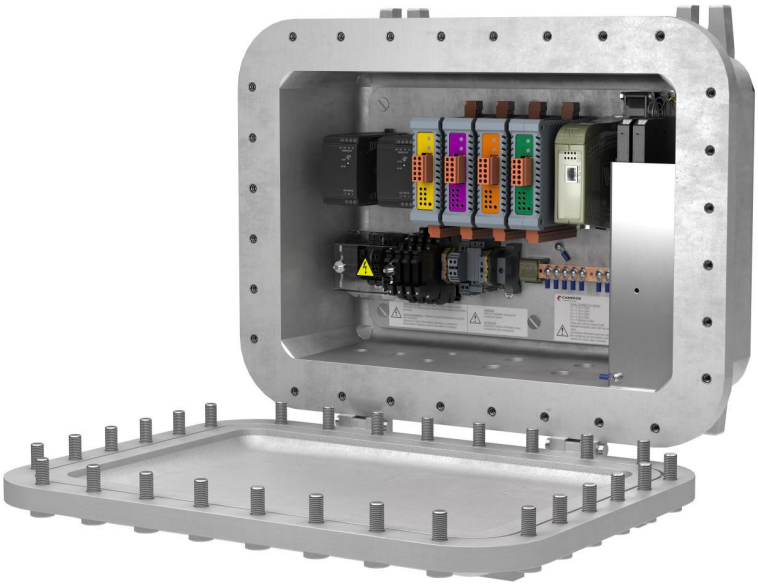
sensia
Rockwell Automation + Schlumberger

+ MEASUREMENT

WJISKOOT™ MEASUREMENT SYSTEMS

+ InSpec Remote I/O HUB (ATEX, IECEx)

Installation, Operation & Maintenance Manual



Manual No. H112, Rev. 2

Important Safety Information

Symbols used throughout the supporting documentation and on the products are defined below:

Symbol	Meaning	Definition
	**Dangerous Voltage**	To indicate hazards arising from dangerous voltages.
	**Warning/Caution**	An appropriate safety instruction should be followed or caution to a potential hazard exists.
	**Protective Earth (Ground)**	To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.
	**Functional Earth**	To identify an earth (ground) terminal in cases where Protective or clean Earth (ground) is explicitly required.
	**Frame or Chassis**	To identify a frame or chassis bonding terminal
	**Heavy**	This product is heavy and reference should be made to the safety instructions for provisions of lifting and moving.
	**Static Sensitive Device (Hand Prohibited)**	All precautions against electro-static discharge (ESD) must be observed to avoid damaging electronic circuits
	**Disposal:** - Monitoring and Control Instruments, accessories and their packaging should be sorted for environmental-friendly recycling. **Only for EC countries:** Do not dispose of Monitoring and Control Instruments into household waste! According to the European Directive 2002/96/EC on waste electrical and electronic equipment (WEEE and its incorporation into national law, Monitoring and Control Instruments that are no longer suitable for use must be separately collected and sent for recovery in an environmental-friendly manner.	
	**Tools Required:** - Tools listed next to this symbol will be required to perform the task outlined in the text that follows.	
	**Hints & Tips:** - Text may help answer some questions or aid configuration.	

Terms Used in This Manual

WARNING	A warning identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.
CAUTION	Caution statements Indicate actions or procedures which, if not performed correctly, may lead to personal injury or incorrect function of the instrument or connected equipment.
Note	Indicates additional information about specific conditions or circumstances that may affect instrument operation.

Table of Contents

CERTIFIED PRODUCT
Scheduled Document
No modification permitted without reference to the Notified Body

REVISION HISTORY

Revision:	Description of change:	Issuer:	Approver:	Date:
1	1st Issue	MF	TMM	31st October 2018
2	Change Document Branding to Sensia	MF	TMM	17th June 2020

*Mark of Sensia

GENERAL

WARNING!

This instrument is designed for connection to hazardous electric voltages.

Ignoring this warning can result in severe personal injury or mechanical damage.

To avoid the risk of electric shock and fire, the safety instructions of this manual must be observed, and the guidelines followed.

The specifications must not be exceeded, and the unit must only be applied as described in the following.

Prior to the installation and commissioning of the unit, this manual must be examined carefully.

Only qualified personnel (technicians) should install this unit.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

HAZARDOUS VOLTAGE

CAUTION!

WARNING!

Until the instrument is fixed, do not connect hazardous voltages to the instrument.

The following operations should only be carried out on a disconnected unit and under ESD-safe conditions: -

- General mounting, connection and disconnection of wires.
- Troubleshooting the unit.

Repair of the instrument must only be done by Sensia (UK) Ltd.

INSTALLATION

WARNING!

Installation may only be carried out by electrically skilled and instructed personnel in accordance with national legislation, including the relevant standards.

All technical data on the instrument is to be observed.

Changes to the design and modifications to the equipment are not permitted.

The equipment shall only be operated as intended and only in undamaged and perfect condition.

Sufficient segregation must exist between different cables and wires carrying different types of signal or power and all other circuits.

All wires must be terminated, complete with crimping lugs. Unused cores should be terminated to the earth bus bar.

Section 1: **Introduction**

The Jiskoot™ InSpec* Remote I/O Hub is intended for use in hazardous locations in which an explosive gas atmosphere, caused by mixtures of air and gases, vapour or mists, exist under normal atmospheric conditions, as defined in IEC/EN 60079-0.

Under the ATEX directive, 2014/34/EU, the InSpec Remote I/O Hub is a Category II Group 2G piece of equipment intended for use in a Potentially Explosive Gas Atmosphere, where the Area Classification is equal to or hazard has been categorised as less than Zone 1 IIB+H2 T6 and the ambient temperature range Tamb or Ta = -20°C to +50°C or + 60°C (depending upon the model).

Depending on the application software installed, the unit may be used for sampling, blending or wildstream control applications.

The unit may be sold separately or as part of a system for integration into a larger installation.

