

Metermatic

SCS-400

Sealed Parcel Delivery System

Installation Manual

Contents

1.	Introduction	1
2.	Pre Installation	1
2.1.	General	1
2.2.	Exd	2
2.3.	Intrinsic Safe	3
2.4.	SCS-400.....	4
2.5.	API-400 Sensor	4
2.6.	BVS-100 Sensor	4
2.7.	MAN-400 Sensor.....	4
2.8.	REF-400 Sensor	4
3.	Installation.....	5
3.1.	SCS-400 Installation Block Diagram	5
3.2.	SCS-400 All Connections.....	6
3.3.	Input Power (Connector J1)	7
3.4.	Aux Battery (Connector J2)	8
3.5.	Output Power (Connector J3).....	8
3.6.	RS232 / RS 485 (Connector J4).....	9
3.7.	RS232 / GSM (Connector J5)	10
3.8.	Gantry Permissive Interface (Connector J7)	10
3.9.	5 Wire Sensor Interface (Connector J8).....	11
3.10.	CANBUS Interface (Connector J9).....	12
3.11.	IO Interface (Connector J10).....	16
3.12.	Proximity Interface (Connector J11).....	17
3.13.	2 Wire Sensor Interface (Connector J12).....	18
4.	Troubleshooting	19
4.1.	EXD Test Points	19
4.2.	IS Test Points.....	20
5.	Certification.....	21
5.1.	SCS-400 - 15.0026X	21
5.2.	Annex to 15.0026X.....	24
5.2.1.	Equipment.....	24
5.2.1.1.	Power to the non-i.s. electronics in the flameproof enclosure:	25
5.2.1.2.	ANT [Ex ib] (824MHz to 1990MHz).....	25
5.2.1.3.	J8 - 5 Wire Interface [Ex ia].....	26
5.2.1.4.	J9 – CANBUS [Ex ia]	26
5.2.1.5.	J12 - 2 Wire Interface [Ex ia].....	26
5.2.1.6.	J11 – Proxy Interface [Ex ia]	27
5.2.1.7.	J10 – Output (pin 1 w.r.t 2) Interface [Ex ia].....	27
5.2.1.8.	J10 – Input (pin 3 w.r.t 4 Interface [Ex ia].....	27
5.2.1.9.	JJ8 – Dallas Tag Interface [Ex ia]	28

5.2.1.10.	J7 - GPI Interface [Ex ia]	28
5.2.2.	Conditions of Certification	28
5.2.2.1.	Conditions of manufacture	28
5.2.2.2.	Special conditions of use	29
5.3.	API, BVS, MAN, REF - 15.0009X.....	30
5.4.	Annex to 15.0009X.....	33
5.4.1.	Equipment.....	33
5.4.1.1.	API-400:.....	33
5.4.1.2.	MAN-400:.....	34
5.4.1.3.	BVS-100:.....	34
5.4.1.4.	REF-400:.....	35
5.4.2.	Conditions of Certification	36
5.4.2.1.	Special Conditions of use.....	36
5.4.2.2.	Conditions of manufacture	36



1. Introduction

The SCS-400 System, designed and manufactured by Metermatic (Pty.) Ltd. South Africa, is intended to control and monitor liquid product transports. The SCS-400 is mounted on bulk petroleum vehicles and is designed to electronically seal all loading/offloading and access points on the vehicle, providing a “sealed parcel delivery” system.

The SCS-400 is housed in a combined Exd and Intrinsic safe enclosure, which has approximate dimensions of 347mm x 226mm x 91mm. Four M10 bolts secure the SCS-400 onto the vehicle. The SCS-400 enclosure has seven M20x1.5 gland entries, the first three providing cable entries to the Intrinsic Safe side and four providing cable entries to the Exd side. There is also an M16x1.5 gland entry at the top providing an entry for the M16 Exd antenna bush assembly, when GSM connectivity is required.

2. Pre Installation



Failure to adhere to the operating conditions and considerations described below could result in the equipment malfunctioning.

2.1. General

- a) The SCS-400 enclosure must be mounted within a stainless steel cabinet for additional protection from the elements.
- b) The enclosure shall be installed so that it is not subjected to direct spray from the vehicle's wheels.
- c) If welding is to be done on the vehicle after the SCS has been installed, then all connections to the SCS must be isolated, and the internal battery should be disconnected.
- d) No additional holes may be drilled into any enclosure, as this will invalidate the certification of the system.
- e) No additional components may be installed in any enclosure, as this will invalidate the certification of the system.
- f) Repair of this equipment shall be carried out in accordance with the applicable code of practice.
- g) All cables that interconnect the various system components and sensors must be securely fastened.



2.2. Exd Instructions

The following instructions apply to equipment covered by certificate number **IECEX ICS 15.0026X**. Referring to the FLP-100 (Exd Enclosure specifically)

Certification Number: IECEX ICS 15.0026X
Classification: Exd [ia] [ib] IIA T4 Mb Gb
Ambient temperature: -20°C to +60 deg °C
PART No. FLP-100
VOLTAGE: 24V
WATT: 7.5W

Installation Safety Instructions:

- a) Manager's site rules and guidelines to be followed to install equipment.
- b) Refer to Installation drawings for the flameproof dimensions and correct wiring.
- c) Inspection of the FLP-100 Enclosure (SCS-400) should be performed prior to powering of the system.
- d) The following items should be inspected, but inspection should not be limited to:
 - Flameproof bolted joints for missing or loose fasteners.
 - Flameproof joint gaps.
 - Flameproof compression glands, blanking plugs and certified bushings.
 - Check all terminations for loose connections.
- e) Only qualified personnel are allowed to be installing, inspecting and maintaining equipment.



2.3. Intrinsic Safe Instructions

The following instructions apply to equipment covered by certificate number **IECEX ICS 15.00026X** and **IECEX ICS 15.0009X**.

1. The equipment is only certified for use in ambient temperatures from 20°C to +60°C and should not be used outside this range.
2. Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel and in accordance with the Manual provided.
3. The plastic enclosures (REF-400) shall be installed so that under normal conditions of use, maintenance and cleaning, danger of ignition due to electrostatic charges is avoided.
4. The cleaning of the plastic enclosures should be executed with a damp cloth.
5. Repair of this equipment shall be carried out in accordance with the applicable code of practice.
6. Programming connectors JJ1, JJ2 and JJ3 are only used during manufacturing, repair or overhaul.
7. The BR2330 coin cell is not replaceable.
8. Only a Metermatic BBU-500 can be used in the SCS-400 system, replacement may only take place in a Safe Area. This is not a user replaceable battery.
9. The certification of this equipment relies upon the following materials used in its construction:
 - Aluminium enclosure (API-400, MAN-400, BVS-100).
 - Plastic enclosure (REF-400).
 - Type FR453 Elite Chemicals potting compound.
10. The certificate number has an 'X' suffix, which indicates that special conditions of installation and use apply. Refer to Certificate 15.0026X - [Special conditions of use](#) and Certificate 15.0009X [Special Conditions of use](#) for more information.



2.4. SCS-400

- a) The installed location height of the unit should permit easy viewing of the display, and provide convenient access to the keypad and the M16 Exd Antenna Bush assembly located on the top of the enclosure.
- b) Access for servicing the unit is through the front cover. Complete access by service personnel for repair and removal of parts should be provided. For ease of service, the cover must swing open more than 100°. The enclosure is hinged on the left.
- c) The SCS enclosure must be earthed to the vehicle's chassis by means of either the connecting bolts or bonding point provided.
- d) A plastic isolator separates Intrinsically Safe connections J7 and J8 from Non Intrinsically Safe connections J1, J2, J3, J4 and J5. Care must be taken that in the event of any connection comes loose, a clearance of at least 50mm is maintained between IS and non-IS connections.

2.5. API-400 Sensor

- a) The API adaptors must be installed so that the API-400 sensor is positioned horizontally.

2.6. BVS-100 Sensor

- a) Ensure that the correct length BVS-stem is used for the bottom valve type used.
- b) When attaching the BVS-100 sensor to the bottom valve ensure that the bolts are not overtightened, as this will effect operation.

2.7. MAN-400 Sensor

- a) The MAN-400 sensors must be installed on top of the manhole cover perpendicular to the opening movement of the manhole.
- b) All MAN-400 sensor cables must be routed neatly and securely to prevent any obstruction to operators or interference with manhole operation.
- c) All MAN-400 sensors must be orientated in the same direction.

