GemOne®

Sapphire V2S
Hardware Installation
Procedure Manual

Please contact the Gem One support desk at +1 844-275-2801 or support@gemone.com after the table has been filled out.

Gem Serial #	1	2	3	4
End User				
End User Address				
Equipment Make				
Equipment Model				
Equipment Serial #				
Key Hours at Install				

Has Gem One been sent the customer setup sheet? (drivers, override codes, admin users)

Table of Contents

1.   Safety Precautions

Read the following safety precautions before installation or operation.

Abnormal Conditions

Should the V2S display become hot, start to emit smoke, or a strange odor; immediately turn the power off and contact Gem One. Continued usage is dangerous and may result in fire or electrical shock.

LCD Screen

Never apply heavy pressure on the V2S display or subject it to strong impact. Doing so may crack the screen or LCD panel glass, resulting in personal injury or major damage to the device.

Power Supply

Do not use the Sapphire V2S with any voltage other than that specified. Avoid situations that can cause damage to the power cable.

2. Introduction

1. Purpose

This document is to be used as a guide to install the Sapphire V2S onto various type of equipment, whether they are internal combustion or electric equipment.

2. Scope

This document is to be used by a trained and authorized person(s) with the necessary PPE as a guide for the installation, operation, and management of the Sapphire V2S. This document provides information on the components of the Sapphire V2S, installation procedure, and general troubleshooting methods.

3. Terminology

Sapphire V2S	Sapphire V2S Display
NO	Normally Open
COM	Common
Aux	Auxiliary
PPE	Personal Protective Equipment
LV	Low Voltage
HV	High Voltage
IB	Interface Box

3. Sapphire V2S Technical Parameters

There are two types of interface boxes that connect up to the equipment. One (LV) has 12-24V input and should be used for internal combustion equipment and the other (HV) has 36-80V input and should be used for battery electric equipment

⚠️ There is a sticker at the back of the Sapphire V2S display with 8-36V input. This is OK as the display will get power from the interface box.

Sapphire V2S LV Interface Box			
LV Interface Box	12	24	V
Equipment Detection - LV	7.5	24	V
Digital Input Detection - LV	5	24	V
Sapphire V2S HV Interface Box			
HV Interface Box	36	80	V
Equipment Detection - HV	7.5	80	V
Digital Input Detection - HV	5	80	V
Sapphire V2S Outputs			
Operation Inhibit Relay (NO)	-	10	A
Auxiliary Relay (NO)	-	10	A
Sapphire V2S Miscellaneous			
Touch Sensitive Display	-	-	Ω
Gem RFID or HID Reader	-	-	-
Strobe Alarm	12	48	V

4. Sapphire V2S Components

The following section shows pictorial examples of components of the Sapphire V2S system. The final product may vary slightly from what is depicted.

Figure 1:
Sapphire V2S Display

Figure 2:
Main Display Harness

Figure 3:
Interface Box

Figure 4:
Black Harness (A)

Figure 5:
Grey Harness (B)

Figure 6:
Mounting Hardware

Figure 7:
RFID Kit (OPTIONAL)

Figure 8:
RFID Extension Harness
(OPTIONAL)

Figure 9:
Harness A & B connected to IB

Figure 10:
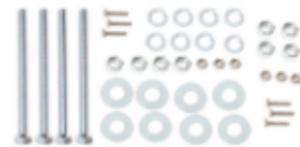Strobe Alarm (OPTIONAL)

Figure 11:
Overhead Plate (OPTIONAL)

Figure 12:
Overheard Hardware
(OPTIONAL)

5. Hardware Placement

The following section shows pictorial example of components of the Sapphire V2S system.

