Trusted Processor Interface Adapter

Product Overview

This document provides general information for the Trusted® Processor Interface Adapter T813X. The Adapter provides easy access to the communications ports of the Trusted Triple Modular Redundant (TMR) Processor (T8110B) in the Controller Chassis for the Distributed Control System (DCS) and other links. The unit is also used to enable a number of extended facilities available on the Trusted TMR Processor including facilities for the reception of IRIG-IRIG-B time synchronisation signals, enabling the use of Dual ('enhanced') Peer to Peer and enabling the Trusted System to become Modbus Master.

Features:

- Allows easy access for external systems to communicate with a Trusted TMR Processor.
- Easy installation (connects directly to the rear of the Controller Chassis).
- Two RS422/485 configurable 2 or 4 wire connections.
- One RS422/485 2 wire connection.
- Fault/fail connections for Active and Standby Processors.
- Processor diagnostics connection.
- PSU shutdown monitor connections.
- Enables IRIG-B122 and IRIG-B002 time synchronisation signals.
- Enables Modbus Master on the Trusted Communications Interface.
- Enables ICS2000 to Trusted Interface.

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PREFACE

In no event will Rockwell Automation be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment. The examples given in this manual are included solely for illustrative purposes. Because of the many variables and requirements related to any particular installation, Rockwell Automation does not assume responsibility or reliability for actual use based on the examples and diagrams.

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DISCLAIMER

It is not intended that the information in this publication covers every possible detail about the construction, operation, or maintenance of a control system installation. You should also refer to your own local (or supplied) system safety manual, installation and operator/maintenance manuals.

REVISION AND UPDATING POLICY

This document is based on information available at the time of its publication. The document contents are subject to change from time to time. The latest versions of the manuals are available at the Rockwell Automation Literature Library under "Product Information" information "Critical Process Control & Safety Systems".

TRUSTED RELEASE

This technical manual applies to **Trusted Release: 3.6.1**.

LATEST PRODUCT INFORMATION

For the latest information about this product review the Product Notifications and Technical Notes issued by technical support. Product Notifications and product support are available at the Rockwell Automation Support Centre at
http://rockwellautomation.custhelp.com

At the Search Knowledgebase tab select the option "By Product" then scroll down and select the Trusted product.

Some of the Answer ID’s in the Knowledge Base require a TechConnect Support Contract. For more information about TechConnect Support Contract Access Level and Features please click on the following link:

https://rockwellautomation.custhelp.com/app/answers/detail/a_id/50871

This will get you to the login page where you must enter your login details.

IMPORTANT A login is required to access the link. If you do not have an account then you can create one using the "Sign Up" link at the top right of the web page.

DOCUMENTATION FEEDBACK

Your comments help us to write better user documentation. If you discover an error, or have a suggestion on how to make this publication better, send your comment to our technical support group at http://rockwellautomation.custhelp.com

SCOPE

This manual specifies the maintenance requirements and describes the procedures to assist troubleshooting and maintenance of a Trusted system.

WHO SHOULD USE THIS MANUAL

This manual is for plant maintenance personnel who are experienced in the operation and maintenance of electronic equipment and are trained to work with safety systems.

SYMBOLS

In this manual we will use these notices to tell you about safety considerations.

	SHOCK HAZARD: Identifies an electrical shock hazard. If a warning label is fitted, it can be on or inside the equipment.
	WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which can cause injury or death, property damage or economic loss.
	ATTENTION: Identifies information about practices or circumstances that can cause injury or death.
	CAUTION: Identifies information about practices or circumstances that can cause property damage or economic loss.
	BURN HAZARD: Identifies where a surface can reach dangerous temperatures. If a warning label is fitted, it can be on or inside the equipment.
	This symbol identifies items which must be thought about and put in place when designing and assembling a Trusted controller for use in a Safety Instrumented Function (SIF). It appears extensively in the Trusted Safety Manual.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
NOTE	Provides key information about the product or service.
TIP	Tips give helpful information about using or setting up the equipment.

WARNINGS AND CAUTIONS

WARNING: EXPLOSION RISK

Do not connect or disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations or equivalent

AVERTISSEMENT - RISQUE D'EXPLOSION

Ne pas connecter ou déconnecter l'équipement alors qu'il est sous tension, sauf si l'environnement est exempt de concentrations inflammables ou équivalente

MAINTENANCE

Maintenance must be carried out only by qualified personnel. Failure to follow these instructions may result in personal injury.