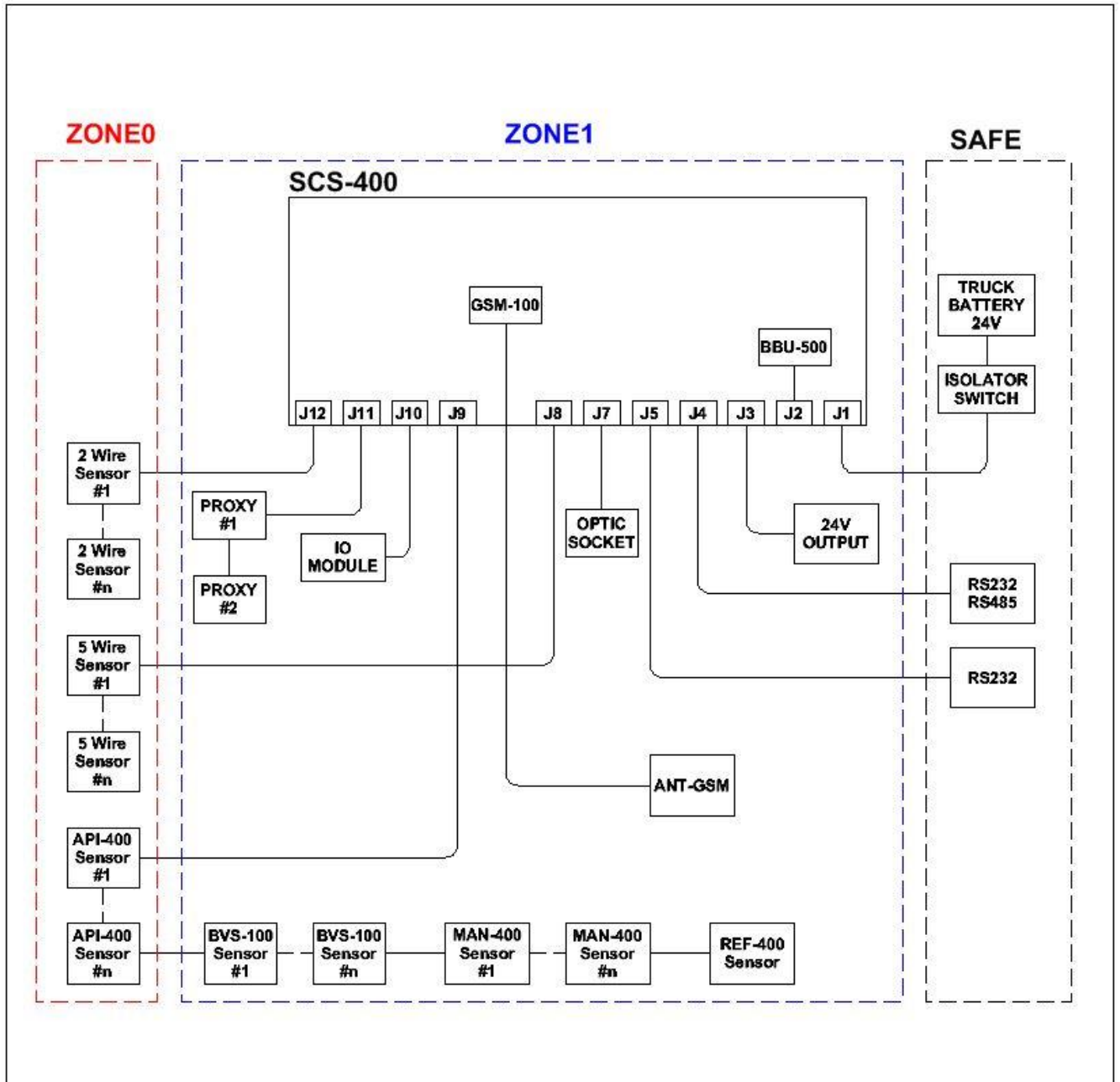
2.8. REF-400 Sensor

- a) The REF-400 sensor must be installed at the end of the CAN bus. (Refer to section [CANBUS Interface \(Connector J9\)](#) for details).
- b) The REF-400 sensor cable must be routed neatly and securely to prevent any obstruction to operators or interference with manhole operation.
- c) The REF-400 sensor must be orientated in the same direction as all the MAN-400 sensors.

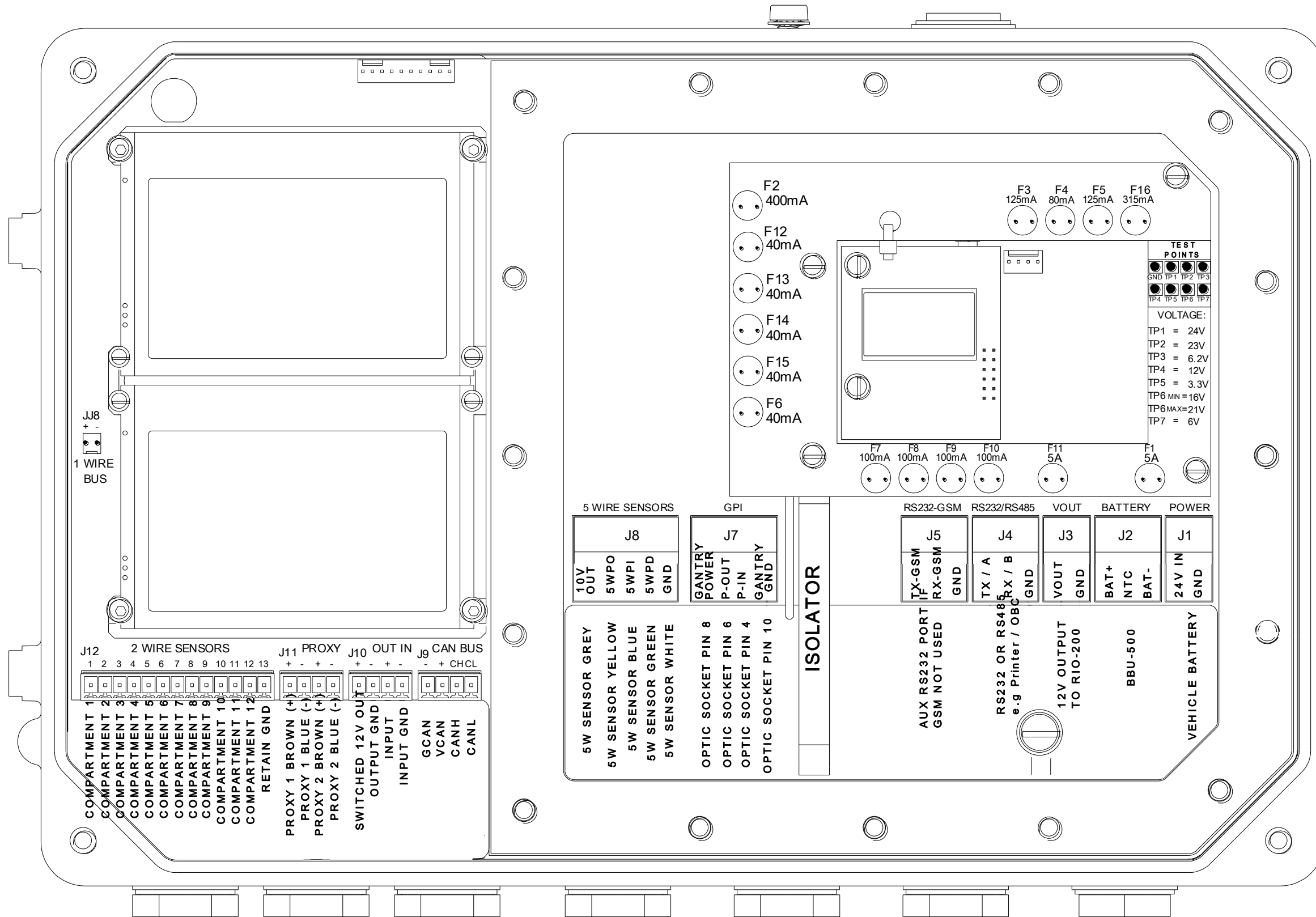


3. Installation

3.1. SCS-400 Installation Block Diagram



3.2. SCS-400 All Connections



3.3. Input Power (Connector J1)

Nominal Input Voltage: 24VDC

Input Voltage range: 22VDC to 30VDC

Max Input Current: 1600 mA

(8 Compartment vehicle with full control. Internal Battery Charging)

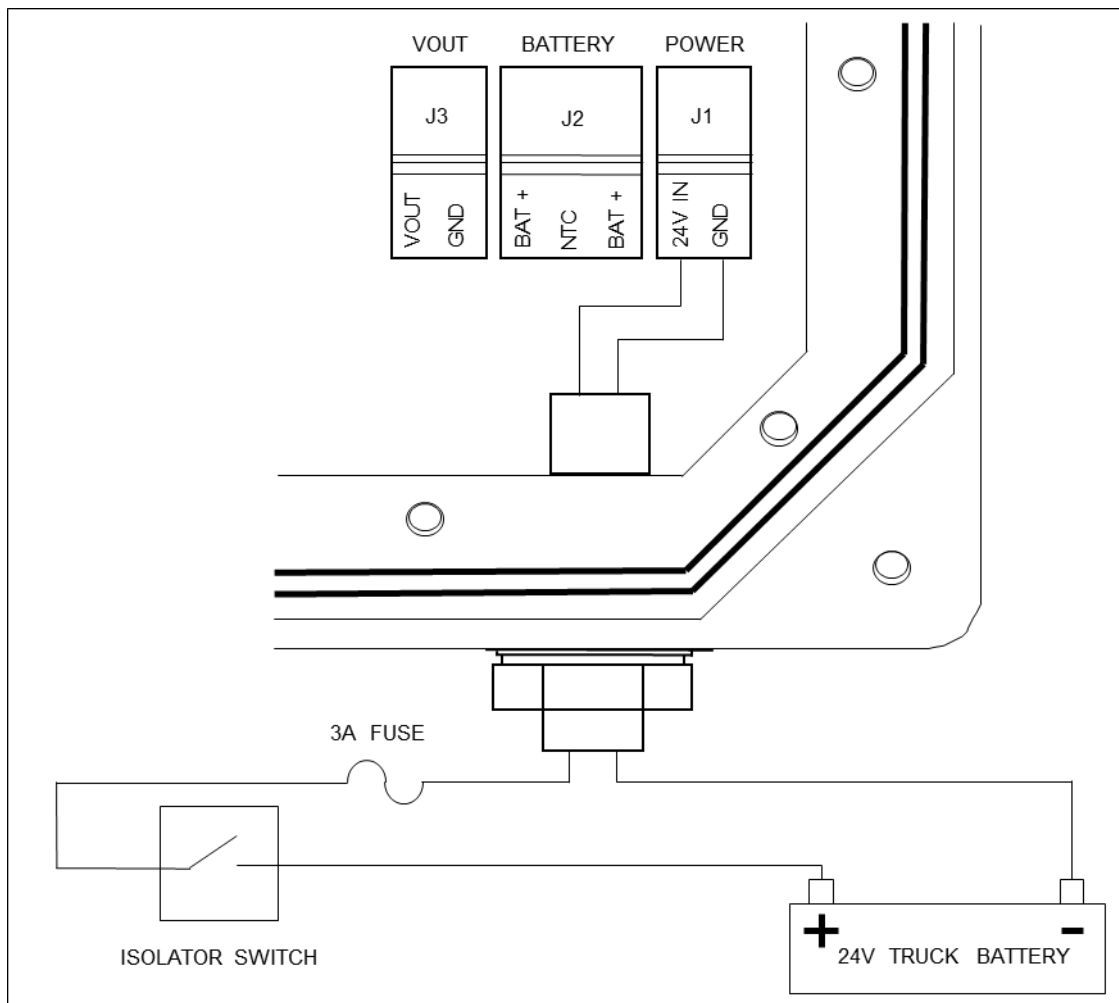
Max Input Current: 640 mA

(8 Compartment vehicle with full control. Internal Battery Fully Charged)



It is important to supply the SCS-400 from the Isolator Switch and not directly from the battery as shown in the figure below. Failure to do this will invalidate the IS certification.