Depending on the model purchased, the following functions may be integrated into the unit:

- Load-Cell Amplifiers (2 off) to interface with a Jiskoot CanWeigh System
- Isolating Converter (1 or 2 off) to interface with Jiskoot CanHigh System
- Ancillary power for 24V DC solenoid coils and transmitters.
- Ethernet Line Driver Interface for applications that have a distance exceeding 100 metres between the Remote I/O Hub and the nearest Ethernet Switch/Router.
- Maximum of 4 Solid State Relays (SSR) suitable for switching either AC or DC circuits, up to 1 Amp, depending upon model.
- Maximum of 4 RIO Modules, from the following:
    - Jiskoot RIO-DIO Digital Input/Output Module(s)
    - Jiskoot RIO-PUL Pulse/Frequency Input Module(s)
    - Jiskoot RIO-ANI 4-20mA Analogue Input Module(s)
    - Jiskoot RIO-ANO 4-20mA Analogue Output Module(s)

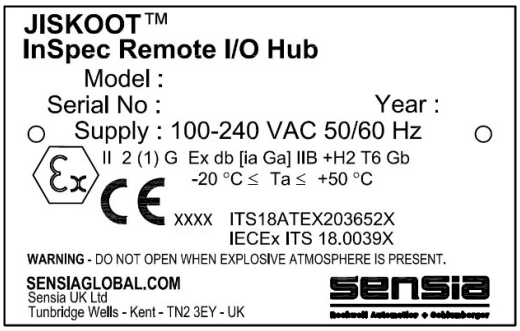
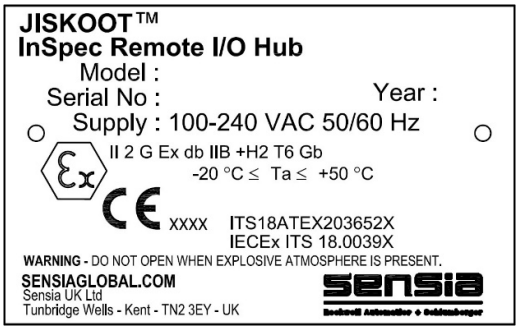
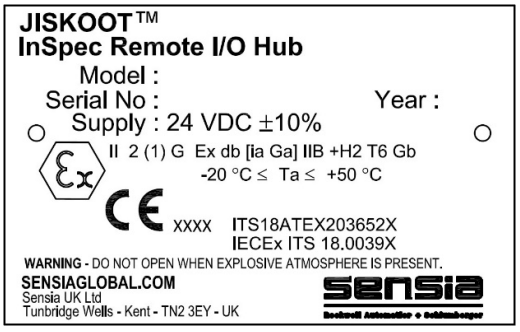
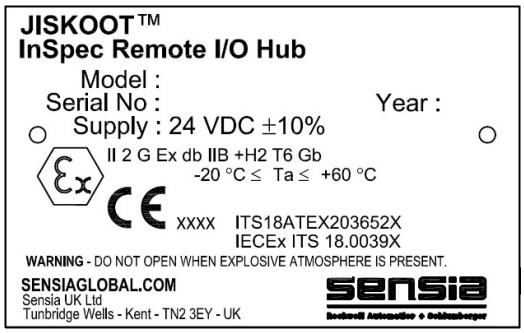
NOTE: When requesting assistance or spare parts, please provide the model and serial number of the unit to ensure that the correct options are noted.

Section 2: **Model Number, Options & Marking**

Each Jiskoot InSpec Remote I/O Hub has a model number that identifies the options fitted, as per the following table:

CODE											DESCRIPTION
											Cable Entries:
A											Metric threads
B											Imperial threads
											Certification:
	A										ATEX (Europe), IECEx
	E										ETL-Listed (USA & Canada)
											AC/DC PSUs:
		X									None fitted
		A									Ancillary AC-DC PSU (Module & Transmitter Power)
		B									Ancillary AC-DC PSU Solenoid Power
		C									Both Module & Ancillary Power
											Relays:
			X								None
			0 to F								AC or DC Output (Encoded)
				DIO: 0 to 4	PUL: 0 to 2	ANI: 0 to 4	ANO: 0 to 2				**Remote I/O Modules (4 max.):**
											RIO-DIO Qty.
											RIO-PUL Qty.
											RIO-ANI Qty.
											RIO-ANO Qty.
											Ethernet Interface:
								A			Cable/Wire Only
								B			Ethernet Extender
											CanWeigh/CanHigh:
										X	None
										3	2 Ch. CanWeigh Amplifiers (2 x D5264S)
										4	2 Ch. CanHigh Interface (1 x D5030D)
										5	4 Ch. CanHigh Interface (2 x D5030D)

MARKING (LABEL DETAIL)

LABEL DETAIL	APPLICATION
	**AC** powered unit. **With** Intrinsically Safe Isolators. Model Numbers ##A######3 ##B######3 ##A######4 ##B######4 ##A######5 ##B######5 ##C######3 ##C######4 ##C######5
	**AC** powered unit. **Without** Intrinsically Safe Isolators. Model Numbers ##A######X ##B######X ##C######X
	**DC** powered unit. **With** Intrinsically Safe Isolators. Model Numbers ##X######3 ##X######4 ##X######5
	**DC** powered unit. **Without** Intrinsically Safe Isolators. Model Numbers ##X######X ##X######X ##X######X

Section 3: **Installation Details**

Installation may only be carried out by skilled electricians and instructed personnel in accordance with local statutory, regulatory requirements for the country of use and customer requirements.

The equipment must not be installed into, or operated in, Hazardous (Classified) Locations outside the scope of those stated in the previous section of this manual. The enclosure must not be installed or operated in a Zone 0 Hazardous Location.

All technical data on the enclosure is to be observed.

Changes to the design and modifications to the equipment are not permitted.

The electrical installation must be in accordance with applicable national standards (equivalent to IEC/EN 60364) in addition to the requirements for installation in hazardous areas according to EN/IEC 60079-14 "Electrical installations in hazardous locations" or equivalent national standards.

The equipment is intended for permanent connection. The product is to be suitably grounded or earthed. For additional information, refer to Earthing Requirements.

