA	500 mA	460 mA	310 mA
0.52	20	500 mA	500 mA	290 mA	190 mA
0.33	22	500 mA	370 mA	180 mA	120 mA
0.21	24	420 mA	230 mA	110 mA	70 mA

It can be seen from the table that a single run of 0,21 mm^2 (AWG24) 3-core cable would be more than adequate to supply the ~320 mA needed to power all 8 S-Bus readers up to 25m (80 ft.) from the S4.

NOTE: *The limits indicated in the table are there to ensure that the volt drop across the cable length remains acceptable. A quick way of checking an installation is to measure the voltage across the “+” and “-” terminals on the S-Bus readers – it must always be more than 10V for reliable operation.*

Lightning Protection and Interference Rejection

Screened cable is recommended for improved interference rejection in electrically noisy environments (near heavy current switching, or powerful radio transmitters) - and the provision of **some measure*** of (indirect) lightning protection.

NOTE:* *Screened cables provide a MEASURE of protection that can reduce (not eliminate) the chances of damage caused by a NEARBY lightning strike. Be warned that NOTHING can withstand a direct lightning strike. Impro Technologies does NOT claim to produce lightning proof products.*

Solder a 2.5 mm^2 (13 AWG) grounding wire to the **S-Bus Host** end of the screen drain wire (insulate the soldered joint so that it is not left exposed) and connect this wire to the Host ETH terminal.

NOTE: *The S-Bus reader Device end of the screen must NOT be connected to anything.*

