

SINGRI SYSTEM USER MANUAL



Version 1.01

2020-01-23

Table of Contents

Introduction 5

Technical Specifications..... 6

Hardware List..... 8

cRIO Module Configuration & Interfacing..... 9

 Analog Inputs Channel Pinout..... 10

Circular Connector Diagram..... 23

Assembly Instructions Military (MS3476)..... 28

Assembly Instructions 97 Series (10SL-3)..... 29

Additional Technical Documentation..... 30

Valkyrie Warranty & Support..... 31

List of Figures

Figure 1. Wiring Diagram & Specifications for NI-9219 Module	10
Figure 2. Voltage Input Connections	13
Figure 3. Current Input Connections	13
Figure 4. 4-Wire Resistance & 4-Wire RTD Input Connections	13
Figure 5. 3-Wire RTD Input Connections	14
Figure 6. Full-Bridge Input Connections.....	14
Figure 7. Half-Bridge Input Connections	14
Figure 8. Digital Input Connections	15
Figure 9. Open Contact Input Connections.....	15
Figure 10. TEDS Sensor Input Connections	15
Figure 11. Circular Connector layout on the SINGRI System	23
Figure 12. Labelling convention for 30-pin connectors	24
Figure 13. Labelling convention for 3-pin connector	27

List of Tables

Table 1. SINGRI System's Technical Specifications.....	6
Table 2. SINGRI-32 System - cRIO Module Configuration Summary.....	9
Table 3. NI-9219 Signal Wiring by Input Mode	11
Table 4. NI-9219 Signal Descriptions.....	12
Table 5. NI-9219 Module Pinout Labels.....	16
Table 6. Pinout for Connectors 1 through 4	24
Table 7. Pinout for Connectors 5 through 8	26
Table 8. Pinout for connector 9.....	27
Table 9. Wire crimping for Amphenol MS3476 Series	28
Table 10. Wire crimping for Amphenol 97 Series.....	29
Table 11. SINGRI System - Additional Technical Documentation	30

Introduction

The SINGRI System is a National Instruments based universal measurement industrial panel (enclosure) which can measure up to 32 channels of Voltage, Current, -3 and 4-wire RTD, Resistance, Digital, and Open Contact inputs at 100S/s/channel with Individual channel input selection.

The SINGRI system features a National Instruments 8-Slot Embedded Real-Time Controller with Reconfigurable FPGA. This CompactRIO can be programmed using the LabVIEW Programming Environment.

The SINGRI system is fully connectorized to allow for quick and fast on-site installation. A total of 9 Amphenol industrial circular connectors are used to interface with the 32 different I/O channels. Corresponding plugs, cable claps, pins, and circular metal dust caps included with the system.

Additional connectors include (x1) Cat6a RJ45 inline coupling connector for Ethernet TCP/IP interfacing. This port allows for direct interfacing with the National Instruments CompactRIO controller.

The SINGRI system comes in two versions. A 32-channel version (SINGRI-32) and a 16-channel version (SINGRI-16).

The SINGRI system is ideal for:

- Low density & high versatility measurement applications
- Applications with variable I/O definition & requirements
- Research and non-permanent testing facilities
- As a spare panel for future facility expansions

For inquiries or technical support please contact us directly at info@valkyriecontrols.com

Technical Specifications

The SINGRI System's technical specifications may vary from version to version. The SINGRI System's specifications are listed in the following table. The following specifications are for the range of -40 °C to 85 °C unless otherwise noted.