The SCS-400 is protected by a 5A internal fuse (F1). It is recommended to connect an additional 3A inline fuse on the positive (+) line from the vehicle battery. Install this fuse after the isolator switch as shown below.



3.4. Aux Battery (Connector J2)

Max Voltage = 21VDC

Min Voltage = 16VDC

Charge time = 3.5hours

Note: The SCS-400 will not operate when the battery voltage is below 16V



- *Only the Metermatic BBU-500 may be connected to these terminals.*
- *The BBU-500 can only be replaced when no explosive atmosphere is present.*
- *The BBU-500 contains Lithium Ion cells. Care must be taken when replacing the BBU-500 that the leads are not shorted together.*
- *Take care when closing the EXD lid that the battery leads are not clamped between the lid and enclosure.*

3.5. Output Power (Connector J3)

$V_{OUT} = 24V$ - Vehicle Battery

OR

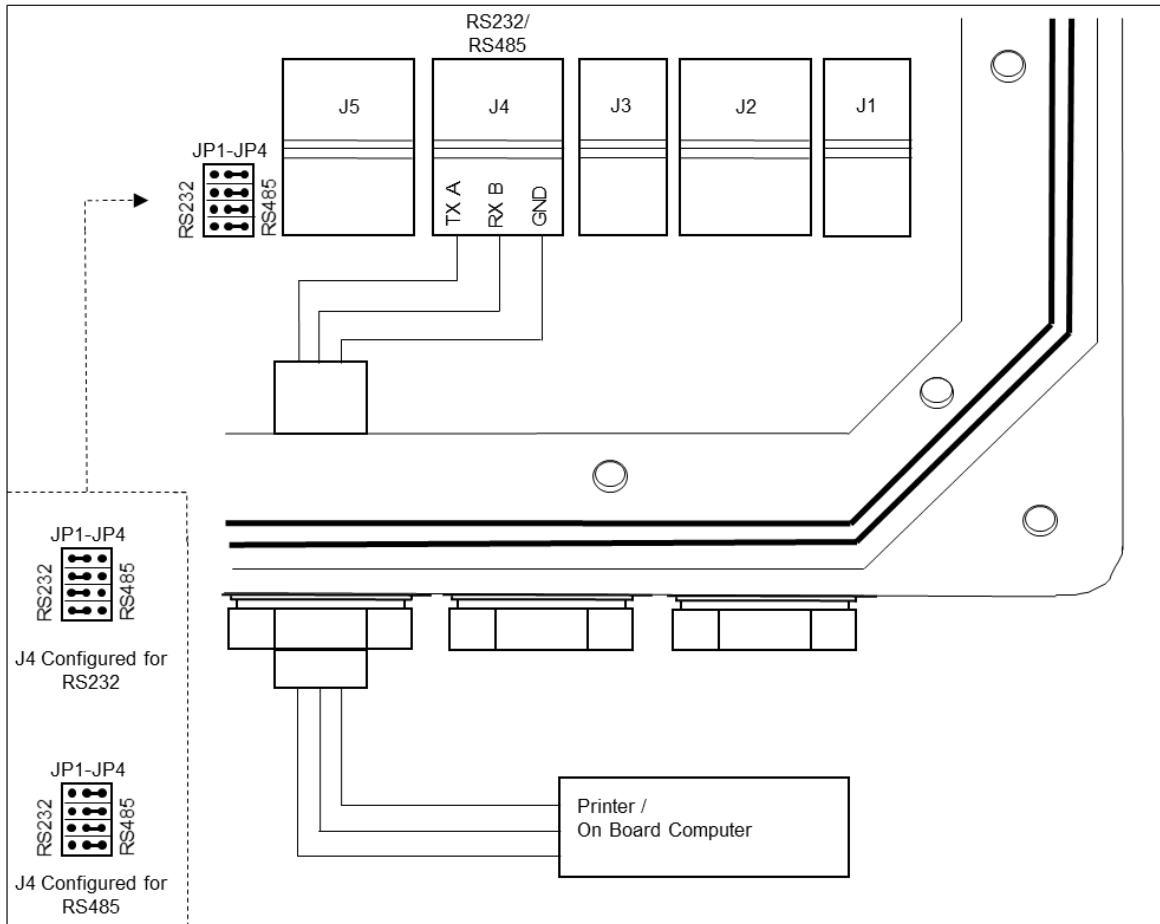
$V_{OUT} = 21V$ - Aux Battery (BBU-500) while SCS-400 is isolated from vehicle battery during loading.

The voltage from connector 3 is used to power the RIO-200 that is located in the pneumatic control box (PCU-500-XX, PCU-600-XX).

3.6. RS232 / RS 485 (Connector J4)

The SCS-400 can interface to communication devices (Printer or On Board Computer) via connector J4.

The port can be configured For RS232 or RS485 by using the jumper settings JP1 – JP4.






3.7. RS232 / GSM (Connector J5)

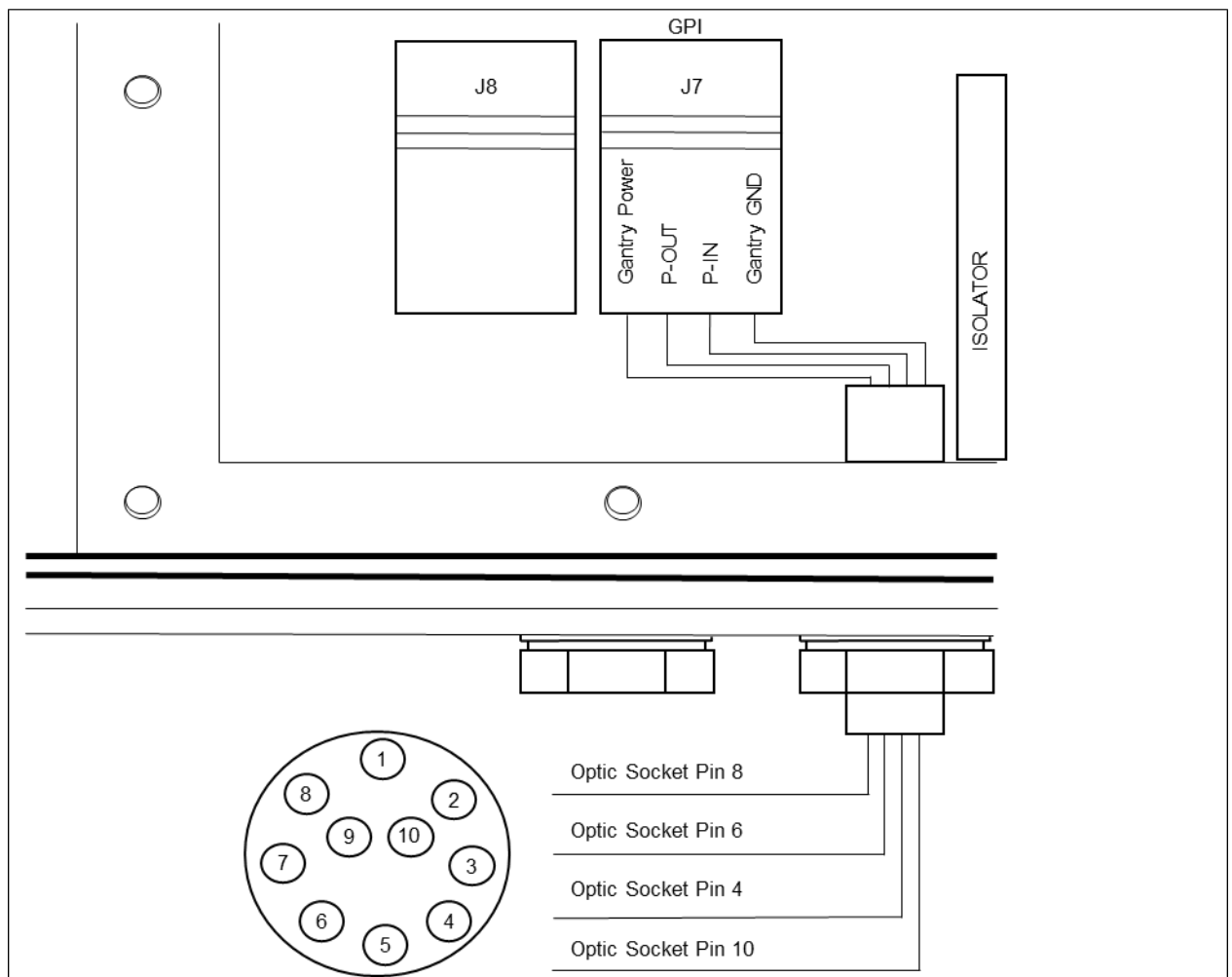
This is an auxiliary communication port that can only be used if the GSM module is not used.

3.8. Gantry Permissive Interface (Connector J7)

The overfill status of the vehicle is transmitted to the Gantry via the GPI connections on the SCS-400.


 *It is important not to exceed the safety parameters of J7 (see section [J7 GPI Interface \[Ex ia\]](#)) Failure to do this will invalidate the IS certification.*

These connections are wired to the 10 pin Optic Socket as shown in the figure below.