Sapphire V2S Display with RFID Option		The display should be in a location where both the reader and touch screen display is easily accessible and available to the operator. Placement should also not impede on the operator to view surrounding safely, i.e. mirrors.
Sapphire V2S Interface Box		The interface box (IB) should be secured to a flat surface with minimal movement. This is important as the IB also contains the impact sensor. The IB needs to be bolted to the frame and it cannot be installed onto the firewall. Consider space for cabling when selecting the location.
Sapphire V2S Strobe/Alarm Option		Strobe/Alarm should be positioned to maximise visibility to operator and surroundings. The V2S display can be mounted to the same bracket or separately. Consider height restrictions if the strobe is mounted outside the overhead guard.
Sapphire V2S Cabling		Cabling must be secured and routed in a way that it is free from excessive heat and moving components that could damage the insulation.

6.   Installation Guide

Now that suitable locations have been found to mount the hardware, wires need to be installed onto the equipment in order to get the Sapphire V2S operational.

⚠️ The type of connectors and methods used will vary from workshop to workshop.

The section below will be generic guides for two main categories; internal combustion and battery electric.

1.   Connection V2HARNA (Black) and V2HARNB (Grey) to the Interface Box

There are two positions on the interface box for the black and grey connector. Each connector has a special notch so they can only be plugged into the correct position.
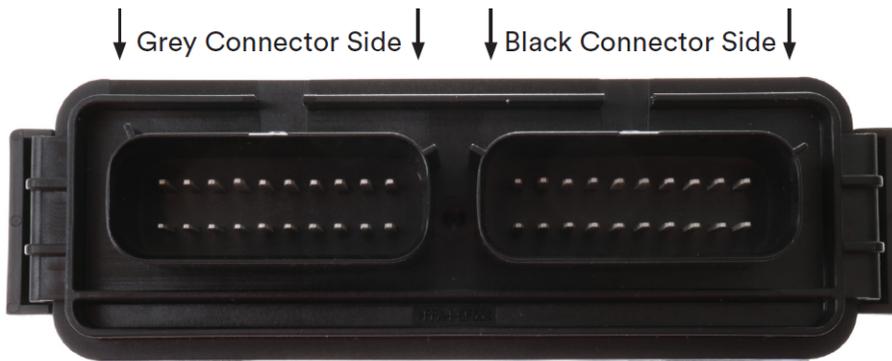
⚠️ There are 4 loose wires (with spades) coming out of the black and grey connectors. Connect the two wires coming out of the black connector to the two wires coming out of the grey connector.

It does not matter where each wire is connected as long as those 4 wires are connected.

2. Wiring Guide

The following information describes where to connect wires found on the grey connector.

|		
Black	Ground	Ground/Earth/Negative
Red	Power	Battery Positive/ Constant Power Source
Yellow	Ignition Sense	Key switch - accessories position
Grey	Digital Input 1	Operator presence is most common for input 1. Operator Presence is measured by either the deadman or seat switch.
Brown	Digital Input 2	Forward or Reverse is most common for input 2.
White	Drive Inhibit Relay COM	Internal Combustion - Male spade at the end Connected to Position 85 of starter relay coil Electric Vehicle - Male spade at the end Connected to seat/dead man switch
White/Purple OR White/Orange	Drive Inhibit Relay NO	Internal Combustion - Male spade at the end Connected to Position 85 of starter relay coil Electric Vehicle - Male spade at the end Connected to seat/dead man switch
White/Black	Aux Relay COM	Relay for impact lockout Connected to Ground/Earth/Negative
White/Blue OR White/Yellow	Aux Relay NO	Relay for impact lockout Connected to Aux device Ground/Earth/Negative

3.   Internal Combustion Wiring Diagram

The following diagram is an overview of the installation required for internal combustion equipment. It does contain the optional strobe/alarm combo and RFID Reader.

⚠️ Inputs (grey and brown) wires do not affect the operation of the equipment. They only count the time On and time Off.