Key Component Positions

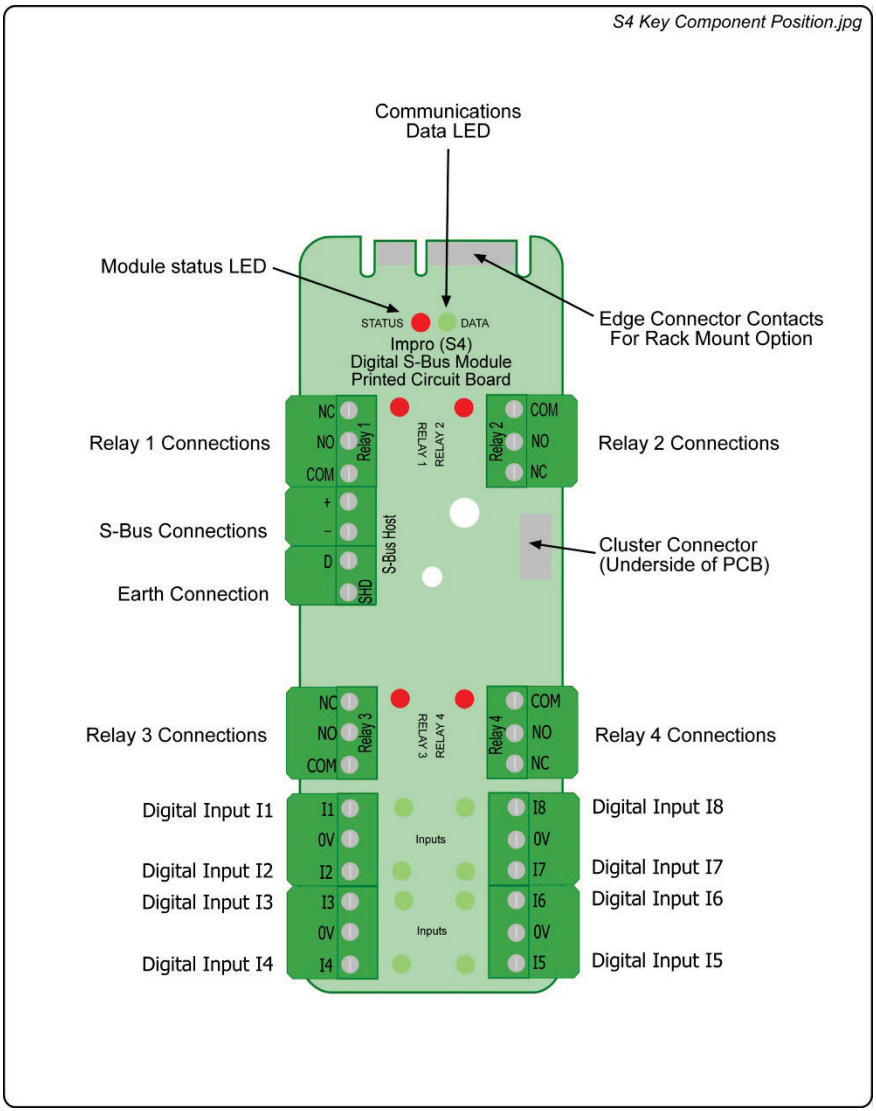

Figure 3: Key Component Positions

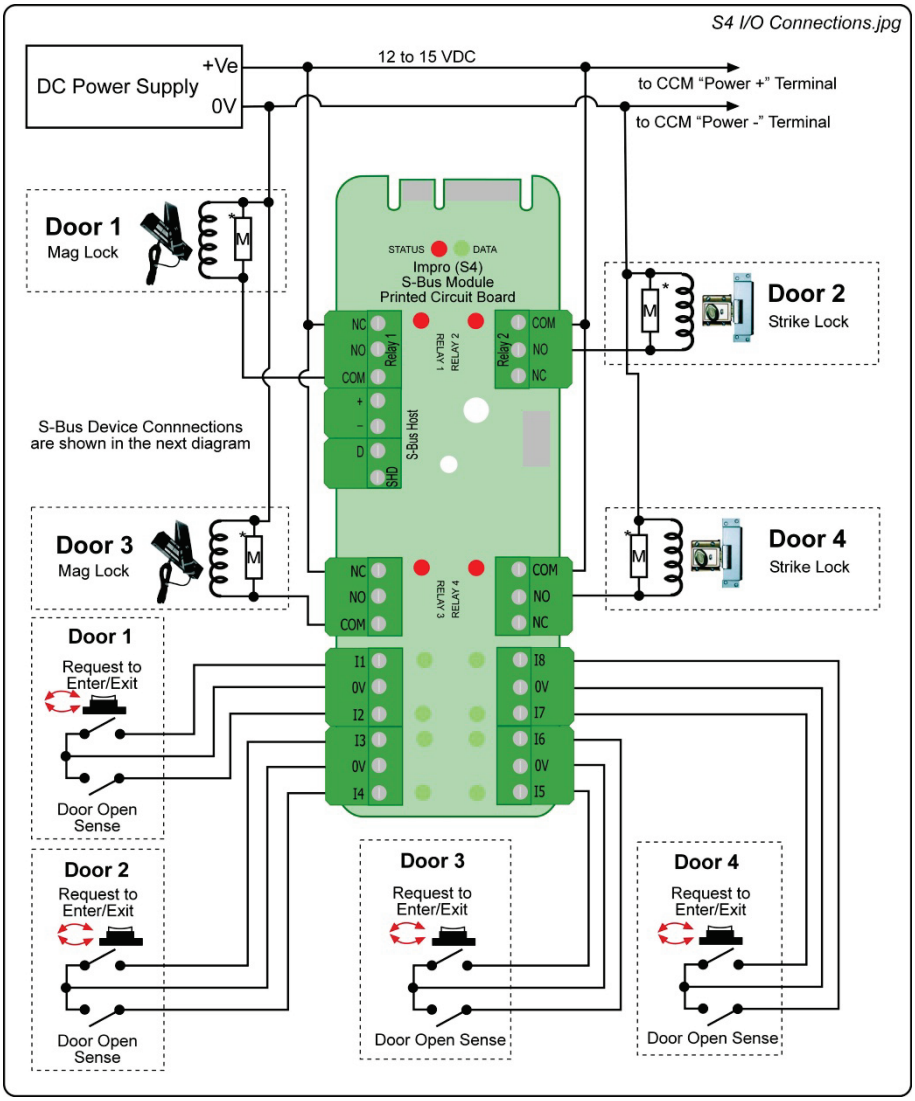

Figure 4: Four-door I/O wiring diagram

NOTE: See Notes on next page

NOTE: ** Refer to **Figure 2** on page 5 for Arc Suppression details when using inductive loads across the relays.*

The logic driving the 4 relays and the 8 digital inputs in **Figure 4** *is configurable from within the Access Portal Software.*

***Figure 4** doesn't show the end-of-line resistors on the Digital Input Circuits - See **Figure 1** (on page 2) for the correct placement of the 1kΩ EOL Resistors.*

Figure 5 S-Bus readers may be connected in parallel onto the S-Bus Host Terminals.