CAUTION: RADIO FREQUENCY INTERFERENCE

Most electronic equipment is influenced by Radio Frequency Interference. Caution should be exercised with regard to the use of portable communications equipment around such equipment. Signs should be posted in the vicinity of the equipment cautioning against the use of portable communications equipment.

CAUTION:

The module PCBs contains static sensitive components. Static handling precautions must be observed. DO NOT touch exposed connector pins or attempt to dismantle a module.

ISSUE RECORD

Issue	Date	Comments
2	Sep 05	Format
3	Aug 06	Dual Peer to Peer
4	Sep 07	Port purposes
5	Sep 14	Fault/Fail connector identity
6	Sep 15	Rebranded and reformatted with standardisation of the Relative Humidity Range and Operating Temperature specifications
7	Apr 16	Updated to incorporate IEEE standards and correct typographical errors

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1. Description

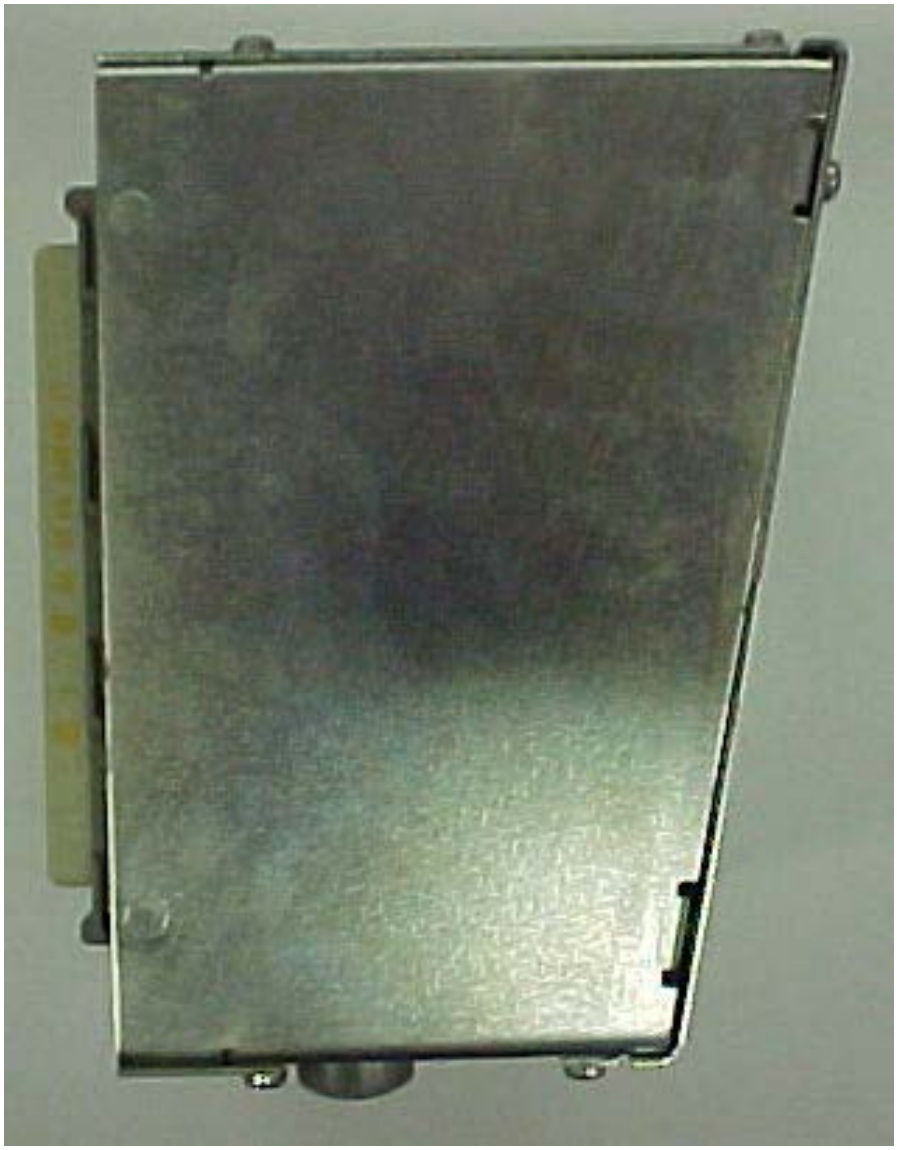

Figure 1 Photo T813X

The Trusted Processor Interface Adapter T813X is designed to be connected directly to the rear of a Trusted TMR Processor position in a Trusted Controller Chassis T8100. The Adapter provides a communications connection interface between the Trusted TMR Processor and remote systems. The Adapter also provides the option of connecting IRIG-B time synchronisation signals to the Processor. Connection between the Adapter and the Trusted TMR Processor is via two 48-way DIN41612 E-type connectors (SK1), one each for connection to the Active and Standby Processors.

Figure 2 shows the physical layout of serial port, diagnostics and IRIG-B connectors on the Adapter printed circuit board (PCB).