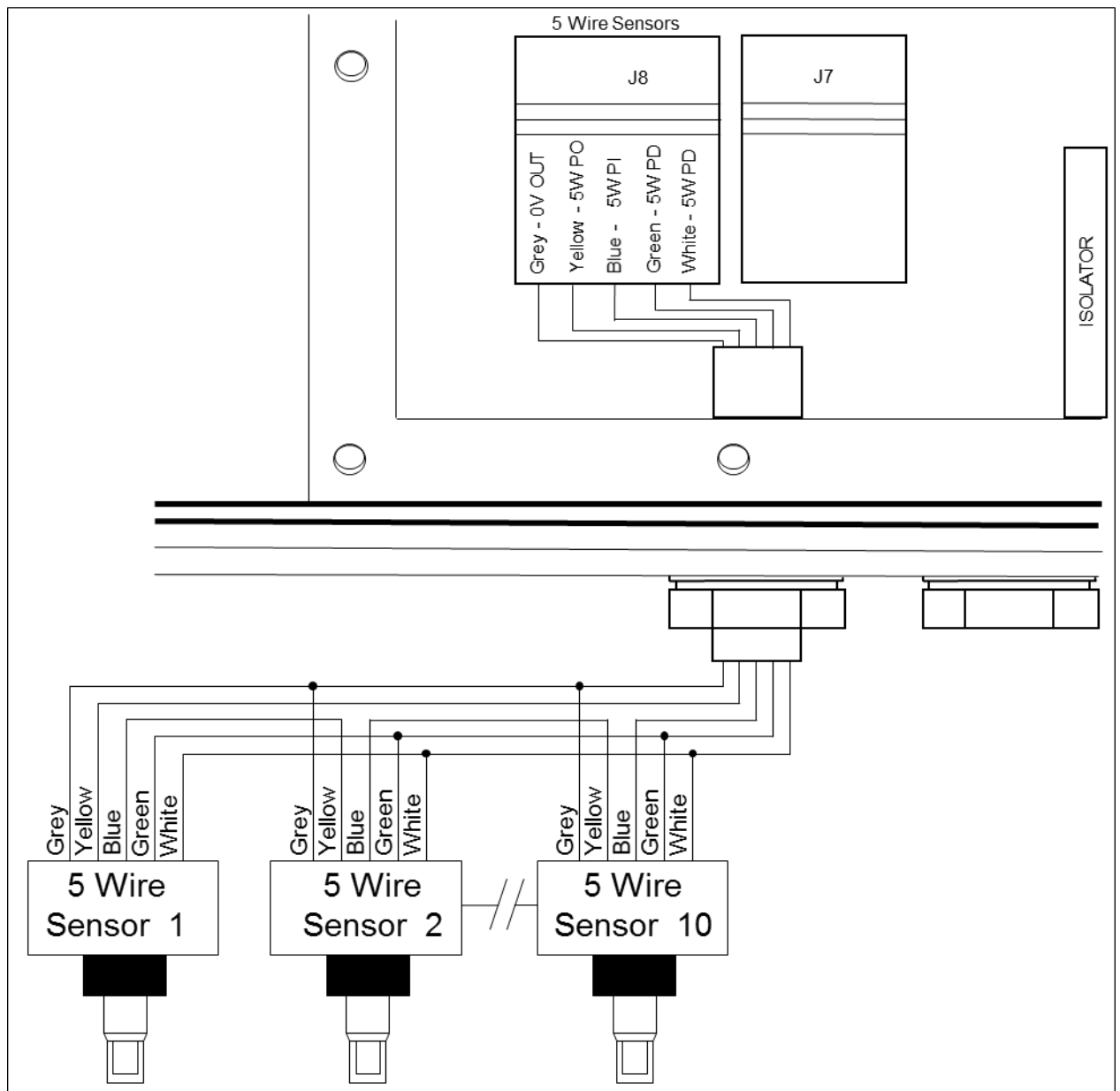


3.9. 5 Wire Sensor Interface (Connector J8)

The SCS-400 interfaces to 5 Wire Overfill Sensors that comply with EN13922. The SCS-400 can interface to a maximum of 10 x 5 wire sensors (10-compartment vehicle).

 *It is important not to exceed the safety parameters of J8 (see section [J8 - 5 Wire Interface \[Ex ia\]](#)). Failure to do this will invalidate the IS certification.*

The sensors connections are shown in the figure below:



3.10. CANBUS Interface (Connector J9)

The following sensors / components interface to the SCS-400 via the CAN Bus:

- API-400
- BVS-100
- PCU-500/600-XX
- MAN-400
- REF-400



It is important not to exceed the safety parameters of J9 (see section [J9 – CANBUS \[Ex ia\]](#)). Failure to do this will invalidate the IS certification.

NOTE *The most important issue regarding the wiring of the sensors on the CAN bus, is that the REF-400 **MUST** be connected at the furthest point on the BUS.*

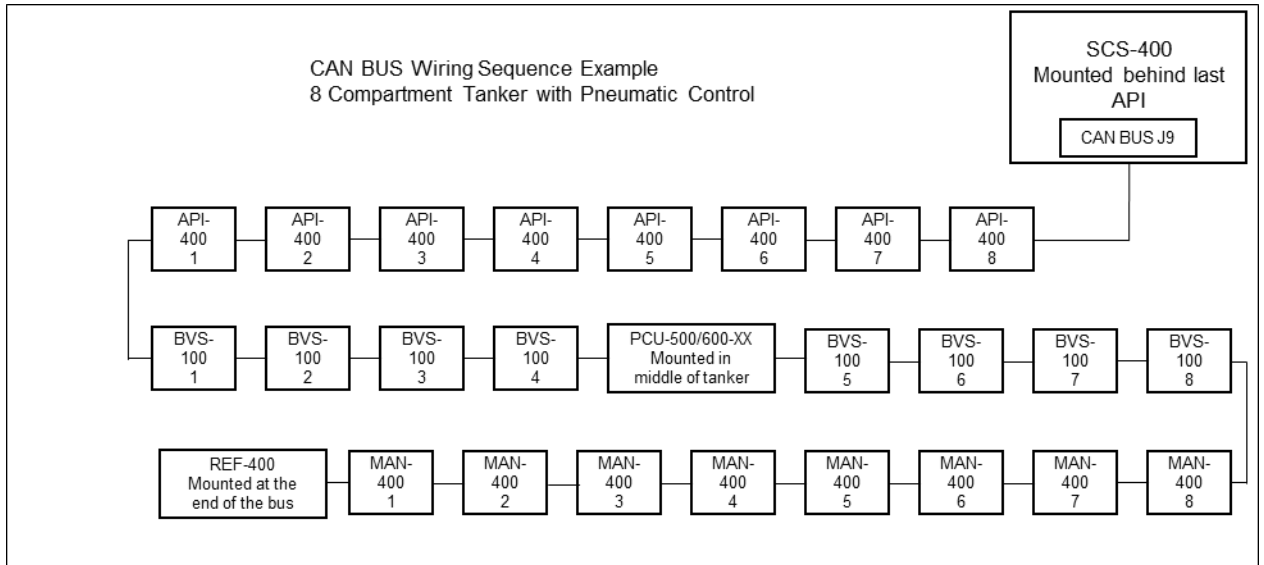
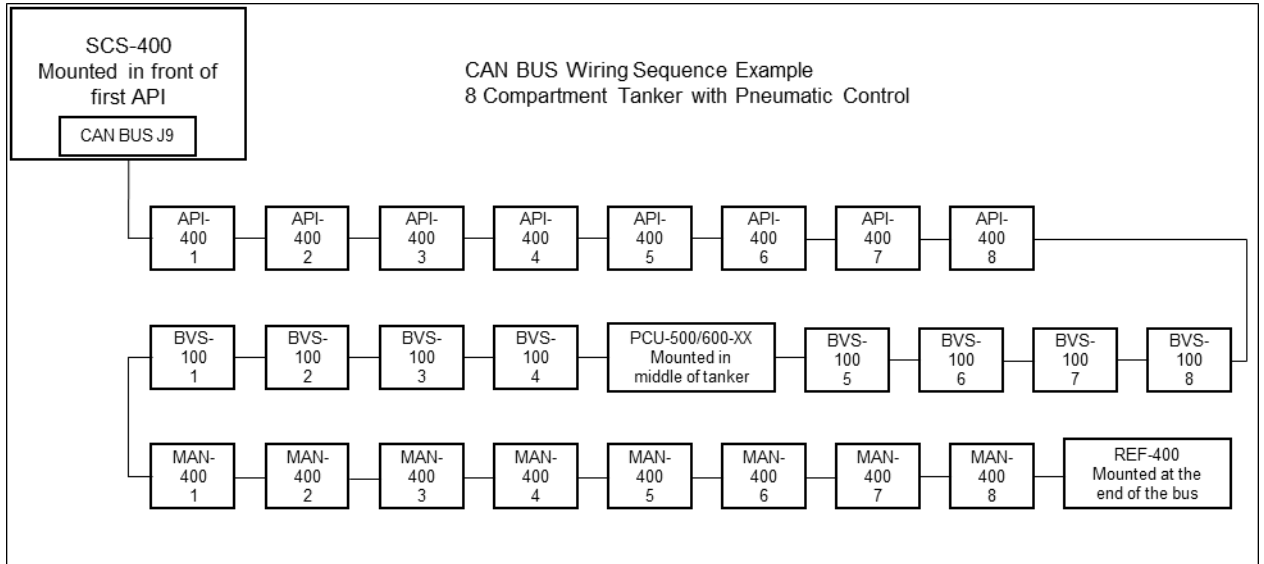
When wiring the CAN Bus, the objective is to maintain the shortest possible cable length connecting all sensors.