Table 1. SINGRI System's Technical Specifications

Universal Inputs	(x32) Universal Analog Input Channels (Singri-32 Version) (x16) Universal Analog Input Channels (Singri-16 Version)
Input Ranges (Nominal)	Voltage (± 60 V, ± 15 V, ± 4 V, ± 1 V, ± 125 mV) Current (± 25 mA) 4-Wire and 2-Wire Resistance (10 k Ω , 1 k Ω) 4-Wire and 3-Wire RTD (Pt 1000, Pt 100) Quarter-Bridge (350 Ω , 120 Ω) Half-Bridge (± 500 mV/V) Full-Bridge (± 62.5 mV/V, ± 7.8 mV/V) Digital In (On/Off) Open Contact (On/Off)
Input Ranges (Actual)	Voltage (± 60 V, ± 15 V, ± 4 V, ± 1 V, ± 125 mV) Current (± 25 mA) 4-Wire and 2-Wire Resistance (10.5 k Ω , 1.05 k Ω) 4-Wire and 3-Wire RTD (5.05 k Ω , 505 Ω) Quarter-Bridge (350 Ω , 120 Ω) Half-Bridge (± 500 mV/V) Full-Bridge (± 62.5 mV/V, ± 7.8125 mV/V) Digital In (0 V to 60 V) Open Contact (1.05 k Ω)
Ethernet Connectivity	(x1) RJ45 CAT6a GbE

Power Input	18-30VDC 24VDC Nominal
Power Consumption	17-25W (min to max)
cRIO Configuration (Singri-32 Version)	(x1) 8-Slot Embedded Real-Time Controller with Reconfigurable FPGA; NI-9066 (x8) 4-Ch Universal Measurements, 100 S/s Simultaneous Module; NI-9219
cRIO Configuration (Singri-16 Version)	(x1) 4-Slot Embedded Real-Time Controller with Reconfigurable FPGA; NI-9063 (x4) 4-Ch Universal Measurements, 100 S/s Simultaneous Module; NI-9219
Operating Temperature	-4 to 131 °F (-20 to 55 °C)
Storage Temperature	-40 to 185 °F (-40 to 85 °C)
Physical Dimensions	36" x 36" x 8"
I/O Interface	Amphenol Industrial Circular Connectors; (x8) MS3470L18-30SX (x1) 97-3102A-10SL-3P + Dust Cover (x1) 97-3106A-10SL-3S (Included)

Hardware List

(x1) 8-slot Embedded Real-Time Controller; NI-9066 (Singri-32)



(x1) CONEC Series Cat6a RJ45 Inline Coupler; 17-150134



(x8) 4-Ch Universal Measurements, 100 S/s Module; NI-9219 (Singri-32)



(x1) Hubbell-Wiegmann Ultimate series enclosure, NEMA 4/12/13, 36 x 36 x 8in (HxWxD), wall mount, carbon steel



(x1) 4-Slot Embedded Real-Time Controller; NI-9063 (Singri-16)



(x6) Shell Size 18 Amphenol Standard Plug Assembly; MS3470L18-30SX



(x6) 30-pin circular MIL Spec connector; MS3470L18-30SX



(x10) 97 Series Amphenol Standard Plug Assembly; 97-3102A-10SL-3S



(x1) 3-pin circular 97 Series connector; 97-3102A-10SL-3P



cRIO Module Configuration & Interfacing

The following tables and associated figures describe the CompactRIO (cRIO) module configuration for the SINGRI System. The module slot order & module wiring details are described in this section.

The following table describes the cRIO module configuration of the SINGRI-32 System:

Table 2. SINGRI-32 System - cRIO Module Configuration Summary

Chassis 1			
Chassis	# of Slots Used	Channel Count (Chassis I/O)	Associated Circular Connectors
NI-9066 (Singri-32)	8	-	1-8
NI-9063 (Singri-16)	4	-	1-4
Chassis 1 Modules			
Module	Slot #	Channel Count	Associated Circular Connectors
NI-9219	1	4	1
NI-9219	2	4	2
NI-9219	3	4	3
NI-9219	4	4	4
NI-9219 (Singri-32)	5	4	5
NI-9219 (Singri-32)	6	4	6
NI-9219 (Singri-32)	7	4	7
NI-9219 (Singri-32)	8	4	8