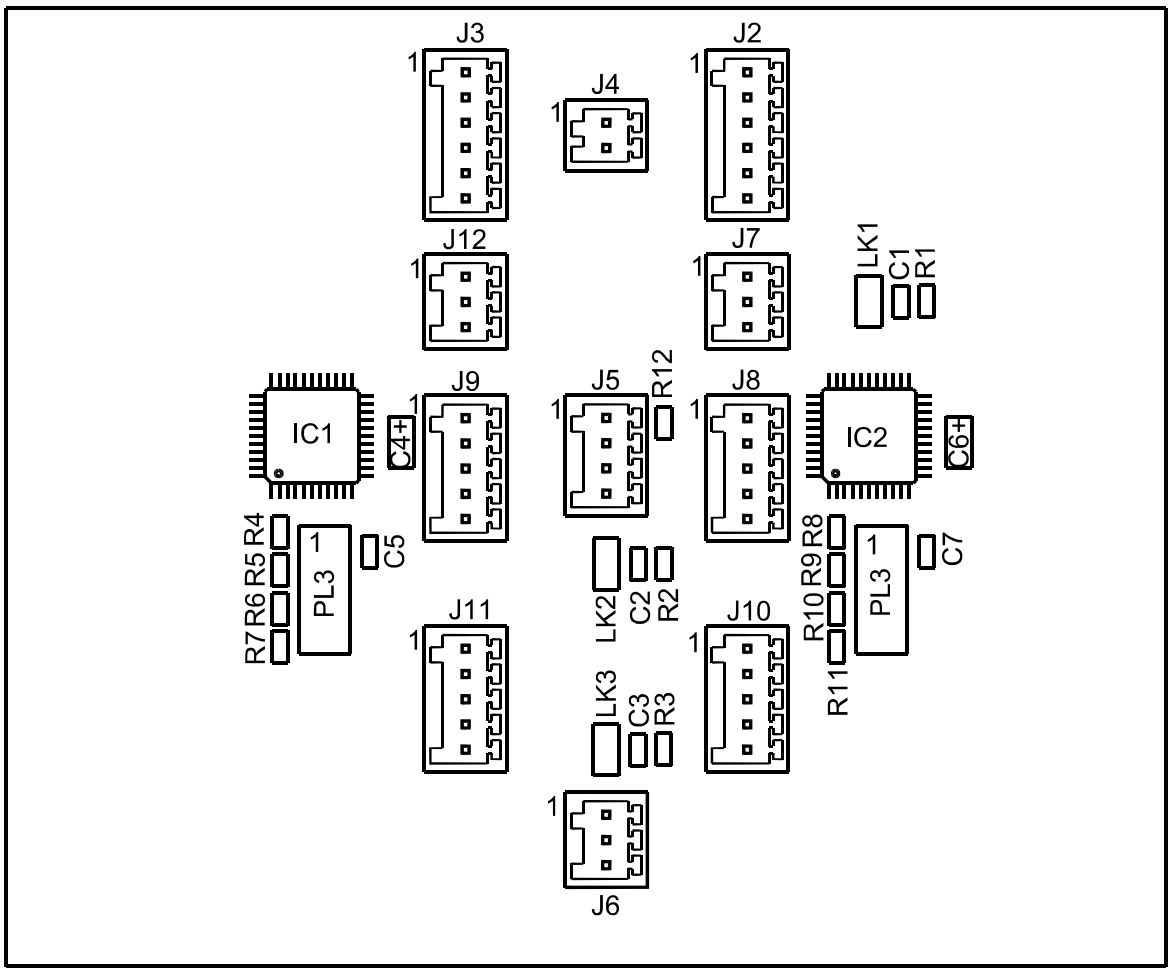

Figure 2 Adapter Layout

The Adapter comprises a PCB on which the communications ports, IRIG-B connectors and both SK1 sockets (connectors to the Active/Standby Trusted TMR Processors) are mounted. The Adapter is contained within a metal enclosure and is designed to be clipped onto the appropriate connector at the rear of the Controller Chassis. Release buttons are provided to enable the Adapter to be disconnected.

The communications ports available at the Adapter are RS422/RS485 2 wire on Port 1, and RS422/RS485 2 or 4 wire on Ports 2 and 3.

An earth point is provided on the PCB so that the Chassis earth of the Processor will be connected to the shell of the Adapter and module rack earth. It is an important safety and Emergency Shutdown ESD requirement that the equipotential bonding is connected and maintained.

1.1. Processor Interface Connector (SK1)

SK1 is a 48-way DIN41612, E-type connector.

Pin	CONNECTOR SK1 PINOUT		
	A	B	C
2	Fault Relay (NC)	DIAG_RTN	Failed Relay (NC)
4	Fault Relay (Common)	DIAG_IN_1	Failed Relay (Common)
6	Fault Relay (NO)	0 V Port 1	Failed Relay (NO)
8	N.C.	Serial Port 1 B	N.C.
10	5 V_D	Serial Port 1 A	IRIG-B122+
12	DATA_OUT	0 V Port 2	IRIG-B122-
14	ENABLE	Serial Port 2 B TX	Reserved
16	DATA_IN	Serial Port 2 A TX	Reserved
18	CLK	Serial Port 2 B RX/TX	IRIG-B002-
20	0 V	Serial Port 2 A RX/TX	IRIG-B002+
22	Chassis GND	0 V Port 3	Chassis GND