A double pole isolator, having suitable safety approvals for the country of the equipment's ultimate end use t, must be installed to disconnect the equipment from the supply. It must be located nearby, easily reached and marked as the disconnecting device for the equipment.

ENCLOSURE MOUNTING, ORIENTATION & POSITION

LIFTING

CAUTION

This equipment weighs approximately 50 kg (110 lb). A detailed hazard analysis/risk assessment should be performed before attempting to lift and secure the enclosure into position.

The instrument shall be securely mounted to a suitable vertical flat surface using all four mounting lugs/feet cast onto the enclosure, with M12 (½ inch) mounting bolts and washers.

Depending upon the access limitations, the equipment should be lifted using mechanical lifting aids such as a forklift, or an overhead crane with a suitably rated nylon strop around the body of the housing.

Care must be taken to avoid damaging the threaded entries in the bottom of the enclosure and the flame path.

When lifting aids cannot be used, the equipment should be put into position using a team lift employing a minimum of 3 persons.

ORIENTATION & POSITION

- The unit shall be mounted so that all cable entries are at the bottom of the enclosure.
- Once installed, a minimum separation of 40mm (1.57 in.) is required and shall be maintained between the flameproof flange joint and any solid object that is not part of the enclosure.
- The location should not subject the controller to vibration or shock.
- Sunshades are recommended in hot and sunny environments where temperatures exceed 30°C (86°F).

WIRING METHODS & MATERIALS

The electrical installation must be in accordance with applicable national standards (equivalent to IEC/EN 60364) in addition to the requirements for installation in hazardous areas according to IEC/EN 60079-14 "Electrical installations in hazardous locations" or equivalent national standards. Local wiring ordinances may also apply.

Only personnel who are experienced with field wiring should perform these procedures.

- Personnel installing field wiring must strictly adhere to all manufacturers datasheets and instructions.
- The conduit or cable gland threads must be the same thread size as the enclosure's entry thread size, either M25 & M20, or 1" and ¾" NPT, as determined by the model number – See Section 2:.
- Cable glands
    - A barrier gland is required due to the volume of the enclosure.
    - Cable glands must be used with an appropriate cable, as per the manufacturer's specifications, to maintain integrity of the installation.
    - The cable must be adequately supported.
- All wires must be terminated, complete with crimping lugs.
- Terminal block screws must be tightened to a torque of 4.4 to 5.3 lb.in.
- The hazardous area end of any unused cores shall be either a) connected to earth or b) adequately insulated by means of suitable terminations (Insulation tape alone is not recommended) and connected to earth in the non-hazardous area.

CABLE/WIRE SELECTION

All field wiring must have a minimum specification of 0.5mm², 75°C, VW-1. It must be suitably sized for the application and local conditions, conform to national standards (equivalent to IEC/EN 60364) in addition to the requirements for installation in hazardous areas according to IEC/EN 60079-14 "Electrical installations in hazardous locations" or equivalent national standards. Local wiring ordinances may also apply.

Considerations such as (but not limited to) the supply voltage and frequency, load current, voltage drop, temperature, cable mounting and grouping factors should be considered.

In general, Sensia recommends the following types of cables for the associated signal types:

Analogue Signals	:	Screened twisted pairs with an overall screen. Blue cable sheath for Intrinsically Safe circuits.
Pulse/Frequency Signals	:	Screened twisted pairs with an overall screen. Blue cable sheath for Intrinsically Safe circuits.
DC Digital Signals	:	Multicore with an overall screen

CABLE ENTRIES

All entries must be fitted with certified and correctly dimensioned gland, equal to the marking on the enclosure (II 2 G Ex db IIB +H2 Gb) or better. For additional information on the applicable standards, refer to IEC/EN 60079-14.

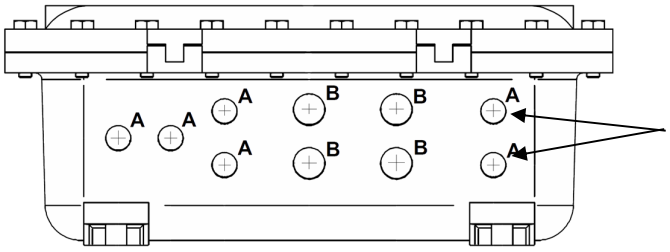
All unused entries must be fitted with certified flameproof blanking elements, equal to the marking on the enclosure (II 2 G Ex db IIB +H2 Gb) or better. A blanking element shall not be used with an adapter

Each entry shall have no more than one certified flameproof thread adapter, equal to the marking on the enclosure (II 2 G Ex db IIB +H2 Gb) or better when a thread adapter is used.

When changing the size of an entry, this should be documented and marked accordingly per IEC/EN 60079-1 clause 13.2 marking of the specific thread type and size adjacent to the hole in accordance with table 15.

Intrinsically safe circuits must be installed into the two right hand entries, in the bottom of the enclosure. Once the circuits are brought into the enclosure, they must remain physically and electrically isolated from any other circuits within the enclosure.

No Intrinsically Safe Earth is required as only isolated barriers are used in the unit.



MODEL NUMBER	(REF. ABOVE IMAGE)	SIZE 'A'	SIZE 'B'
A#########	**Metric Threads**	M20	M25
B#########	**Imperial Threads**	¾"	1"

Section 4: **Field Connections**

DIN RAIL TERMINALS

TERMINALS	FUSE	CROSS REFERENCE	OPTION	NOTES
E				Protective Earth (PE) connection point
1		Section 4: AC Power Supply Connection	Yes	Internal AC to DC PSU(s) AC Input Power
F1	F1			
F2	F2		Yes	AC Output (fused) for AC SSR loads
2				Additional Neutral Connections
3				
4				
5				
E		Section 4: Earthing Requirements		Protective Earth (PE) connection point
13		Section 4: Relay Circuits (Outputs)	Yes	Relay Output No. 1
14				
13				Relay Output No. 2
14				
13				Relay Output No. 3
14				
13				Relay Output No. 4
14				
E		Section 4: Earthing Requirements		Protective Earth (PE) connection point
6			Yes	Additional 0V DC (GND) Connections for DC SSR Loads
7				
8				
9				
F3	F3	Section 4: Ancillary Power (DC)	Yes	+24V DC 32W Output for DC SSR Loads
F4	F4	Section 4: DC Power Supply Connection & Ancillary Power (DC)	Yes	RIO-Hub +24V DC Input Power (30W max.), or +24V DC Output (12W max.)
9				0V DC (GND) Connection
E		Section 4: Earthing Requirements		Protective Earth (PE) connection point

EARTHING REQUIREMENTS

An external protective earth (PE) conductor, associated with unit's main power source, must be connected to the dedicated PE terminal. The minimum size of the incoming external earth wire is 2.5mm² (14 AWG) and rated for 300V, 105°C, VW-1.