Analog Inputs Channel Pinout

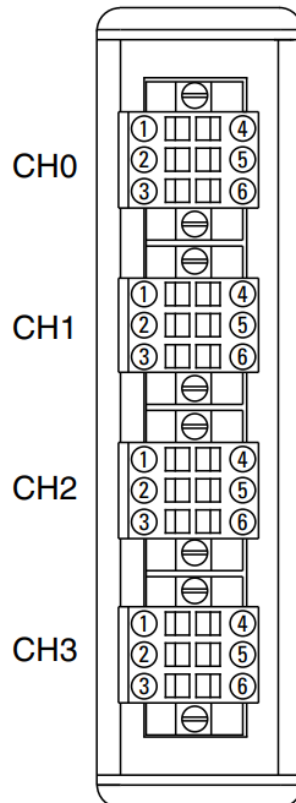
4-Channel 100 S/s/channel Universal Analog Input Module (NI-9219):

The NI-9219 is designed for multipurpose testing. With the NI-9219, you can measure signals from sensors such as strain gages, resistance temperature detectors (RTDs), thermocouples, load cells, and other powered sensors, as well as make quarter-bridge, half-bridge, and full-bridge current measurements, with built-in voltage and current excitation.

Each channel is individually selectable, so you can perform a different measurement type on each channel.

The following figure shows the wiring pinout & specifications for the National Instruments NI-9219 module:

Figure 1. Wiring Diagram & Specifications for NI-9219 Module



For additional information & specifications on the NI-9219 module see [NI-9219 Datasheet.pdf](#)

The following tables shows the signal wiring by input mode and signal descriptions for the NI-9219 input module:

Table 3. NI-9219 Signal Wiring by Input Mode

NI-9219 Module						
Mode	Pin					
	1	2	3	4	5	6
Voltage	T+	T-	_____	HI	LO	_____
Current	T+	T-	HI	_____	LO	_____
4-Wire Resistance	T+	T-	EX+	HI	EX-	LO
2-Wire Resistance	T+	T-	HI	_____	LO	_____
4-Wire RTD	T+	T-	EX+	HI	EX-	LO
3-Wire RTD	T+	T-	EX+	_____	EX-	LO
Quarter-Bridge	T+	T-	HI	_____	LO	_____
Half-Bridge	T+	T-	EX+	HI	EX-	_____
Full-Bridge	T+	T-	EX+	HI	EX-	LO
DI	T+	T-	_____	HI	LO	_____
Open Contact	T+	T-	HI	_____	LO	_____

Table 4. NI-9219 Signal Descriptions

NI-9219 Module	
Signal	Description
EX+	Positive sensor excitation connection
EX-	Negative sensor excitation connection
HI	Positive input signal connection
LO	Negative input signal connection
T+	TEDS data connection
T-	TEDS COM connection

The following figures show typical sensor wiring to the NI-9219 module by input mode:

Figure 2. Voltage Input Connections

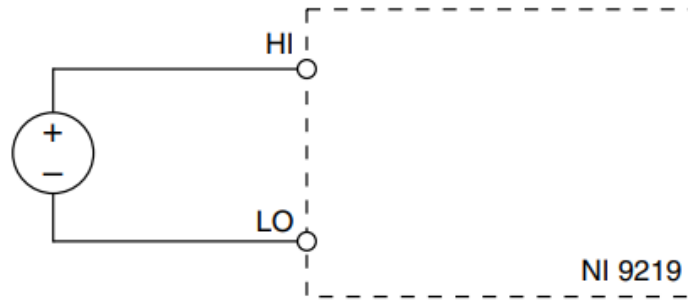


Figure 3. Current Input Connections

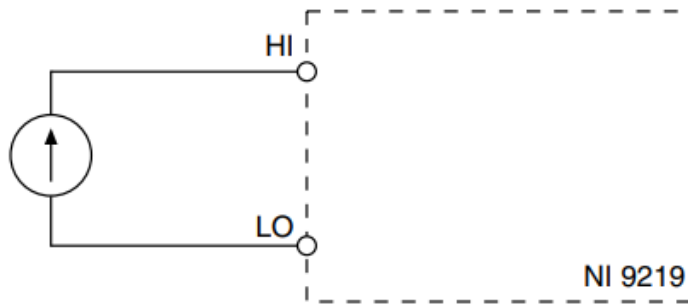


Figure 4. 4-Wire Resistance & 4-Wire RTD Input Connections

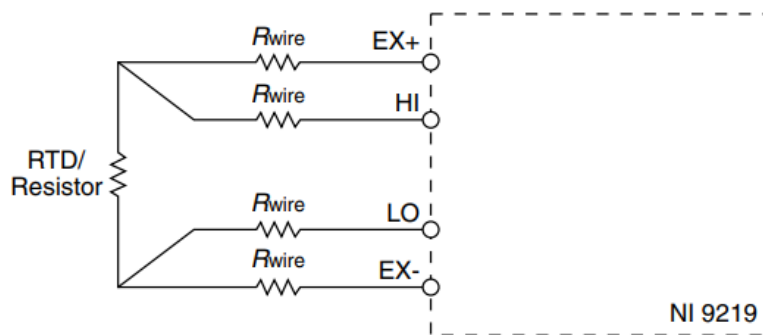


Figure 5. 3-Wire RTD Input Connections

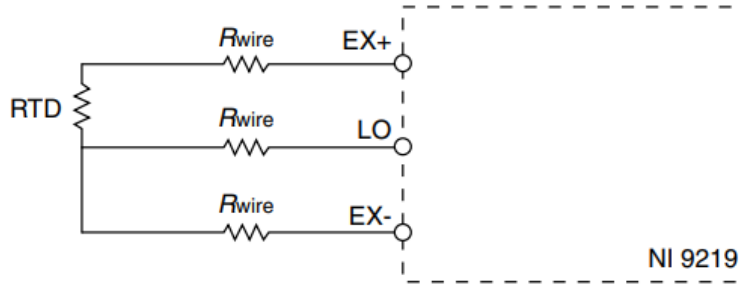


Figure 6. Full-Bridge Input Connections

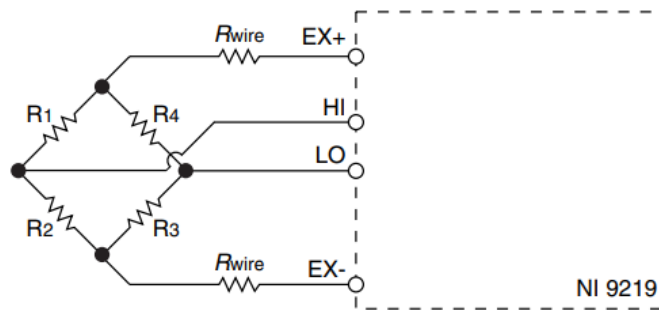


Figure 7. Half-Bridge Input Connections

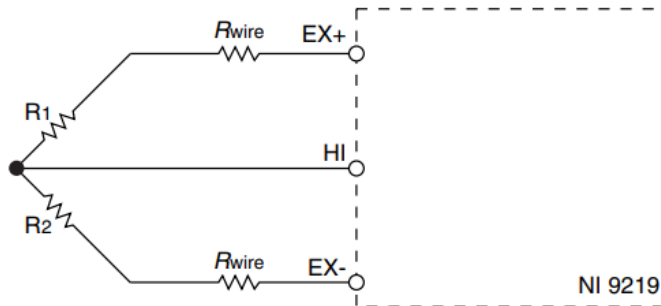


Figure 8. Digital Input Connections

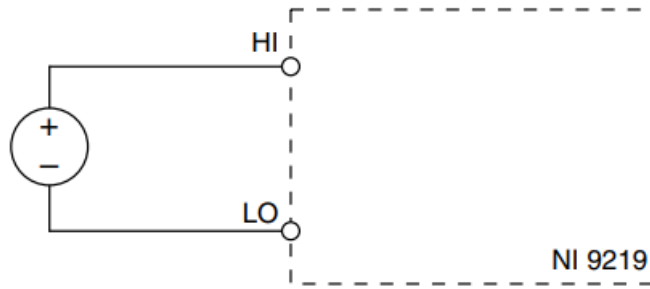


Figure 9. Open Contact Input Connections

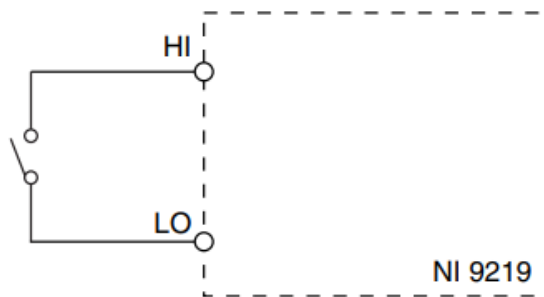
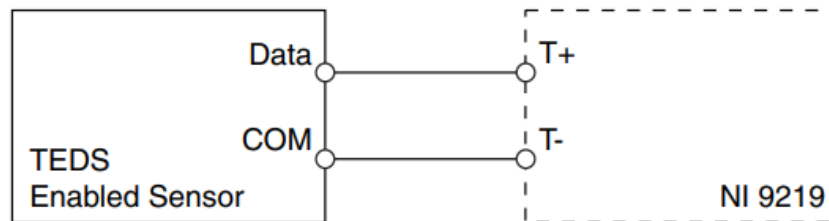


Figure 10. TEDS Sensor Input Connections



All NI-9219 modules are directly connected to Amphenol circular connectors. The following table shows the associated circular connector pinout labels for all input channels for slots 1-8 of chassis 1:

Table 5. NI-9219 Module Pinout Labels

NI-9219 Modules			
Slot #	Channel #	Module Pinout Labels	Associated Circular Connector
1	1	Slot 1-1-Pin1 Slot 1-1-Pin2 Slot 1-1-Pin3 Slot 1-1-Pin4 Slot 1-1-Pin5 Slot 1-1-Pin6 Slot 1-1-GND	1 (Pins A & B & C & D & E & F & G)