24	Chassis GND	Serial Port 3 B TX	Chassis GND
26	Chassis GND	Serial Port 3 A TX	Chassis GND
28	24 V PSU 1 LV Warning	Serial Port 3 B RX/TX	24 V PSU 1 Shutdown
30	24 V PSU 2 LV Warning	Serial Port 3 A RX/TX	24 V PSU 2 Shutdown
32	24 V Return	24 V Return	24 V Return

Table 1 Connector SK1 Pinout

1.2. Fault/Fail Connectors (J2 and J3)

J2 and J3 are Phoenix contact 2.5 mm pitch connectors.

Pin	Service
1	FAULT_n_NC
2	FAULT_n_COMMON
3	FAULT_n_NO
4	FAIL_n_NC
5	FAIL_n_COMMON
6	FAIL_n_NO

Table 2 Fault/Fail Connectors

Note: n=1 for connector J2 and 2 for connector J3 providing fault and fail connections for the Active and Standby Processors respectively. FAULT NC relay contacts open on any system fault which sets the Processor System Healthy LED flashing red. FAIL NC relay contacts open on Processor shutdown.

1.3. Diagnostic Connector (J4)

J4 is a Phoenix contact 2.5 mm pitch connector. This port is not for operational use.

Pin	Service
1	DIAG_RTN
2	DIAG_IN_1

Table 3 Diagnostic Connector

1.4. PSU Shutdown Monitor Connector (J6)

J6 is Phoenix contact 2.5 mm pitch connector. These two system inputs are made available to the application on the Processor's complex I/O equipment definition. The inputs expect volt-free contacts to the RTN pin.

Pin	Service
1	24 V_PSU1_SHUTDOWN
2	24 V_PSU2_SHUTDOWN
3	24 V_RTN

Table 4 PSU S/D Monitor Connectors

1.5. Serial Port 1 (Diagnostic) Connectors (J7 and J12)

J7 and J12 are Phoenix 2.5 mm pitch connectors.