There is provision for making an external earth connection to the enclosure, via an external grounding screw.

SHIELDED (SCREENED) CABLES

Control and signal cable screens and drain wires should be terminated to a low-impedance earth (ground), preferably using a 360° shield (screen) clamp. If pigtails are used, where the screen is brought down to a single wire and connected to the earth point, these must be as short as possible; otherwise the inductance of the pigtail renders it useless at high frequencies.

- For a circuit with an ungrounded source the screen should be terminated at the input end, whereas if the input is floating and the source is grounded then the screen should be terminated at the source end.
- If both the signal source and signal inputs are both grounded, terminating the screen at both ends is not recommended as this may reduce the performance of the system.
- To shield against low-frequency electric fields terminate the screen at one end only.
- To shield against low-frequency magnetic fields terminate both ends of the screen.

POWER

INSTRUMENT POWER

The instrument can be supplied for use with either AC or DC power. The instructions below describe the wiring connections for each power supply type.

- Do not attempt to power the instrument from both AC and DC supplies at the same time!
- A double-pole isolator, having suitable safety approvals for the country of the equipment's end use, must be installed to disconnect the equipment from the supply. It must be located nearby and easily reached; and marked as the disconnecting device for the equipment.

AC Power Supply Connection - Model Numbers

##**A**######
##**B**######
##**C**######

AC power is connected to the unit via terminals **E**, **N**, and **F1**.

TERMINAL	FUSE	DUTY
E		Protective Earth
N		Neutral
F1	F1	Live

Ensure that the associated supply fuse or circuit breaker and cabling is suitably sized.

DC Power Supply Connection - Model Numbers ##X#######

DC power is connected to the unit via terminals **F4**, **10** and **E**.

TERMINAL	FUSE	DUTY
F4	F4	+24VDC
10		GND (0V DC)
E		Protective Earth

Ensure that the associated supply fuse or circuit breaker and cabling are suitably sized.

ANCILLARY POWER (DC)

24VDC (32 Watts max.) - Model Numbers ##B#######
##C#######

An optional AC/DC PSU intended to supply equipment such as solenoid coils.

TERMINAL	FUSE	DUTY
F3	F3	+24V DC (32 Watts Max. Continuous Load)
6, 7, 8 & 9		GND (0V DC)

24VDC (12 Watts) - Model Numbers ##A#######
##C#######

An optional AC/DC PSU intended to supply equipment such as temperature, flow or pressure transducers.

TERMINAL	FUSE	DUTY
F4	F4	+24V DC (12 Watts Max. Continuous Load)
10		GND (0V DC)

SIGNALS

Safety Extra Low Voltage (SELV) Circuits

Connect only SELV circuits to the RIO-DIO, RIO-PUL, RIO-ANI or RIO-ANO modules.

RELAY CIRCUITS (OUTPUTS)

The Remote I/O Hub requires different relay modules to switch AC and DC loads. Please check carefully that the load voltage matches the relay type fitted.

- Crydom # CN024D24 = 24V DC Load Voltage @ 1 Amp Max.
- Crydom # CN240A24 = 100-240V AC Load Voltage (50/60Hz) @ 1 Amp Max.

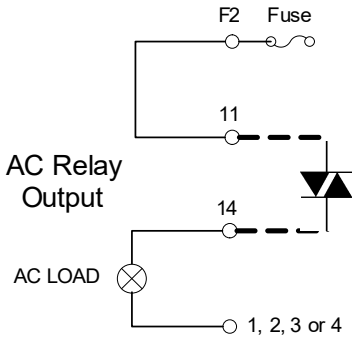
	Relay Output / Load			
Model	**RL1**	**RL2**	**RL3**	**RL4**
###0######	AC	AC	AC	AC
###1######	AC	AC	AC	DC
###2######	AC	AC	DC	AC
###3######	AC	AC	DC	DC
###4######	AC	DC	AC	AC
###5######	AC	DC	AC	DC
###6######	AC	DC	DC	AC
###7######	AC	DC	DC	DC

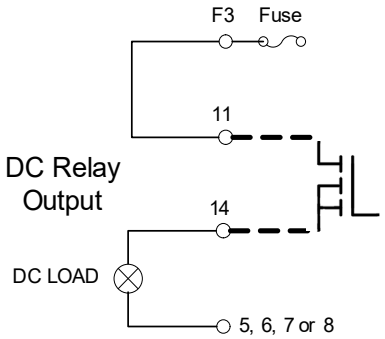
	Relay Output / Load			
Model	**RL1**	**RL2**	**RL3**	**RL4**
###8######	DC	AC	AC	AC
###9######	DC	AC	AC	DC
###A######	DC	AC	DC	AC
###B######	DC	AC	DC	DC
###C######	DC	DC	AC	AC
###D######	DC	DC	AC	DC
###E######	DC	DC	DC	AC
###F######	DC	DC	DC	DC
###X######	No relays fitted			

Terminals 11 (13+) and 14 on each relay (RL1, RL2, RL3 & RL4) provide connections to the relays outputs, controlled via the first RIO-DIO module, as follows:

Terminal	**Duty**	
	AC ∿	**DC ⎓**
11 (13+)	∿	+
14		-

The relay outputs can switch circuits designated as Installation Category III. Each relay output may switch a maximum of 250VAC rms or 30VDC and is rated for 1 Amp resistive or inductive load at 60°C (140°F). All wiring connected to any relay output must have a suitably sized protection device fitted to protect the relay circuit and load being switched by it.