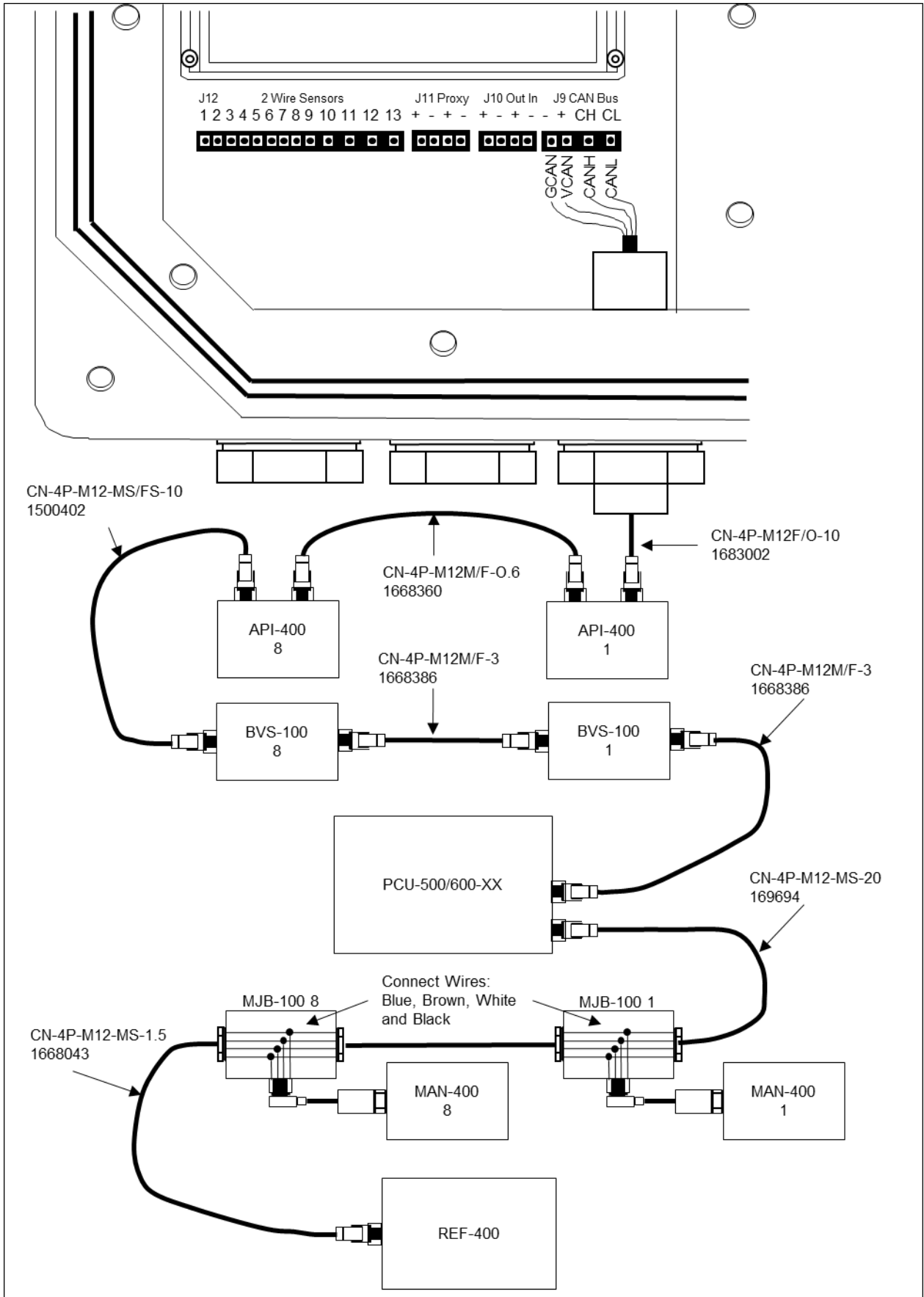
Examples of CAN BUS wiring is shown below. The first example is when the SCS-400 is mounted in front of the API's and the second example is when the SCS-400 is mounted behind the API's.

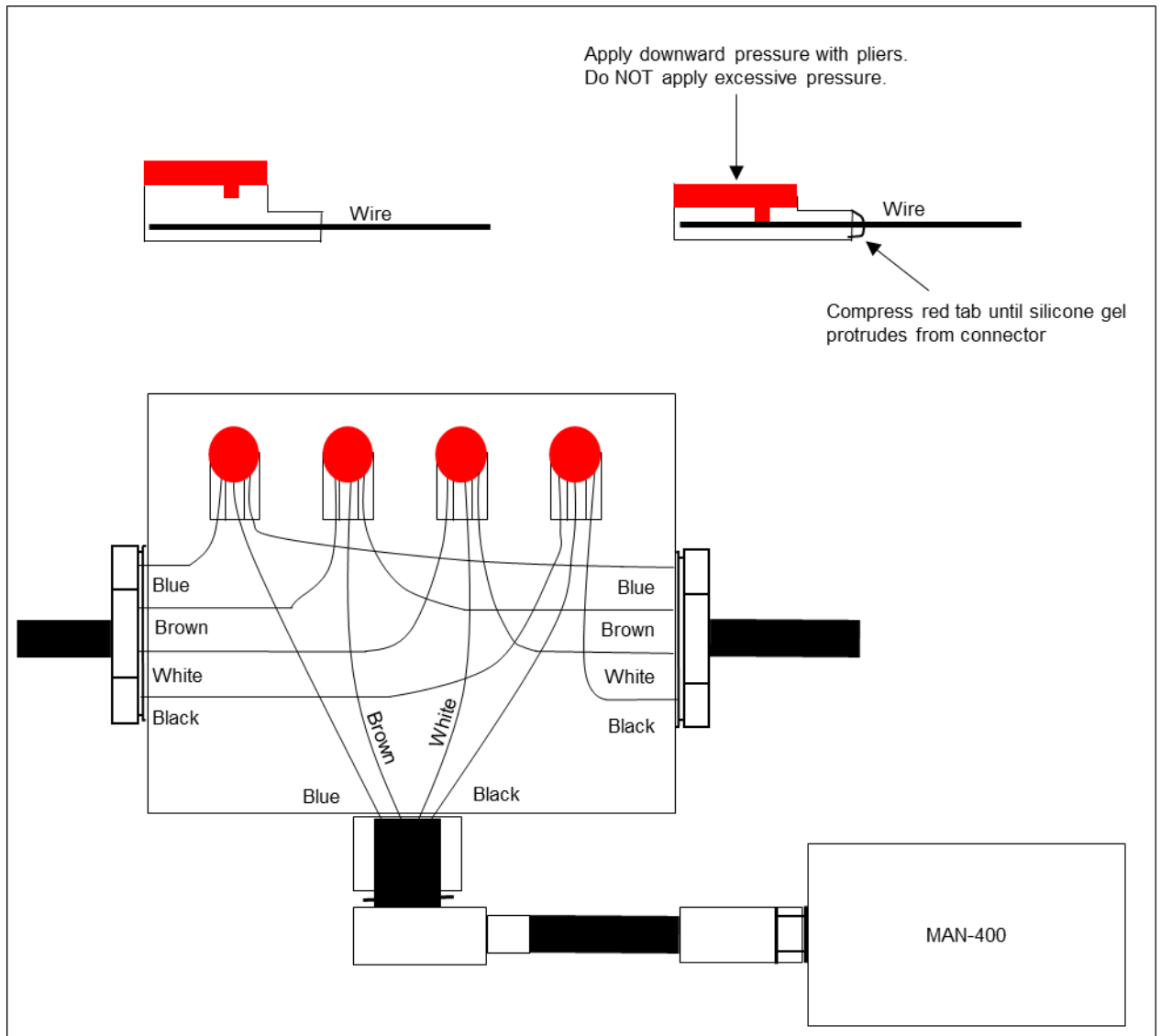
These examples illustrate that the sensor sequence does not have to follow the compartment number sequence. Note that the PCU-500/600-XX can be mounted in between the bottom valve sensors.

Please note: The actual wiring sequence can differ from the examples below depending on equipment mounting and cable trunking / piping provided on the tanker.

The REF-400 sensor contains a GPS module. The REF-400 enclosure must not be covered with any metal plate that will interfere with the GPS signal.








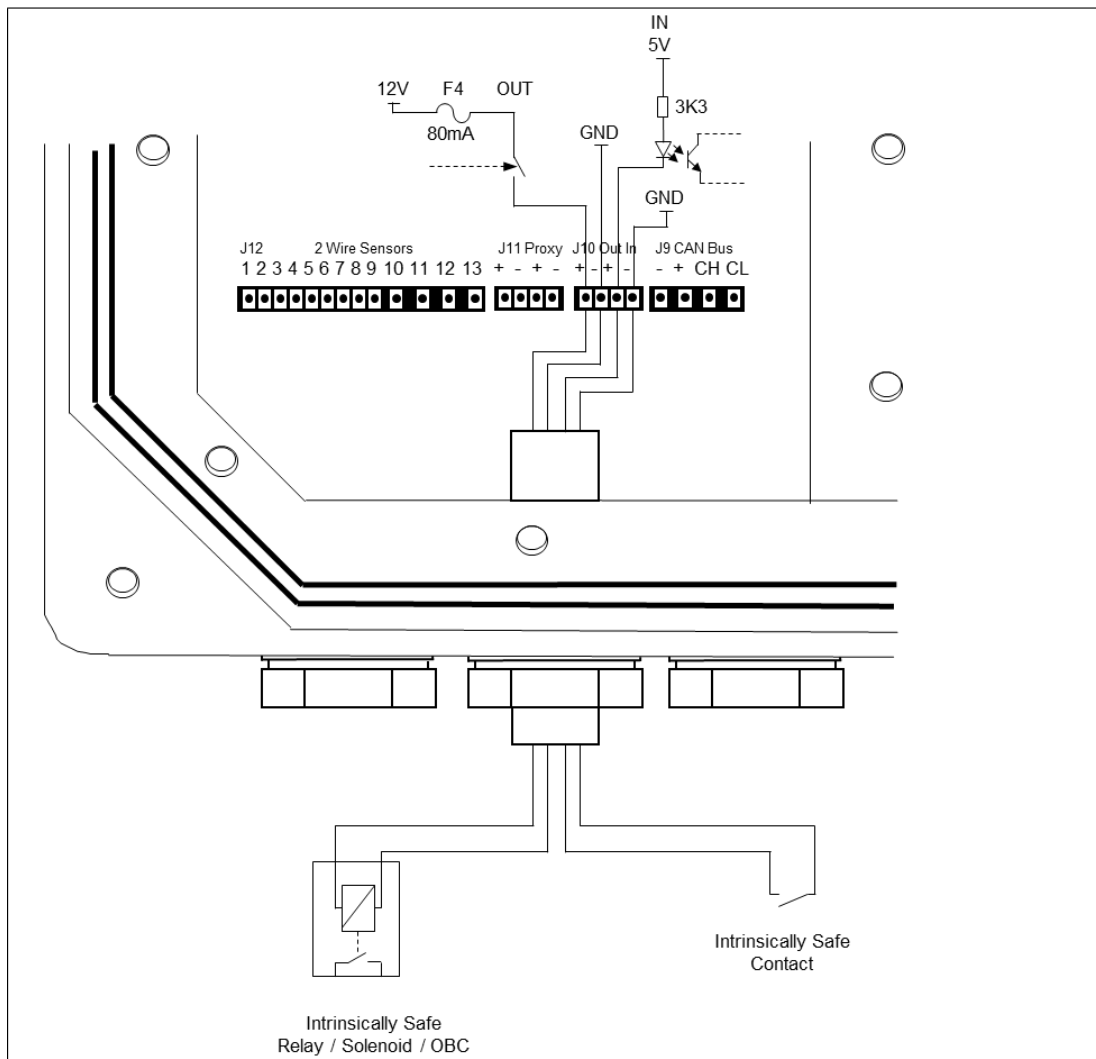
3.11. IO Interface (Connector J10)

The SCS-400 has a single Intrinsically Safe output that can be used to switch a certified relay or solenoid. Alternatively, it can be used as a permissive signal to a certified OBC.

The SCS-400 has a single Intrinsically Safe input that can be switched from a certified contact.