Note down how the inputs trigger (normally 0V then it changes to +VE upon active or vice versa) and inform Gem One.
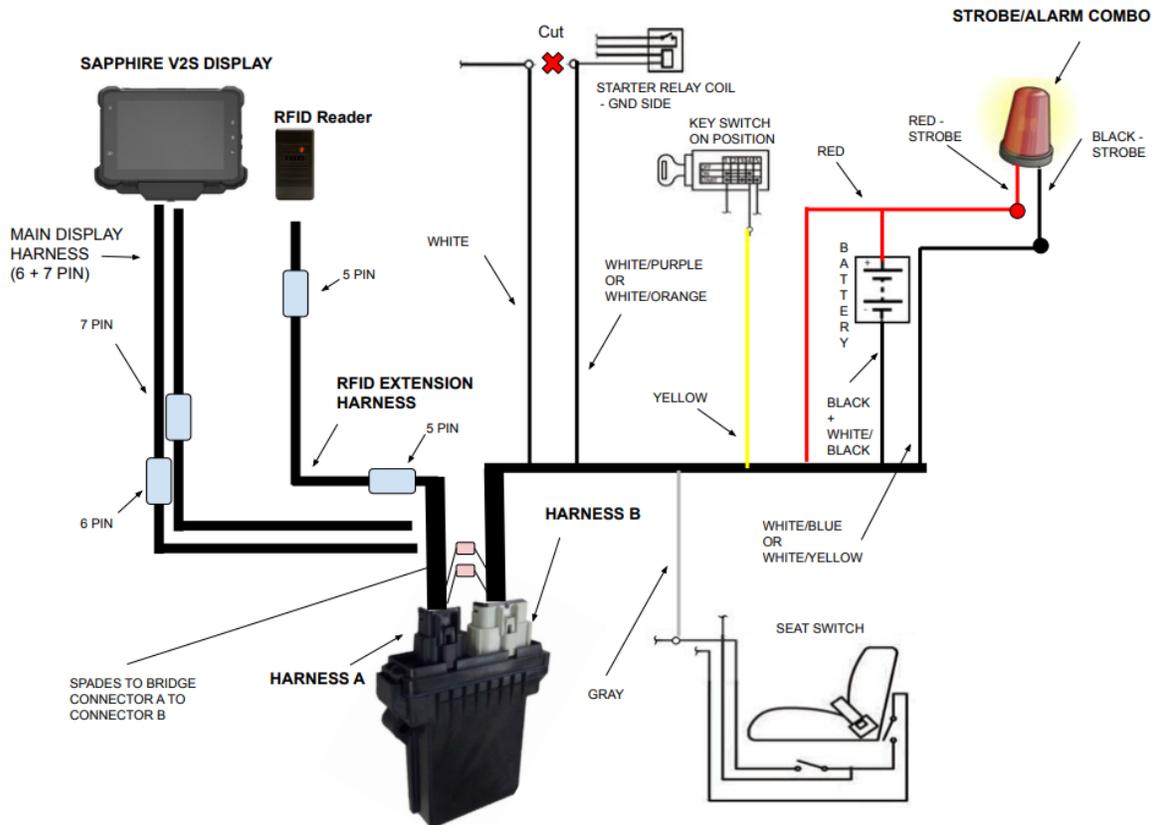
4.   Battery Electric Wiring Diagram

The following diagram is an overview of the installation required for battery electric equipment. It does contain the optional strobe/alarm combo and RFID Reader.

⚠️

Inputs (grey and brown) wires do not affect the operation of the equipment. They only count the time On and time Off.

Note down how the inputs trigger (normally 0V then it changes to +VE upon active or vice versa) and inform Gem One.

There should not be a need to install DC-DC converters if the 36-80V interface box is installed on battery electric equipment.