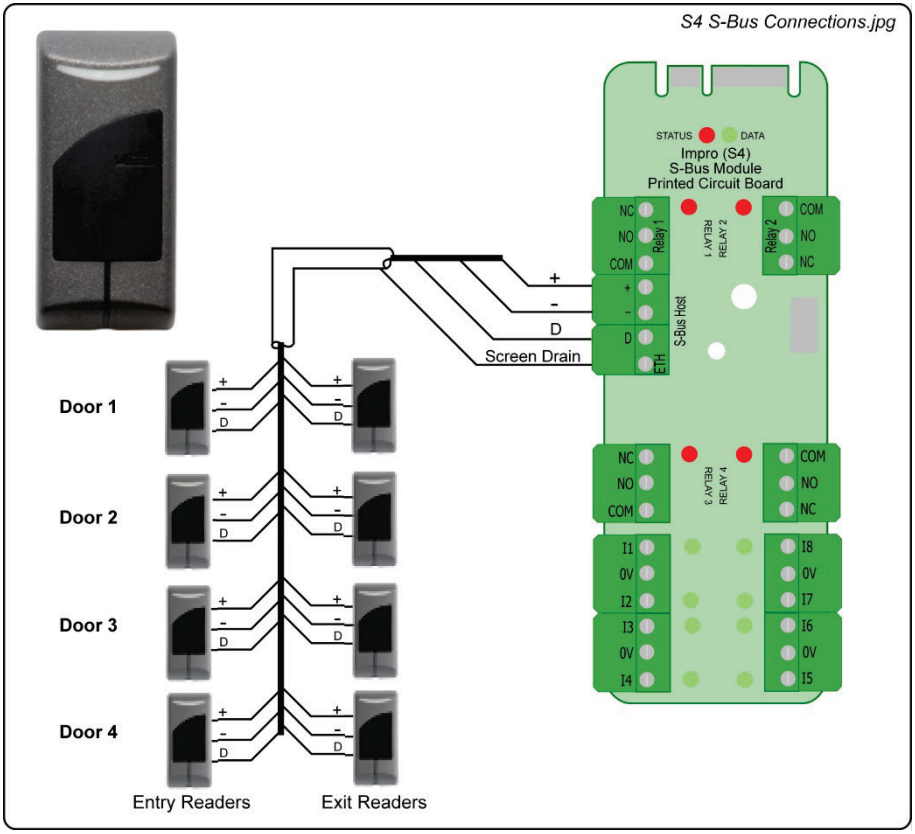

Figure 5: Connecting S-Bus readers to the S-Bus Host Terminal

NOTE: *Reader-to-Relay allocation is performed by setting the DIP Switches inside the S-Bus readers (See the S-Bus reader Installation Manual).*

Entry/Exit reader settings are allocated from within the Access Portal Software Application.

The need for screened cable is subject to the requirements of the site. (Be sure to conform to the S-Bus wiring requirements on page 7).

Fixed Address Labels

Once the installation is complete, do the following:

- Sketch a rough site plan.
- Attach the loose additional Fixed Address Label, packaged with the S4, in the position of the S4 on the sketched site plan.
- Attach the loose additional Fixed Address Labels, packaged with each of any installed S-Bus readers, in the position of these readers on the sketched site plan.
- When the system installation is complete and all the S4s (and their associated S-Bus readers) are represented on the site plan by their Fixed Address Labels, file the site plan for future reference.

USER NOTES

GUARANTEE OR WARRANTY

CAUTION: We reserve the right to nullify the products guarantee or warranty where you have not properly installed the Metal-oxide Varistors.

This product conforms to our Guarantee or Warranty details placed on our Web Site, to read further please go to www.impro.net.

This manual is applicable to the Impro (DIO) Digital I/O Module, Product Order Codes: HMS900-0-0-GB-XX, HMS901-0-0-GB-XX (The last two digits of the Impro stock code indicate the issue status of the product).			
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