1	2	Slot 1-2-Pin1 Slot 1-2-Pin2 Slot 1-2-Pin3 Slot 1-2-Pin4 Slot 1-2-Pin5 Slot 1-2-Pin6 Slot 1-2-GND	1 (Pins H & J & K & L & M & N & P)
1	3	Slot 1-3-Pin1 Slot 1-3-Pin2 Slot 1-3-Pin3 Slot 1-3-Pin4 Slot 1-3-Pin5 Slot 1-3-Pin6 Slot 1-3-GND	1 (Pins R & S & T & U & V & W & X)
1	4	Slot 1-4-Pin1 Slot 1-4-Pin2 Slot 1-4-Pin3 Slot 1-4-Pin4 Slot 1-4-Pin5 Slot 1-4-Pin6 Slot 1-4-GND	1 (Pins Y & Z & a & b & c & d & g)

NI-9219 Modules (Continued)			
Slot #	Channel #	Module Pinout Labels	Associated Circular Connector
2	1	Slot 2-1-Pin1 Slot 2-1-Pin2 Slot 2-1-Pin3 Slot 2-1-Pin4 Slot 2-1-Pin5 Slot 2-1-Pin6 Slot 2-1-GND	2 (Pins A & B & C & D & E & F & G)
2	2	Slot 2-2-Pin1 Slot 2-2-Pin2 Slot 2-2-Pin3 Slot 2-2-Pin4 Slot 2-2-Pin5 Slot 2-2-Pin6 Slot 2-2-GND	2 (Pins H & J & K & L & M & N & P)
2	3	Slot 2-3-Pin1 Slot 2-3-Pin2 Slot 2-3-Pin3 Slot 2-3-Pin4 Slot 2-3-Pin5 Slot 2-3-Pin6 Slot 2-3-GND	2 (Pins R & S & T & U & V & W & X)
2	4	Slot 2-4-Pin1 Slot 2-4-Pin2 Slot 2-4-Pin3 Slot 2-4-Pin4 Slot 2-4-Pin5 Slot 2-4-Pin6 Slot 2-4-GND	2 (Pins Y & Z & a & b & c & d & g)
3	1	Slot 3-1-Pin1 Slot 3-1-Pin2 Slot 3-1-Pin3 Slot 3-1-Pin4 Slot 3-1-Pin5 Slot 3-1-Pin6 Slot 3-1-GND	3 (Pins A & B & C & D & E & F & G)