RIO-DIO MODULE CONNECTIONS (DIGITAL I/O)

Model Numbers:

####**1**#####

####**2**#####

####**3**#####

####**4**#####

IMPORTANT: Cables terminating to this terminal block must be screened.

For complete information about the RIO-DIO module, please refer to the InSpec Remote I/O Module manual. The main field terminal assignments are as follows:

RIO-DIO MODULE (FIELD CONNECTIONS)	TERMINAL	DUTY
	1	+24VDC Common Connection Points (From External PSU)
	2	
	3	
	4	
	5	Digital I/O Point # 1
	6	Digital I/O Point # 2
	7	Digital I/O Point # 3
	8	Digital I/O Point # 4
	9	Digital I/O Point # 5
	10	Digital I/O Point # 6
	11	Digital I/O Point # 7
	12	Digital I/O Point # 8
	13	0V DC Common Connection Points
	14	
	15	
	16	

RIO-PUL MODULE CONNECTIONS (PULSE INPUTS)

Model Numbers:
#####**1**####
#####**2**####
#####**3**####
#####**4**####

IMPORTANT: Cables terminating into Pulse Inputs must be screened and kept separate from the Digital I/O.

For complete information about the RIO-PUL module, please refer to the InSpec Remote I/O Module manual. The main field terminal assignments are as follows:

RIO-PUL MODULE (FIELD CONNECTIONS)	TERMINAL		DUTY
	1	+	Ch. # 1 Pulse/Frequency Input
	2	-	
	3	+	Ch. # 2 Pulse/Frequency Input
	4	-	
	5	+	Ch. # 3 Pulse/Frequency Input
	6	-	
	7	+	Ch. # 4 Pulse/Frequency Input
	8	-	
	9	+	Ch. # 5 Pulse/Frequency Input
	10	-	
	11	+	Ch. # 6 Pulse/Frequency Input
	12	-	
	13	+	Ch. # 7 Pulse/Frequency Input
	14	-	
	15	+	Ch. # 8 Pulse/Frequency Input
	16	-	

RIO-ANI MODULE CONNECTIONS (ANALOGUE INPUTS)

Model Numbers:

######1###

######2###

######3###

######4###

IMPORTANT: Cables terminating into Analogue Inputs must be screened and kept separate from the Digital I/O and Pulse Inputs.

For complete information about the RIO-ANI module, please refer to the InSpec Remote I/O Module manual. The main field terminal assignments are as follows:

RIO-ANI MODULE (FIELD CONNECTIONS)	TERMINAL		DUTY
	1	+	Ch. # 1 Analogue Input (4-20mA)
	2	-	
	3	+	Ch. # 2 Analogue Input (4-20mA)
	4	-	
	5	+	Ch. # 3 Analogue Input (4-20mA)
	6	-	
	7	+	Ch. # 4 Analogue Input (4-20mA)
	8	-	
	9	+	Ch. # 5 Analogue Input (4-20mA)
	10	-	
	11	+	Ch. # 6 Analogue Input (4-20mA)
	12	-	
	13	+	Ch. # 7 Analogue Input (4-20mA)
	14	-	
	15	+	Ch. # 8 Analogue Input (4-20mA)
	16	-	

RIO-ANO MODULE CONNECTIONS (ANALOGUE OUTPUTS)

Model Numbers:
#######**1**##
#######**2**##
#######**3**##
#######**4**##

IMPORTANT: Cables terminating into Analogue Outputs must be screened and kept separate from the Digital I/O and Pulse Inputs.

For complete information about the RIO-ANO module, please refer to the InSpec Remote I/O Module manual. The main field terminal assignments are as follows:

RIO-ANO MODULE (FIELD CONNECTIONS)	TERMINAL		DUTY
	1	+	Ch. # 1 Analogue Output (4-20mA)
	2	-	
	3	+	Ch. # 2 Analogue Output (4-20mA)
	4	-	
	5	+	Ch. # 3 Analogue Output (4-20mA)
	6	-	
	7	+	Ch. # 4 Analogue Output (4-20mA)
	8	-	
	9	+	Ch. # 5 Analogue Output (4-20mA)
	10	-	
	11	+	Ch. # 6 Analogue Output (4-20mA)
	12	-	
	13	+	Ch. # 7 Analogue Output (4-20mA)
	14	-	
	15	+	Ch. # 8 Analogue Output (4-20mA)
	16	-	

FIELD CABLES (INTRINSICALLY SAFE)

INTRINSICALLY SAFE APPARATUS ENTITY PARAMETERS

In the system safety analysis, always check to ensure that the Hazardous Area/Hazardous Locations devices conform with the related system documentation, if the device is Intrinsically Safe check its suitability for the Hazardous Area/Hazardous Locations and group encountered and that its maximum allowable voltage, current, power (Ui/Vmax, Ii/Imax, Pi/Pi) are not exceeded by the safety parameters (Uo/Voc, Io/Isc, Po/Po) of the D5264/D5030D series Associated Apparatus connected to it. Also consider the maximum operating temperature of the field device, Check that added connecting cable and field device capacitance and inductance do not exceed the limits (Co/Ca, Lo/La, Lo/Ro) given in the Associated Apparatus parameters for the effective group. See parameters indicated in the table below:

CanWeigh Applications (GM Int. 5264S) **Model Numbers:**

#########3

D5264 Terminals	D5264 Associated Apparatus Parameters		Must be	Hazardous Area/Hazardous Locations Device Parameters
13 - 14 - 15 - 16 - 17 - 18	Uo / Voc = 7.2 V		≤	Ui / Vmax
13 - 14 - 15 - 16 - 17 - 18	Io / Isc = 177 mA		≤	Ii / Imax
13 - 14 - 15 - 16 - 17 - 18	Po / Po = 471 mW		≤	Pi / Pi
D5264 Terminals	**D5264 Associated Apparatus Parameters Cenelec (US)**		**Must be**	**Hazardous Area/Hazardous Locations Device Parameters**
13 - 14 - 15 - 16 - 17 - 18	Co / Ca = 0.3 µF Co / Ca = 1.5 µF Co / Ca = 2.2 µF Co / Ca = 2.8 µF Co / Ca = 1.5 µF	IIC (A,B) IIB (C) IIA (D) I IIIC (E, F, G)	≥	Ci / Ci device + C cable
13 - 14 - 15 - 16 - 17 - 18	Lo / La = 0.5 mH Lo / La = 6.5 mH Lo / La = 9.5 mH Lo / La = 13 mH Lo / La = 6.5 mH	IIC (A,B) IIB (C) IIA (D) I IIIC (E, F, G)	≥	Li / Li device + L cable

Characteristic: trapezoidal

If the cable parameters are unknown, the following values may be used: Capacitance 180pF per meter (60pF per foot), Inductance 0.60µH per meter (0.20µH per foot).

CanHigh Applications (GM Int. D5030D) **Model Numbers:**

#########**4**

#########**5**

D5030 Terminals		D5030 Associated Apparatus Parameters		Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1 Ch2	7 - 8 9 - 10	Uo / Voc = 10.5 V		≤	Ui / Vmax
Ch1 Ch2	7 - 8 9 - 10	Io / Isc = 22 mA		≤	Ii/ Imax
Ch1 Ch2	7 - 8 9 - 10	Po / Po = 56 mW		≤	Pi / Pi
D5030 Terminals		**D5030 Associated Apparatus Parameters Cenelec (US)**		**Must be**	**Hazardous Area/ Hazardous Locations Device + Cable Parameters**
Ch1 Ch2	7 - 8 9 - 10	Co / Ca = 2.4 µF Co / Ca = 16.8 µF Co / Ca = 75 µF Co / Ca = 66 µF Co / Ca = 16.8 µF	IIC (A, B) IIB (C) IIA (D) I IIIC (E, F, G)	≥	Ci / Ci device + C cable
Ch1 Ch2	7 - 8 9 - 10	Lo / La = 78.3 mH Lo / La = 313.4 mH Lo / La = 626.9 mH Lo / La = 1028.6 mH Lo / La = 313.4 mH	IIC (A, B) IIB (C) IIA (D) I IIIC (E, F, G)	≥	Li / Li device + L cable
Ch1 Ch2	7 - 8 9 - 10	Lo / Ro = 635.9 µH/Ω Lo / Ro = 2543.9 µH/Ω Lo / Ro = 5087.9 µH/Ω Lo / Ro = 8347.4 µH/Ω Lo / Ro = 2543.9 µH/Ω	IIC (A, B) IIB (C) IIA (D) I IIIC (E, F, G)	≥	Li / Ri device and L cable / R cable

For installations in which both the Ci and Li of the Intrinsically Safe apparatus exceed 1% of the Co and Lo parameters of the Associated Apparatus (excluding the cable), then 50% of Co and Lo parameters are applicable and shall not be exceeded (50% of the Co and Lo become the limits which must include the cable such that Ci device + C cable ≤ 50% of Co and Li device + L cable ≤ 50% of Lo). The reduced capacitance of the external circuit (including cable) shall not be greater than 1 µF for Groups I, IIA, IIB and 600 nF for Group IIC. If the cable parameters are unknown, the following value may be used: Capacitance 200pF per meter (60pF per foot), Inductance 1µH per meter (0.20µH per foot).

Section 5: **: Putting into Service**

- Ensure that no unauthorised modifications have been made to the unit.
- Flameproof cable entry devices incorporating compound filled seals around the individual cores or other equivalent sealing arrangements must be used because the enclosure volume exceeds 2 dm^3 (2 litres).
- If certified conduit entries are used for the connection to the Jiskoot InSpec Remote I/O Hub enclosure, the associated stopping boxes shall be installed immediately at the enclosure.
- Unused openings for cable or conduit entries shall be closed with blanking elements suitable for the relevant type of protection. The blanking elements shall be removable only with the aid of a tool.
- Ensure that electrical connections are tight and that unused cores are terminated to electrical protective/safety earth at one end.
- Ensure that flame paths are clean and undamaged and that the gasket is secure and undamaged.
- Cover retaining bolts - Use only the bolts supplied with the enclosure. No cover bolts are to be omitted. Install and alternate cover bolt pattern when tightening.

Section 6: **Use**

The unit shall only be operated as intended and only in undamaged and perfect condition and only within the environmental and electrical constraints stated within this manual.

Section 7: **Adjustment & Calibration**

- Once installed and commissioned the unit requires no adjustment except for periodic recalibration when necessary.
- Please refer to the InSpec Enhanced Controller Instrument Operation Manual for details on the following:
    - Analogue input re-calibration (RIO-ANI Module) – if fitted.
    - Analogue output re-calibration (RIO-ANO Module) – if fitted.
- Please refer to the product GM Int. handbooks for calibration instructions for the following:
    - Load-Cell Amplifier Calibration (GM Int. D5264S Modules) - If fitted.
    - Can-High Isolating Converter Adjustment (GM Int. D5030D Module(s) – If fitted.

GM Int. products require *a Windows™ PC/Laptop with USB port, GM Int. PPC5092 adapter (includes driver software) and associated SWC5090 software (http://www.gminternational.com)*

WARNING: Adjusting Intrinsically Safe Modules requires the enclosure to be open whilst it contains hazardous live parts. This **must** only be carried out within the requirements of all applicable customer, statutory and regulatory requirements.