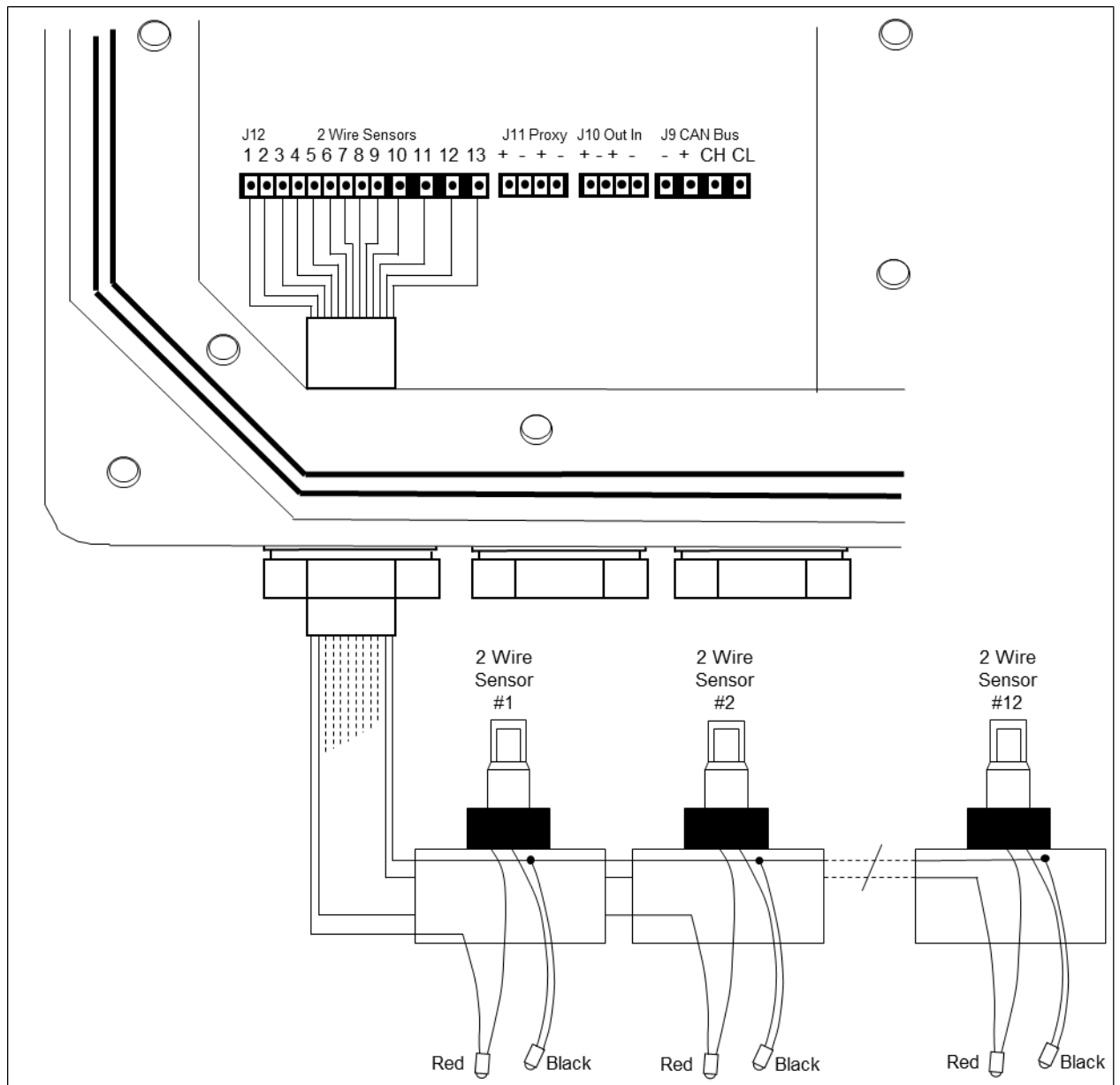
It is important not to exceed the safety parameters of J10 (see sections [J10 – Output \(pin 1 w.r.t 2\) Interface \[Ex ia\]](#) & [J10 – Input \(pin 3 w.r.t 4 Interface \[Ex ia\]\)](#)). Failure to do this will invalidate the IS certification.



3.13. 2 Wire Sensor Interface (Connector J12)

The SCS-400 can interface to 12 x 2 wire retain sensors.

 *It is important not to exceed the safety parameters of J12 (see section [J12 - 2 Wire Interface \[Ex ia\]](#)). Failure to do this will invalidate the IS certification.*



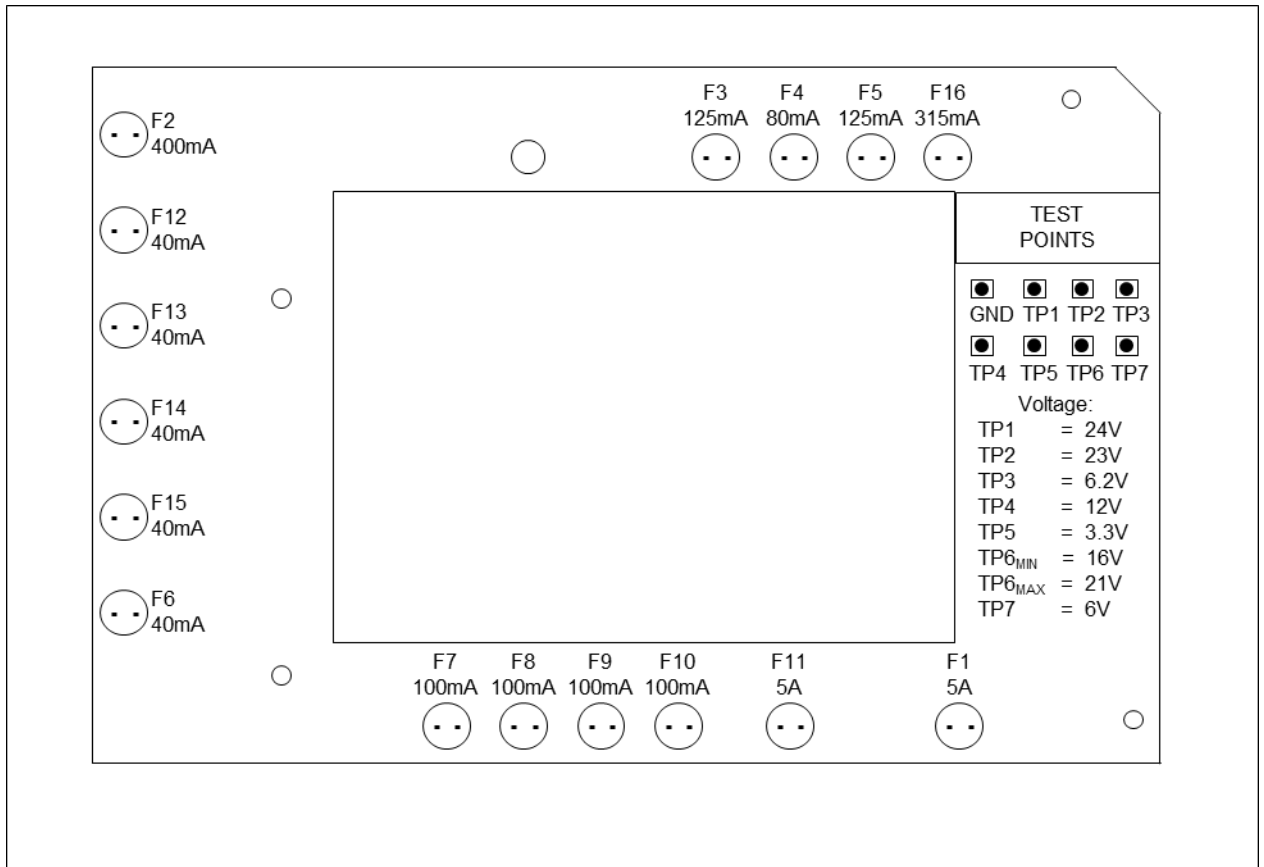


4. Troubleshooting

4.1. EXD Test Points

- TP1 = 24V
- TP2 = 23V
- TP3 = 6.2V
- TP4 = 12V
- TP5 = 3.3V
- TP6_{min} = 16V
- TP6_{max} = 21V
- TP7 = 6V

Related fuse for TP1 to TP7 = F1 (5A) or external in-line fuse.
 Related fuse for TP6 = F11 (5A).
 If voltage on TP6 toggles between 0V and 21V then check F11.