NI-9219 Modules (Continued)			
Slot #	Channel #	Module Pinout Labels	Associated Circular Connector
3	2	Slot 3-2-Pin1 Slot 3-2-Pin2 Slot 3-2-Pin3 Slot 3-2-Pin4 Slot 3-2-Pin5 Slot 3-2-Pin6 Slot 3-2-GND	3 (Pins H & J & K & L & M & N & P)
3	3	Slot 3-3-Pin1 Slot 3-3-Pin2 Slot 3-3-Pin3 Slot 3-3-Pin4 Slot 3-3-Pin5 Slot 3-3-Pin6 Slot 3-3-GND	3 (Pins R & S & T & U & V & W & X)
3	4	Slot 3-4-Pin1 Slot 3-4-Pin2 Slot 3-4-Pin3 Slot 3-4-Pin4 Slot 3-4-Pin5 Slot 3-4-Pin6 Slot 3-4-GND	3 (Pins Y & Z & a & b & c & d & g)
4	1	Slot 4-1-Pin1 Slot 4-1-Pin2 Slot 4-1-Pin3 Slot 4-1-Pin4 Slot 4-1-Pin5 Slot 4-1-Pin6 Slot 4-1-GND	4 (Pins A & B & C & D & E & F & G)
4	2	Slot 4-2-Pin1 Slot 4-2-Pin2 Slot 4-2-Pin3 Slot 4-2-Pin4 Slot 4-2-Pin5 Slot 4-2-Pin6 Slot 4-2-GND	4 (Pins H & J & K & L & M & N & P)

NI-9219 Modules (Continued)			
Slot #	Channel #	Module Pinout Labels	Associated Circular Connector
4	3	Slot 4-3-Pin1 Slot 4-3-Pin2 Slot 4-3-Pin3 Slot 4-3-Pin4 Slot 4-3-Pin5 Slot 4-3-Pin6 Slot 4-3-GND	4 (Pins R & S & T & U & V & W & X)
4	4	Slot 4-4-Pin1 Slot 4-4-Pin2 Slot 4-4-Pin3 Slot 4-4-Pin4 Slot 4-4-Pin5 Slot 4-4-Pin6 Slot 4-4-GND	4 (Pins Y & Z & a & b & c & d & g)
5	1	Slot 5-1-Pin1 Slot 5-1-Pin2 Slot 5-1-Pin3 Slot 5-1-Pin4 Slot 5-1-Pin5 Slot 5-1-Pin6 Slot 5-1-GND	5 (Pins A & B & C & D & E & F & G)
5	2	Slot 5-2-Pin1 Slot 5-2-Pin2 Slot 5-2-Pin3 Slot 5-2-Pin4 Slot 5-2-Pin5 Slot 5-2-Pin6 Slot 5-2-GND	5 (Pins H & J & K & L & M & N & P)
5	3	Slot 5-3-Pin1 Slot 5-3-Pin2 Slot 5-3-Pin3 Slot 5-3-Pin4 Slot 5-3-Pin5 Slot 5-3-Pin6 Slot 5-3-GND	5 (Pins R & S & T & U & V & W & X)