Section 8: **Safety Information**

ELECTRICAL SAFETY

- **Hazardous Voltages** are capable of rendering an electric shock or burn under normal conditions or in a single fault condition. These are defined as voltages that exceed those of SELV circuits as defined in Section 15:.
- Instrument power should be connected via a suitable power disconnect using a suitably sized and electrically and mechanically protected cable.
- Always replace fuses with appropriate replacements, as defined in Section 14:, Spare Fuses.
- To avoid risk of fire, burns, or damage to your instrument, do not allow conductive/metal objects enter the instrument casing.
- Use only Sensia approved spare parts.
- Do not disassemble. There are no user-serviceable parts inside.

Section 9: **Instrument Specifications**

GENERAL SPECIFICATIONS

DESIGN AREA	ITEM	DESCRIPTION
Physical	Size (mm)	440mm x 565mm x 240mm (W x H x D) Approx. 17½" x 22¼" x 9½" (W x H x D) Approx.
	Weight	50 kg approx.
	Wire Connections	**Screw Terminals:** 22–12 AWG (0.5 to 2.5mm²) **Earth Bus Bar:** 22–12 AWG (0.5 to 2.5mm²), 16mm² when cable lug used. **RIO-xxx Modules & Relay Modules:** 24–14 AWG (0.25 to 2.5mm²)
Operating Environment	Equipment Class	I
	Installation Category	II
	Pollution Degree	3[1] (Jiskoot Remote I/O Hub only)
	Operating Temperature	**AC Powered:** -20°C to +50°C (-4°F to +122°F) **DC Powered:** -20°C to +60°C (-4°F to +140°F)
	Relative Humidity	80% up to 31°C decreasing linearly to 50% at 40°C
	IP Rating	IP66
	Altitude	2000 metres max. (6562 feet)
Power Supply	Voltage, Frequency	**AC Powered:** 100 to 240 V AC, 50/60 Hz **DC Powered:** 24V DC ± 10%
	Power Consumption	**AC Powered:** 80 Watts Max. (All options fitted) **DC Powered:** 30 Watts Max. (All options fitted)
Remote I/O Modules	Quantity	4 max.
	Types	**RIO-DIO :** Digital Input/Output Module **RIO-PUL :** Pulse/Frequency Input Module **RIO-ANI :** Analogue (4-20mA) Input Module **RIO-ANO :** Analogue (4-20mA) Output Module
Relay Outputs	Quantity	4
	Contact Form	Solid State Relay – SPST – NO
	Installation Category	III
	Max. Switching Voltage	250V AC, 30V DC
	Max. Switching Current	1 Amp
Intrinsically Safe Interfaces	Quantity	2 max.
	Types	Either 2 Ch. CanWeigh or 2/4 Ch. CanHigh
Communications	Quantity	1
	Type	Either: Ethernet 10/100 direct wire (100m max.), or Ethernet SHDSL Extender (15km max.)

[1] Pollution Degree 3 – Normally only non-conductive POLLUTION occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

COMPLIANCE TO INTERNATIONAL STANDARDS

STANDARD	TITLE
IEC/EN 60079-0	Explosive atmospheres - Part 0: Equipment - General requirements
IEC/EN 60079-1	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC/EN 60079-11	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" (Models #########3, #########4 or #########5).
IEC/EN 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use
IEC/EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements.

Section 10: **Operation**

Please refer to the InSpec Enhanced Controller Handbooks for information on how to integrate the InSpec Remote IO-Hub into a system, and configure and perform basic diagnostics using the web interface.

The operation of the InSpec RIO-Hub is controlled from the InSpec Enhanced Controller, using Modbus TCP protocol.

COMMUNICATIONS FAILURE

WARNING In the event of a communications failure to the RIO module(s), the modules will assume a known state. It is incumbent on the system design to ensure that it operates in a safe manner at all times, even in the event of a communications failure.

KNOWN STATES

Product Model		Duty
RIO-DIO	(Digital IO)	All digital outputs **OFF**
RIO-PUL	(Pulse Input)	N/A
RIO-ANI	(Analogue Input)	N/A
RIO-ANO	(Analogue Output)	All analogue outputs set to **4mA**

Section 11: **Inspection & Maintenance**

Inspection and maintenance of this equipment should be carried out to IEC/EN 60079-17.

Repairs may only be carried out by a qualified electrician and will subsequently have to be checked by an “expert”.

WARNING

This Instrument Has No User Serviceable Parts

Any Attempt To Repair The Instrument May Invalidate The Warranty

Opening up enclosure will reveal hazardous live parts

HEALTH & SAFETY PRECAUTIONS

MAINTENANCE

There are no maintenance requirements for this equipment.

Calibration requires the enclosure to be opened and power to be applied. This may require authorised access under the site permit-to-work system and/or continuous gas monitoring as determined by the site operator's health and safety systems.

ANNUAL MAINTENANCE

- It is recommended that the Jiskoot InSpec Remote I/O Hub is calibrated, and a detailed inspection of the equipment carried out at least once per annum.
- The enclosure should be inspected on a regular basis after installing.
- A visual inspection should be made to ensure all cover bolts are installed, tight and in good condition.
- A visual inspection should be made to ensure all conduit/cable connections are intact and free of corrosion.
- If the enclosure must be opened for servicing, the following procedures should be followed:
    - Disconnect power (isolate circuits).
    - Remove all cover bolts, clean and inspect. Replace any corroded or otherwise damaged bolts with factory-approved bolts.

ENCLOSURE SCREW/BOLTS

Use only bolts supplied with the enclosure.

(HEX HEAD COVER BOLT: ISO 4014 OR ISO 4017, GRADE/CLASS 8.8, THREAD FIT CLASS 6H.)

The recommended torque value for M12 x 1.75” bolts is 83 Nm (61 ft lb).

OTHER

Before reassembling the enclosure, inspect and clean the machined flanges on the box and cover - surfaces must be smooth, free of nicks, scratches, dirt or foreign objects. Inspect the cover gasket and ensure that it is secure and undamaged. If the gasket is damaged, replace with factory-approved gasket and adhesive.

The enclosure shall be operated as intended and only in undamaged and perfect condition.

ATTENTION

Caution!

Handle electronic components and printed circuit card assemblies only when you are properly grounded in an ESD Protected Area (EPA). You are a source of ESD unless you are grounded properly.