4.2. IS Test Points

TP8 = 12V Related Fuse – F8

TP9 = +- 6.2V Related Fuse – F2

TP10 = 3.3V Related Fuse – F5

TP11 = 12V Related Fuse – F3

TP12 = 5V Related Fuse – F3

TP13 = 3.3V Related Fuse – F2

TP14 = 10V Related Fuse – F3

TP15 = 3V

Communication Failure RS232-GSM

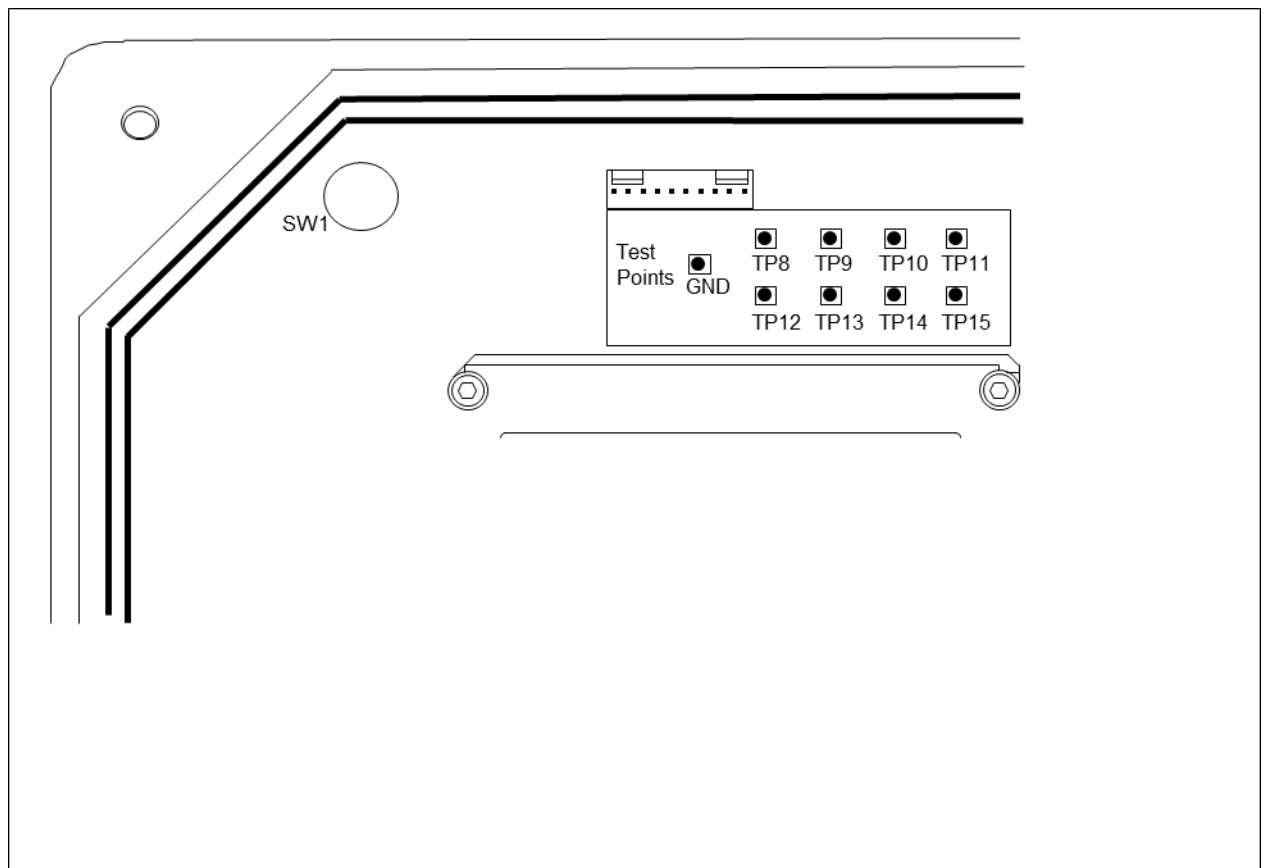
Check Fuses F7 and F8

Communication Failure RS232/RS485

Check Fuses F9 and F10




EXD Processor Comms Issues

Check Fuses F12, F13, F14, F15, F6



5. Certification

5.1. SCS-400 - 15.0026X

 		<h1>IECEX Certificate of Conformity</h1>	
INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres <small>for rules and details of the IECEX Scheme visit www.iecex.com</small>			
Certificate No.:	IECEX ICS 15.0026X	Issue No: 0	<u>Certificate history:</u> Issue No. 0 (2016-05-27)
Status:	Current	Page 1 of 3	
Date of Issue:	2016-05-27		
Applicant:	Metermatic (Pty) Ltd 1 Angus Crescent, Longmeadow Business Estate East, Modderfontein, Gauteng South Africa		
Equipment:	Safety and Control System SCS-400		
<i>Optional accessory:</i>			
Type of Protection:	Ex ia, ib, d		
Marking:	Ex d ia [ia Ga] [ib Gb] IIA T4 Gb -20°C to 60°C		
<i>Approved for issue on behalf of the IECEX Certification Body:</i>	Roelof Viljoen Certification Authority		
<i>Position:</i>			
<i>Signature: (for printed version)</i>	<hr/> <hr/>		
<i>Date:</i>	<hr/> <hr/>		
1. This certificate and schedule may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The Status and authenticity of this certificate may be verified by visiting the Official IECEX Website .			
Certificate issued by: South Africa Mining and Surface Certification (MASC) 45 Jurg Street Lelyta Park Unit 5, Hennospark Ext 87 Centurion, 0157, Gauteng South Africa 			

IEC		IECEX		IECEX Certificate of Conformity	
Certificate No:	IECEX ICS 15.0026X	Issue No:	0		
Date of Issue:	2016-05-27	Page 2 of 3			
Manufacturer:	Metermatic 1 Angus Crescent, Longmeadow Business Estate East, Modderfontein, Gauteng South Africa				
Additional Manufacturing location(s):					
<p>This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEX Quality system requirements. This certificate is granted subject to the conditions as set out in IECEX Scheme Rules, IECEX 02 and Operational Documents as amended.</p>					
STANDARDS:					
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:					
IEC 60079-0 : 2011 Edition:6.0	Explosive atmospheres - Part 0: General requirements				
IEC 60079-1 : 2007-04 Edition:6	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"				
IEC 60079-11 : 2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"				
<i>This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.</i>					
TEST & ASSESSMENT REPORTS:					
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in					
<u>Test Report:</u>					
ZA/ICS/ExTR15.0003/00	ZA/ICS/ExTR16.0007/00	ZA/ICS/ExTR16.0008/00			
ZA/ICS/ExTR16.0006/00					
<u>Quality Assessment Report:</u>					
ZA/ICS/QAR15.0009/00					

		IECEX Certificate of Conformity	
Certificate No:	IECEX ICS 15.0026X	Issue No:	0
Date of Issue:	2016-05-27	Page 3 of 3	
Schedule			
EQUIPMENT:			
<i>Equipment and systems covered by this certificate are as follows:</i>			
The SCS400 is installed on a vehicle that enters the hazardous area.			
The SCS-400 has an aluminium enclosure with approximate dimensions of 347mm x 226mm x 91mm. It has an external cover and an internal flameproof (FLP-100) cover. Therefore, the enclosure comprises two chambers / enclosures.			
· The flameproof (FLP-100) chamber with the flameproof cover and cable entries into this chamber are part of the flameproof concept. The cover has a separate label (FLP-100) to make clear that it is a flameproof enclosure.			
The flameproof enclosure (chamber) contains electronics including the associated apparatus circuits for the external intrinsic safety circuits. The associated apparatus connects to the electronics in the non-flameproof chamber, as well as external intrinsic safety equipment, e.g. sensors.			
See annex to certificate for full description			
CONDITIONS OF CERTIFICATION: YES as shown below:			
See annex to certificate			
Annex:			
Annex to Certificate 15.0026X.pdf			

5.2. Annex to 15.0026X



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0026X **Issue:** 0 **Date:** 2016-05-27
Electrical Apparatus: Safety and Control System SCS-400

5.2.1. Equipment

The SCS400 is installed on a vehicle that enters hazardous areas.

The SCS-400 has an aluminium enclosure with approximate dimensions of 347mm x 226mm x 91mm. It has an external cover and an internal flameproof (FLP-100) cover. Therefore, the enclosure comprises two chambers / enclosures.

- The flameproof (FLP-100) chamber with the flameproof cover and cable entries into this chamber are part of the flameproof concept. The cover has a separate label (FLP-100) to make clear that it is a flameproof enclosure.

The flameproof enclosure (chamber) contains electronics including the associated apparatus circuits for the external intrinsic safety circuits. The associated apparatus connects to the electronics in the non-flameproof chamber, as well as external intrinsic safety equipment, e.g. sensors.

- The following cable entries are provided for in the enclosure:
 - Four threaded entries (M20 x 1.5 – 6H) are provided on the one side in the external wall of the flameproof (FLP-100) enclosure, as well as three threaded entries (M20 x 1.5) into the intrinsically safe chamber.
 - In the opposite external wall, an optional M16 x 1.5 – 6H threaded entry is provided in the flameproof (FLP-100) enclosure. The B-ANT-EXD bushing with hard-wired ANT-GSM antenna is located in this entry.
 - An M16 x 1.5 – 6H threaded entry is provided in an extrusion of the internal cast flameproof (FLP-100) cover.
- Some intrinsically safe circuits exit the flameproof enclosure via internal tracks in a PCB, which is sandwiched in the flange flamepath of the flameproof (FLP-100) enclosure, between the base and the cover. The PCB has copper layers forming the flange flamepath on both sides of the PCB. The cover is secured with sixteen M6 x 1.0 x 25mm – grade 12.9 SHCS (socket head cap screw). Washers are fitted to the fastener up to 3.1mm thick maximum.



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0026X **Issue:** 0 **Date:** 2016-05-27
Electrical Apparatus: Safety and Control System SCS-400

- The external cover covers all the internal electronics (outside the flameproof compartment), as well as the flameproof (FLP-100) cover.
 - A BBU-500 battery pack is attached to the flameproof enclosure cover. The battery is fully encapsulated and connected via a flying lead and a flameproof bushing B-BAT-EXD to a charging circuit inside the flameproof enclosure. The battery is used as follows:
 - When power is applied to the SCS400, the charging of the battery is managed by the charging electronics inside the flameproof enclosure. The BBU-500 is charged in a safe area only.
 - When power to the SCS400 is removed, the BBU-500 battery provides power to the electronics.
 - The electronics outside the flameproof enclosure is powered from the associated apparatus circuits in the flameproof enclosure and allows for connection to external intrinsic safety equipment, e.g. sensors.
 - The external cover is fitted with an optional i-button reader (with o-ring), an o-ring, two polycarbonate windows with gaskets and a keypad with a gasket in the cover. Two LCD displays are visible through the two windows. The cover is secured with four M6 fastener.

The following safety parameters were allocated.