Pin	Service
1	0 V
2	SERIAL_1_B
3	SERIAL_1_A

Table 5 Serial Port 1 Diagnostic Connectors

1.6. Serial Ports 2 and 3 Connectors (J8 to J11)

These are Phoenix 2.5 mm pitch connectors.

Pin	Service
1	0 V
2	SERIAL_TX_B
3	SERIAL_TX_A
4	SERIAL_RX/TX_B
5	SERIAL_RX/TX_A

Table 6 Serial Ports 2 and 3 Connectors

1.7. IRIG-B Connector (J5)

J5 is a Phoenix 2.5 mm pitch connector.

Pin	Service
1	IRIG-B122+
2	IRIG-B122-
3	IRIG-B002-
4	IRIG-B002+

Table 7 IRIG-B Connector

1.8. Mating Connectors

The following table lists the connectors required to mate with the Trusted Processor Interface Adapter.

Connector	Phoenix Contact Part No	ICS Part No	No of Ways
J2,J3	18 81 36 7	3JX072	6
J4	18 81 32 5	3JX073	2
J5	18 81 34 1	3JX074	4
J6,J7,J12	18 81 33 8	3JX075	3
J8,J9,J10,J11	18 81 35 4	3JX076	5

Table 8 Mating Connectors

2. Installation

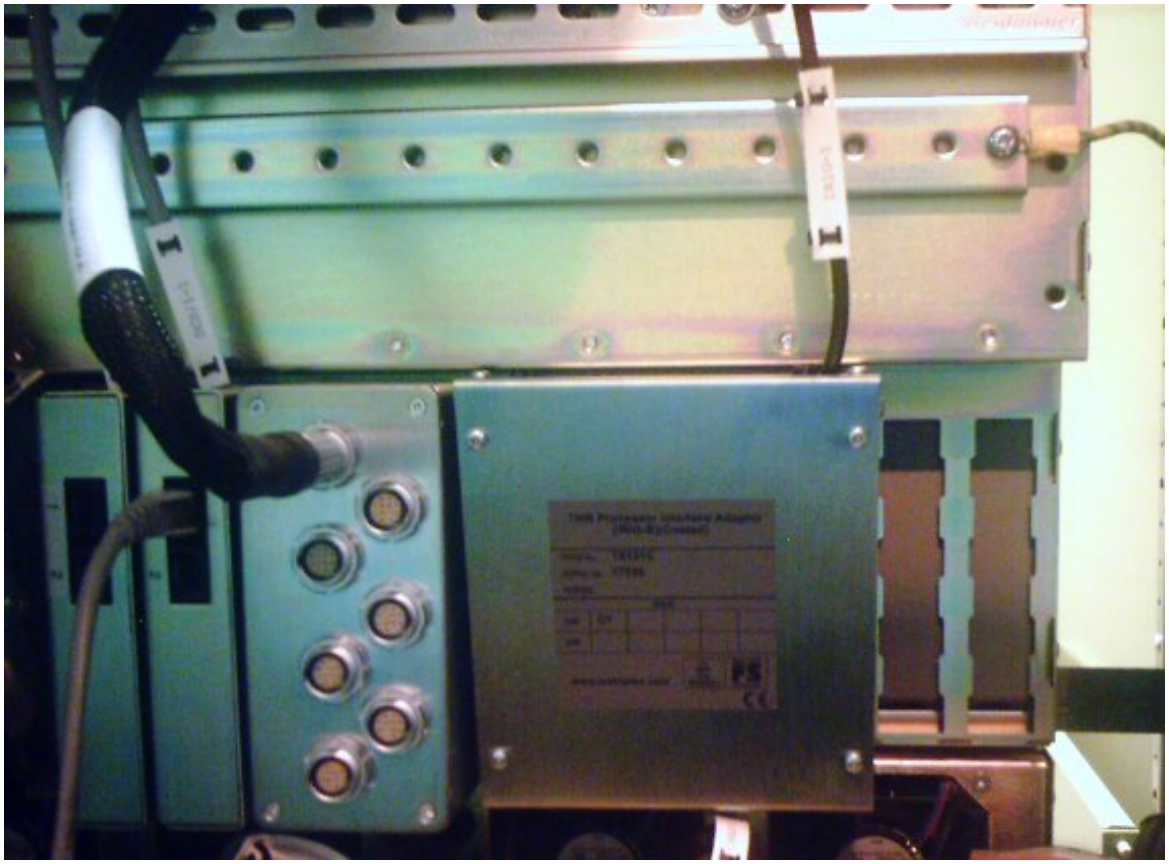

Figure 3 Correct Installation Position

The Adapter should be fitted on the rear of the chassis behind the Processor slots, as shown above. The two connectors should fit into the third and sixth slots from the right, where the Processor connectors will fit. In the correct position, two empty slots will be visible on the right. Insert the Adapter into position about 5 mm lower than its final position, and ensure it is slotted in on both sides. Raise the Adapter upwards until the retaining clips click into place.

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3. Input Configuration

3.1. Serial Ports

The serial ports connectors are arranged so that multi-drop RS422/485 connections can be easily configured. J7, J8 and J10 together with LK1, LK2 and LK3 form the basic terminations for ports 1, 2 and 3 respectively.

For a single point connection the termination would be made to the relevant connector and its corresponding link would be fitted. For a multi-drop connection the 'incoming' connections would be made to the connections listed above and the 'outgoing' to J12, J9 or J11 for ports 1 to 3 respectively. This time however, the link will be removed as only the last connection on a multi-drop chain should be terminated.

The provision of the two connectors for each serial port will enable quicker configuration of serial cabling as there is now no need to terminate two cables onto the same connector. The links LK1 to LK3 provide the serial ports with an easy way to add 120 Ω termination onto the receivers extremely close to the receiving devices.

The 4 wire serial ports 2 and 3 have connectors that are pin compatible with those used on the Trusted Communications Interface Termination Unit (T8153).