Voltage input range for strobe alarm is 12-48V. DO NOT exceed 48V.
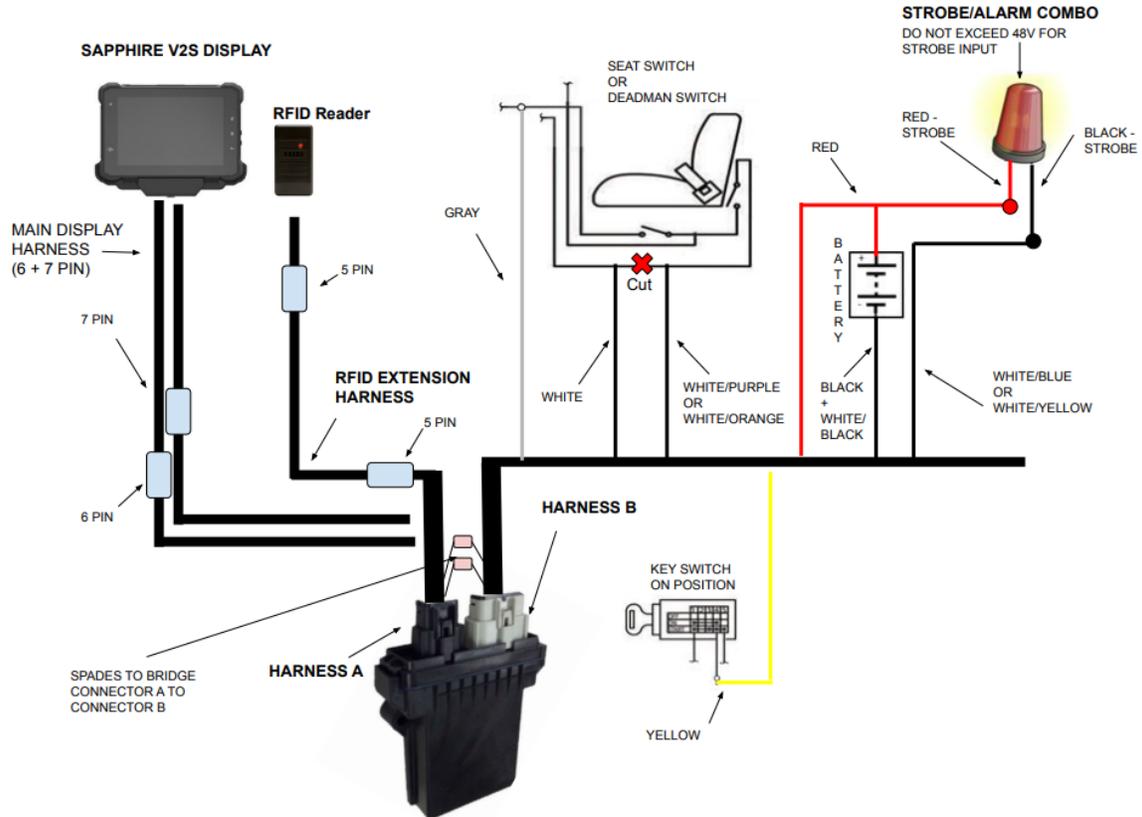
7.   Sapphire V2S Operation

1.   Powering Device

Depending on which equipment type, turn the key to Accessories (internal combustion) or On (battery electric). This will engage the Sapphire V2S allowing operators to log into the screen.

⚠️ The yellow wire (ignition sense/equipment detection) will sense a voltage and the Sapphire V2S display should turn On when the key is turned.

Turn key to Accessories or On
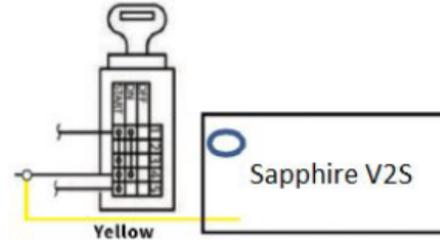
⚠️ Please contact the helpdesk if an extended shutdown is required. This will keep the display On for a period of time after the key I turned to Off and no one is logged in.

2. Relay Operation

1. *Drive Inhibit Relay*

A NO relay is used to inhibit the operation of equipment. Operators must log into the display first before the relay closes which allows the equipment to be used.

When the key is turned to Off, the relay will open back up and the equipment cannot be used until another operator has logged in.