5.2.1.1. Power to the non-i.s. electronics in the flameproof enclosure:

$U_m = 35V_{dc}$

5.2.1.2. ANT [Ex ib] (824MHz to 1990MHz)

$U_o = 3.3V$

$I_o = 2.5A$

$P_o = 45mW$

$C_o = 1.2\mu F$

$L_o = 45.5\mu H$



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0026X

Issue: 0

Date: 2016-05-27

Electrical Apparatus: Safety and Control System SCS-400

5.2.1.3. J8 - 5 Wire Interface [Ex ia]

$U_o = 11.76V$

$I_o = 235mA$

$P_o = 0.69W$

$C_o = 10\mu F$

$L_o = 5.1mH$

$L_o/R_o = 412\mu H/\Omega$

5.2.1.4. J9 – CANBUS [Ex ia]

$U_o = 8V$

$I_o = 3.119A$

$P_o = 4.254W$

$C_o = 982.5\mu F$

$L_o = 29.2\mu H$

$L_o/R_o = 45.6\mu H/\Omega$

5.2.1.5. J12 - 2 Wire Interface [Ex ia]

$U_o = 11.76V$

$I_o = 84.2mA$

$P_o = 0.247W$

$C_o = 10\mu F$

$L_o = 40mH$

$L_o/R_o = 1.14mH/\Omega$



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0026X

Issue: 0

Date: 2016-05-27

Electrical Apparatus: Safety and Control System SCS-400

5.2.1.6. J11 – Proxy Interface [Ex ia]

$U_o = 5.88V$
 $I_o = 12.38mA$
 $P_o = 18.2mW$
 $C_o = 600\mu F$
 $L_o = 460mH$
 $L_o/R_o = 15mH/\Omega$

5.2.1.7. J10 – Output (pin 1 w.r.t 2) Interface [Ex ia]

$U_o = 13.65V$
 $I_o = 2.934A$
 $P_o = 1.77W$
 $C_o = 18\mu F$ (Allocated to J10 Output.)
 $L_o = 33\mu H$
 $L_o/R_o = 28.4\mu H/\Omega$

5.2.1.8. J10 – Input (pin 3 w.r.t 4 Interface [Ex ia]

$U_o = 5.88V$
 $I_o = 1.88mA$
 $P_o = 2.8mW$
 $C_o = 300\mu F$
 $L_o = 1H$
 $L_o/R_o = 103mH/\Omega$



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0026X **Issue:** 0 **Date:** 2016-05-27
Electrical Apparatus: Safety and Control System SCS-400

5.2.1.9. JJ8 – Dallas Tag Interface [Ex ia]

$U_o = 5.88V$
 $I_o = 248.4mA$
 $P_o = 0.86W$
 $C_o = 60\mu F$
 $L_o = 2mH$
 $L_o/R_o = 1.9mH/\Omega$

5.2.1.10. J7 - GPI Interface [Ex ia]

$U_i = 13V$
 $I_i = 250mA$
 $P_i = 0.7W$
 $C_i = 360nF$
 $L_i = 0$

Where safety parameters are not allocated it was not required to be limited for intrinsic safety. The above load parameters apply where:

- a) The external circuit contains no combined lumped inductance (L_i) or lumped capacitance (C_i) greater than 1% of the above values. OR
- b) The external circuit contains either only lumped inductance (L_i) or lumped capacitance (C_i) in combination with a cable. OR
- c) The inductance and capacitance are distributed as in a cable.

In all other situations e.g. the external circuit contains combined lumped inductance and capacitance, up to 50% of each of the inductance and capacitance values are allowed.

5.2.2. Conditions of Certification

5.2.2.1. Conditions of manufacture

- A routine overpressure test is not required based on the equipment passing a 4 times overpressure test as per IEC 60079-1.



IECEX Certificate of Conformity – Annex






Certificate No.: IECEx ICS 15.0026X **Issue:** 0 **Date:** 2016-05-27
Electrical Apparatus: Safety and Control System SCS-400

5.2.2.2. Special conditions of use

The following special conditions of use are applicable:

- The BBU-500 inside the SCS-400 enclosure may only be charged in the safe area.
- The circuit ground and local earth is electrically in contact with each other, which must be considered during installation. (Therefore, the 500Vrms isolation is not maintained.)
- When connecting intrinsically safe equipment to the barrier device where the transient current for the rating of internal components are required to be considered the principles of ExTAG DS 2006/008 (December 2006) with capacitance 100pF ($\pm 20\%$) for a single series capacitor and the applicable U_m value must be used.
- The bushing material may not be subjected to direct UV exposure or mechanisms of generating static electricity.
- The B-ANT-EXD shall be installed so that it is not subjected to any mechanical stress on the cable.
- The system approval of peripheral devices is not part of the certification.
- Only suitably certified glands / blanking elements, with additional rating of at least IP54 may be utilised on the equipment. All unused entries must be blanked.
- Some flamepaths are more restrictive than the minimum requirements in the standard. Information w.r.t. the flamepaths must be obtained from the manufacturer as required.

5.3. API, BVS, MAN, REF - 15.0009X

 		<h2 style="text-align: center;">IECEX Certificate of Conformity</h2>	
INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres <small>for rules and details of the IECEX Scheme visit www.iecex.com</small>			
Certificate No.:	IECEX ICS 15.0009X	Issue No: 0	Certificate history: Issue No. 0 (2016-06-06)
Status:	Current	Page 1 of 3	
Date of Issue:	2016-06-06		
Applicant:	Metermatic (Pty) Ltd 1 Angus Crescent, Longmeadow Business Estate East, Modderfontein, Gauteng 1609 South Africa		
Electrical Apparatus:	Sensors: API-400; BVS-100; MAN-400; REF-400		
Optional accessory:			
Type of Protection:	Ex ia		
Marking:	Ex ia IIA T4 Ga -40°C to 60°C		
Approved for issue on behalf of the IECEX Certification Body:	Roelof Viljoen		
Position:	Certification Authority		
Signature: (for printed version)	_____		
Date:	_____		
1. This certificate and schedule may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The Status and authenticity of this certificate may be verified by visiting the Official IECEX Website .			
Certificate issued by: South Africa Mining and Surface Certification (MASC) 45 Jurg Street Lelyta Park Unit 5, Hennospark Ext 87 Centurion, 0157, Gauteng South Africa			
			



IECEX Certificate of Conformity

Certificate No:	IECEX ICS 15.0009X	Issue No: 0
Date of Issue:	2016-06-06	Page 2 of 3
Manufacturer:	Metermatic (Pty) Ltd 1 Angus Crescent, Longmeadow Business Estate East, Modderfontein, Gauteng 1609 South Africa	

Additional Manufacturing
location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition:8.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition:8.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

[ZA/ICS/ExTR16.0002/00](#)

Quality Assessment Report:

[ZA/ICS/QAR15.0009/00](#)



IECEX Certificate of Conformity

Certificate No: IECEx ICS 15.0009X

Issue No: 0

Date of Issue: 2016-06-08

Page 3 of 3

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The API-400, MAN-400, BVS-100 and REF-400 sensors are intended to be mounted on bulk petroleum delivery vehicles to ensure a sealed parcel delivery system.

Please refer to the annex for full description.

CONDITIONS OF CERTIFICATION: YES as shown below:

See Annex to certificate

Annex:

[Annex to Certificate 15.0009X.pdf](#)

5.4. Annex to 15.0009X



IECEX Certificate of Conformity – Annex



Certificate No.:	IECEX ICS 15.0009X	Issue:	0	Date:	2016-06-06
Electrical Apparatus:	Sensors: API-400, BVS-100, MAN-400, REF-400				

5.4.1. Equipment

5.4.1.1. API-400:

The API-400 sensor is intended to be mounted on bulk petroleum delivery vehicles to ensure a sealed parcel delivery system. The API-400 has two fixed plug type connectors mounted on the side of the enclosure. The electronic circuitry is encapsulated within a rectangular aluminium enclosure with cover and fasteners. It has approximate dimensions of 70mm x 50mm x 29.5mm. An aluminium label is applied on the outside of the enclosure.

An optical sensor and an inductive sensor protrudes from the enclosure. The sensors are fully encapsulated and sealed as part of the fully encapsulated unit.

U_i = 8V

I_i = 3.119A (spark)

I_i = 700mA (power)

P_i = 5W

C_i = 3.4uF

L_i = Negligible

Note: The connections may be used in a daisy chain configuration. From an intrinsically safe perspective, the connections are deemed to be through connected with the addition of C_i and L_i (as applicable).



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0009X **Issue:** 0 **Date:** 2016-06-06
Electrical Apparatus: Sensors: API-400, BVS-100, MAN-400, REF-400

5.4.1.2. MAN-400:

The MAN-400 manhole sensor is intended to be mounted on bulk petroleum delivery vehicles to ensure a sealed parcel delivery system. The MAN-400 has an integral lead fitted with a protective hydraulic hose. The electronic circuitry is encapsulated within a rectangular aluminium enclosure. It has approximate dimensions of 62.5mm x 40mm x 21.5mm. An aluminium label is applied on the outside of the enclosure.

U_i = 8V

I_i = 3.119A (spark)

I_i = 700mA (power)

P_i = 5W

C_i = 5.5uF

L_i = Negligible

5.4.1.3. BVS-100:

The BVS-100 bottom valve sensor is intended to be mounted on bulk petroleum delivery vehicles to ensure a sealed parcel delivery system. The BVS-100 has a fixed plug(s) and socket(s) fitted to the enclosure wall. The electronic circuitry is encapsulated within a square aluminium enclosure with cover and fasteners. It has approximate dimensions of 54mm x 50mm x 24.5mm. An aluminium label is applied on the outside of the enclosure.



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0009X **Issue:** 0 **Date:** 2016-06-06
Electrical Apparatus: Sensors: API-400, BVS-100, MAN-400, REF-400

An external stainless steel magnetic actuator probe/device is used to activate an internal Hall Effect sensor.

U_i = 8V
 I_i = 3.119A (spark)
 I_i = 700mA (power)
 P_i = 5W
 C_i = 3.2uF
 L_i = Negligible

Note: The connections may be used in a daisy chain configuration. From an intrinsically safe perspective, the connections are deemed to be through connected with the addition of C_i and L_i (as applicable).

5.4.1.4. REF-400:

The REF-400 reference sensor is intended to be mounted on bulk petroleum delivery vehicles to ensure a sealed parcel delivery system. The REF-400 has a fixed plug type connector mounted on the side of the enclosure. The electronic circuitry is encapsulated within a rectangular glass fibre reinforced polyester enclosure with cover and fasteners. It has approximate dimensions of 110mm x 75mm x 57mm. An aluminium label is applied on the outside of the enclosure.

U_i = 8V
 I_i = 3.119A (spark)
 I_i = 700mA (power)
 P_i = 5W
 C_i = 17uF
 L_i = Negligible



IECEX Certificate of Conformity – Annex



Certificate No.: IECEx ICS 15.0009X **Issue:** 0 **Date:** 2016-06-06
Electrical Apparatus: Sensors: API-400, BVS-100, MAN-400, REF-400

5.4.2. Conditions of Certification

5.4.2.1. Special Conditions of use

- The MAN-400 shall only be mounted on its base such that the free surface of encapsulant is provided with mechanical protection, i.e.: screwed down.
- The REF-400 surface area exceeds the maximum allowed as per the electrostatic requirements of IEC 60079-0. See manufacturer's instructions.

5.4.2.2. Conditions of manufacture

- None