Serial connections should use screened twisted pair cable with the A-B signals connected as a pair. The screen should be connected to chassis ground at one end only. Some equipment may require a common 0 V connection in order to operate correctly, the 0 V on the connector should be connected to 0 V on the other equipment to facilitate this.

Further information on serial port configuration can be found in the standards listed below:

- EIA/TIA-422-B
- EIA-485
- CCITT V.11

3.2. IRIG-B Ports

The IRIG-B002 input is a pulse width modulated signal at 100bits/s and uses RS422 voltage levels. Connection to this port should be by twisted pair cable. A 120 Ω termination (R13) is permanently provided on the module. For multi-drop IRIG-configurations, the resistor must be removed on all but the last Interface Adapter.

The IRIG-B122 input is a 1 kHz amplitude modulated signal where the modulating signal has the same format as IRIG-B002. The peak amplitude (mark) of the input signal is nominally 1 V to 6 V into 600 Ω. The Trusted TMR Processor is able to receive signals in the range 0.25 V PK-PK to 10 V PK-PK. IRIG-B122 is normally provide via co-axial cable although any suitable medium would be acceptable.

Further information on IRIG-configuration can be found in the standards listed below:

- Range Commanders Council IRIG-STANDARD 200-98
- IEEE Std 1344-1995 Annex F.2

4. Available Operations

The following table lists the variants of the Trusted Processor Adapter Unit and the Trusted TMR Processor options that can be made available by using them. All the variants below will enable the use of Dual ('enhanced') Peer to Peer with other Trusted Systems, using the dxpnc40 I/O definition and its associated data transfer I/O definitions. The Interface Adapter will not enable Dual Peer to Peer communication with Plantguard systems.

Variant	Options Enabled
T8131	ICS 2000 IRIG-B and Modbus Master Enables ICS2000, IRIG-B time signal decode and Modbus Master operation.

Table 9 Available Options

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5. Specifications

Ports	
Port 1	RS422/485
Ports 2 and 3	RS422/485
IRIG-B	IRIG-B122 and IRIG-B002 on a single connector
Operating Temperature	0 ˚C to +60 ˚C (+32 ˚F to +140 ˚F)
Non-operating Temperature	-25 ˚C to +70 ˚C (-13 ˚F to +158 ˚F)
Relative Humidity range (operating, storage & transport)	10 % – 95 %, non-condensing
Environmental Specifications	Refer to Document 552517
Dimensions	
Height	138 mm (5.43 in)
Width:	120 mm (4.72 in)
Depth:	108 mm (4.25 in)
Weight	877 g (1.93 lb)