NI-9219 Modules (Continued)			
Slot #	Channel #	Module Pinout Labels	Associated Circular Connector
5	4	Slot 5-4-Pin1 Slot 5-4-Pin2 Slot 5-4-Pin3 Slot 5-4-Pin4 Slot 5-4-Pin5 Slot 5-4-Pin6 Slot 5-4-GND	5 (Pins Y & Z & a & b & c & d & g)
6	1	Slot 6-1-Pin1 Slot 6-1-Pin2 Slot 6-1-Pin3 Slot 6-1-Pin4 Slot 6-1-Pin5 Slot 6-1-Pin6 Slot 6-1-GND	6 (Pins A & B & C & D & E & F & G)
6	2	Slot 6-2-Pin1 Slot 6-2-Pin2 Slot 6-2-Pin3 Slot 6-2-Pin4 Slot 6-2-Pin5 Slot 6-2-Pin6 Slot 6-2-GND	6 (Pins H & J & K & L & M & N & P)
6	3	Slot 6-3-Pin1 Slot 6-3-Pin2 Slot 6-3-Pin3 Slot 6-3-Pin4 Slot 6-3-Pin5 Slot 6-3-Pin6 Slot 6-3-GND	6 (Pins R & S & T & U & V & W & X)
6	4	Slot 6-4-Pin1 Slot 6-4-Pin2 Slot 6-4-Pin3 Slot 6-4-Pin4 Slot 6-4-Pin5 Slot 6-4-Pin6 Slot 6-4-GND	6 (Pins Y & Z & a & b & c & d & g)

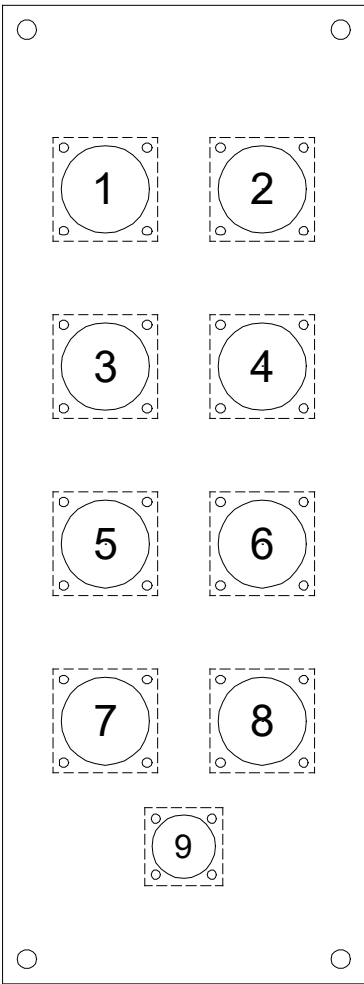
NI-9219 Modules (Continued)			
Slot #	Channel #	Module Pinout Labels	Associated Circular Connector
7	1	Slot 7-1-Pin1 Slot 7-1-Pin2 Slot 7-1-Pin3 Slot 7-1-Pin4 Slot 7-1-Pin5 Slot 7-1-Pin6 Slot 7-1-GND	7 (Pins A & B & C & D & E & F & G)
7	2	Slot 7-2-Pin1 Slot 7-2-Pin2 Slot 7-2-Pin3 Slot 7-2-Pin4 Slot 7-2-Pin5 Slot 7-2-Pin6 Slot 7-2-GND	7 (Pins H & J & K & L & M & N & P)
7	3	Slot 7-3-Pin1 Slot 7-3-Pin2 Slot 7-3-Pin3 Slot 7-3-Pin4 Slot 7-3-Pin5 Slot 7-3-Pin6 Slot 7-3-GND	7 (Pins R & S & T & U & V & W & X)
7	4	Slot 7-4-Pin1 Slot 7-4-Pin2 Slot 7-4-Pin3 Slot 7-4-Pin4 Slot 7-4-Pin5 Slot 7-4-Pin6 Slot 7-4-GND	7 (Pins Y & Z & a & b & c & d & g)
8	1	Slot 8-1-Pin1 Slot 8-1-Pin2 Slot 8-1-Pin3 Slot 8-1-Pin4 Slot 8-1-Pin5 Slot 8-1-Pin6 Slot 8-1-GND	8 (Pins A & B & C & D & E & F & G)