2. *Auxiliary Relay*

A NO relay is used for the auxiliary relay. The most common item connected to the auxiliary relay is a strobe/alarm combo.

The relay will remain open until an exception occurs that exceeds the lockout threshold and the display will lock out. Once the screen locks out, the relay will close and depending on how it is wire, it will supply a ground signal to activate the strobe. See section 8 below for more details on how to wire this up.

The relay will remain closed until the screen has been unlocked.

3. Inputs

There are two inputs currently available on the Sapphire V2S. These can be used to detect operating values/times of various functions.

Inputs do not affect the operation of the equipment. They are only a counter to determine the time On or time Off.

8.   Installing Aux Device for Impact Lockout

If the impact lockout feature is available on the Sapphire V2S, an Aux device (such as an alarm or light) can be fitted to activate upon impact. A threshold is set on the module so impacts above this threshold will lock out the module and activate the device.
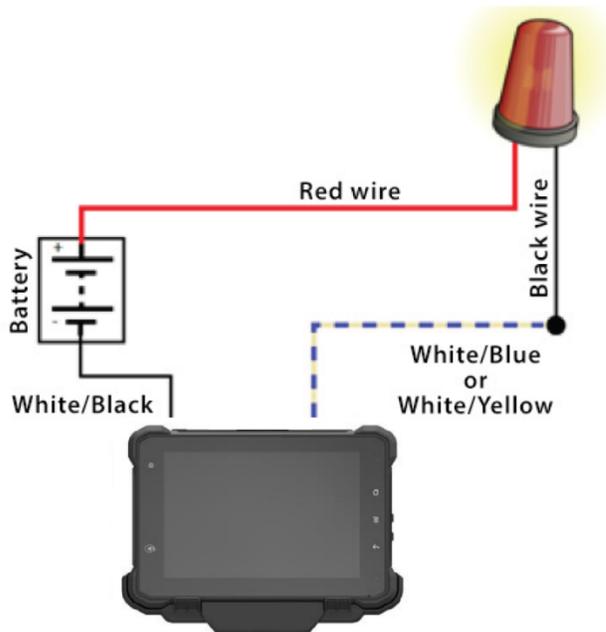
The default lockout threshold is 5.5 G

An override code is required to change the threshold on the module. Alternatively, it can be changed remotely using the interface.

Voltage input range for strobe alarm is 12-48V. DO NOT exceed 48V.

1.   Installation Diagram – Strobe/Alarm Combo

2.   Activating the Aux Device

Installation of the device can be tested by lowering the impact threshold to 1.0 G then triggering an impact above 1.0 G. This will lock out the device and close the Aux relay.

Be sure to change the impact threshold back to 5.5 G (unless the customer utilizes a different value).

9. Installation of Overhead Mounting Bracket (optional)

The following components will be required to install the mounting bracket kit:

- 2 x Overhead Plates (optional)
- 1 x Overhead Hardware (optional)
- 1 x Strobe and Alarm (optional)

⚠️ The mounting bracket kit and strobe/alarm combo reflected in the picture below are optional accessories. These options are not standard in the Sapphire V2S kits.

1. Procedure

Authorized and trained person/s must ensure correct use of appropriate PPE and safety precautions are in place before installing to ensure person/s and equipment are free from damage/injury.

See image below for finished product. Two plates are clamped on the overhead guard with the strobe mounted on the top and the Sapphire V2S mounted underneath. The end of the bolt will be facing up but they will be lower than the strobe.

- Select a location to mount the two plates that will not interfere with the operation of the equipment and will meet overall height requirements

- Line up the holes on both plates and secure using the nuts and bolts

- Select suitable holes on the top plate to mount the strobe

- Select a suitable location to mount the circular section of the Sapphire V2S mounting bracket to the bottom plate

- Attach the Sapphire V2S Display

⚠️ The image above should be used as an example only. A site evaluation may be needed to verify that the placement meets site overall height and safety requirements.