Modern electronic devices are very sensitive to static electric charges.

Use a grounding wrist strap at all times.

Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.

Store and transport ESD-sensitive items in static-shielding containers, such as specially marked bags or boxes.

Section 12: **: Product Specific Drawings**

Please refer to the project specific documentation package.

Section 13: **: Troubleshooting**

SOLVING COMMON PROBLEMS

Instrument does not power up?

☑ Check the integrity of the power supply connected to the unit and verify that it is within the acceptable limits (See Section 4: Field Connections).

AC mains powered units:-

☑ Check that the 20mm fuse in the fused terminal 'F1', on the main terminal rail is good and of the correct size and type (Section 14: - Spare Fuses).

ⓘ Check the green 'DC on' LED indicator is on for any AC/DC PSUs fitted.

DC 24V powered units:-

☑ Check that the 20mm fuse in the fused terminal 'F4', on the main terminal rail is good and of the correct size and type (Section 14: - Spare Fuses).

AC or DC powered units:-

☑ Check that the green status LED on each Jiskoot RIO-xxx Module is flashing.

ⓘ The RIO-xxx Modules have an integral 'PTC Resettable Fuse' on the 24V DC power supply inlet. If the fuse has "blown," power down the unit for 1 minute to reset the fuse. Then power the unit up again.

Instrument power fuses keep blowing?

If the AC power fuses or 24V DC fuse blow regularly the most likely cause of the problem is the external wiring.

☑ Check that the external wiring is correct and without faults.

☑ Check that none of the unit's inputs or outputs are being overloaded.

ⓘ If the power supply is of poor quality, internal circuits for suppression of voltage transients may prematurely age the fuses and cause them to blow.

Section 14: : Support

REPACKAGING FOR SHIPMENT

If the instrument is to be shipped to Sensia for service or repair, be sure to do the following:

- Place the instrument in its original container with appropriate packaging material.
- Secure the container with strong tape or metal bands.

SPARE FUSES

All fuses are 5 x 20mm anti-surge (T) high breaking capacity (H) fuses conforming to IEC 127. Replacement fuses must be of an identical specification.

The absolute maximum fuse sizes that may be fitted to the unit are listed below:

REMOTE I/O HUB MODEL NUMBER	FUSE ID	FUSE TYPE	DUTY	SENSIA PART #
##**A**####### ##**B**####### ##**C**#######	F1	T2AH250V (5x20mm)	Main AC Supply Fuse.	3J-28-0050-00
##**A**####### ##**B**####### ##**C**#######	F2	T1AH250V (5x20mm)	Fused output for AC output type relays.	3J-28-0043-00
##**B**####### ##**C**#######	F3	T2AH250V ** (5x20mm)	Fused output from 24V AC-DC PSU, for energising solenoids and other electro-mechanical loads.	3J-28-0050-00
##**A**####### ##**C**####### ##**X**#######	F4	T2AH250V ** (5x20mm)	Fused output from 24V AC-DC PSU, for energising pressure, flow, temperature transmitters (or similar), or main DC power supply fuse for DC powered models.	3J-28-0050-00
##########	F5	T500mAH250V** (5x20mm)	Circulation fan and I.S. barrier supply.	3J-28-0051-00

** **NOTE:** fuses are to be pre-approved for AC & DC rating

OTHER SPARES

Only exact replacements should be fitted to the InSpec Remote I/O Hub or suitable alternatives supplied by Sensia, covered by the unit's certification. Below is a list of spares:

REMOTE I/O HUB MODEL NUMBER	ITEM	MANUFACTURER	MODEL NO.	SENSIA PART #
##**A**####### ##**B**####### ##**C**#######	AC-DC PSU	TDK-Lambda	DRB100-24-1	3J-24-1049-00
See Section 4: - Relay Circuits (Outputs)	Solid State Relay for DC Load	Crydom	CN024D24	3J-29-0086-00
	Solid State Relay for AC Load	Crydom	CN240A24	3J-29-0087-00
####**1**##### ####**2**##### ####**3**##### ####**4**#####	InSpec Digital I/O Module	Sensia	RIO-DIO	3J-43-0240-00
#####**1**#### #####**2**#### #####**3**#### #####**4**####	InSpec Pulse Input Module	Sensia	RIO-PUL	3J-43-0241-00
######**1**### ######**2**### ######**3**### ######**4**###	InSpec Analogue Input Module	Sensia	RIO-ANI	3J-43-0242-00
#######**1**## #######**2**## #######**3**## #######**4**##	InSpec Analogue Output Module	Sensia	RIO-ANO	3J-43-0243-00
########**B**#	Ethernet Line Driver	Westermo	DDW-120	3J-42-0229-00
#########**3**	I.S. Load-Cell Amplifier	GM International	D5264S	3J-42-0226-00
#########**4** #########**5**	I.S. Can-High Isolator	GM International	D5030D	3J-42-0225-00
#########**3** #########**4** #########**5**	D5000 Series Adapter for Configuration	GM International	PPC5092	3J-42-0227-00

Section 15: **Abbreviations & Acronyms**

ABBREVIATIONS & ACRONYMS

AC	-	Alternating Current
DC	-	Direct Current
GND	-	Ground (0V DC)
I/O	-	Input or Output
IEC	-	The International Electrotechnical Commission
LED	-	Light-Emitting Diode
PE	-	Protective Earth
Pollution	-	Addition of foreign matter, solid, liquid or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity.
PSU	-	Power Supply Unit
PTC	-	Positive Temperature Coefficient
SELV	-	Safety Extra-Low Voltage circuit An SELV circuit is defined as a circuit that is so designed and protected that under both normal and single fault conditions, its voltages do not exceed a safe value. Under normal conditions, the voltage of such a circuit cannot exceed 33 V rms and 46.7 V peak or 70 V DC In the event of a single fault, the voltage cannot exceed 55V rms and 78 V peak or 140 V DC.
SSR	-	Solid State Relay

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Appendix A: **Publisher Notes**

SUPPORT

For further support, contact:

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