NI-9219 Modules (Continued)			
Slot #	Channel #	Module Pinout Labels	Associated Circular Connector
8	2	Slot 8-2-Pin1 Slot 8-2-Pin2 Slot 8-2-Pin3 Slot 8-2-Pin4 Slot 8-2-Pin5 Slot 8-2-Pin6 Slot 8-2-GND	8 (Pins H & J & K & L & M & N & P)
8	3	Slot 8-3-Pin1 Slot 8-3-Pin2 Slot 8-3-Pin3 Slot 8-3-Pin4 Slot 8-3-Pin5 Slot 8-3-Pin6 Slot 8-3-GND	8 (Pins R & S & T & U & V & W & X)
8	4	Slot 8-4-Pin1 Slot 8-4-Pin2 Slot 8-4-Pin3 Slot 8-4-Pin4 Slot 8-4-Pin5 Slot 8-4-Pin6 Slot 8-4-GND	8 (Pins Y & Z & a & b & c & d & g)

Circular Connector Diagram

The SINGRI System’s interface is comprised of Amphenol circular connectors with an aluminum shell. The following layout illustrated in [Figure 11](#) will be referred to throughout the documentation. There are 8x 30-pin connectors (labelled 1 through 8), and one 3-pin connectors (labelled 9).

Figure 11. Circular Connector layout on the SINGRI System



Each connector has its pins labelled according to [Figure 12](#) & [Figure 13](#). Further details on the wiring for individual pins are provided in [Table 6](#).

Figure 12. Labelling convention for 30-pin connectors

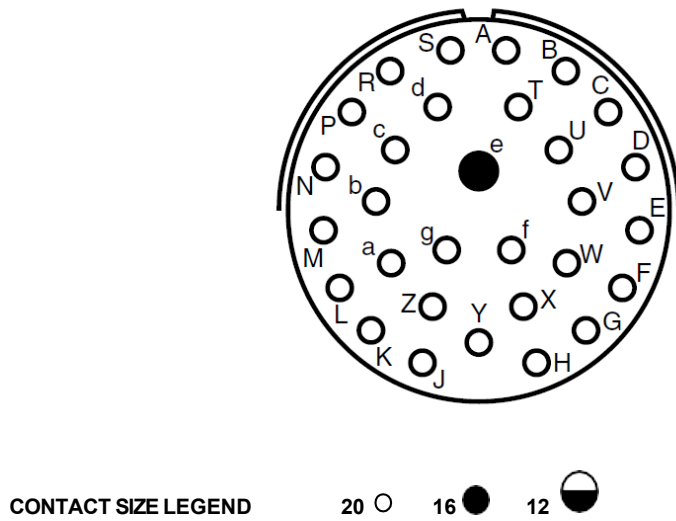


Table 6. Pinout for Connectors 1 through 4

Pin	Connector #			
	1	2	3	4
A	Slot 1-1-Pin1	Slot 2-1-Pin1	Slot 3-1-Pin1	Slot 4-1-Pin1
B	Slot 1-1-Pin2	Slot 2-1-Pin2	Slot 3-1-Pin2	Slot 4-1-Pin2
C	Slot 1-1-Pin3	Slot 2-1-Pin3	Slot 3-1-Pin3	Slot 4-1-Pin3
D	Slot 1-1-Pin4	Slot 2-1-Pin4	Slot 3-1-Pin4	Slot 4-1-Pin4
E	Slot 1-1-Pin5	Slot 2-1-Pin5	Slot 3-1-Pin5	Slot 4-1-Pin5
F	Slot 1-1-Pin6	Slot 2-1-Pin6	Slot 3-1-Pin6	Slot 4-1-Pin6
G	Slot 1-1-GND	Slot 2-1-GND	Slot 3-1-GND	Slot 4-1-GND
H	Slot 1-2-Pin1	Slot 2-2-Pin1	Slot 3-2-Pin1	Slot 4-2-Pin1
J	Slot 1-2-Pin2	Slot 2-2-Pin2	Slot 3-2-Pin2	Slot 4-2-Pin2
K	Slot 1-2-Pin3	Slot 2-2-Pin3	Slot 3-2-Pin3	Slot 4-2-Pin3
L	Slot 1-2-Pin4	Slot 2-2-Pin4	Slot 3-2-Pin4	Slot 4-2-Pin4
M	Slot 1-2-Pin5	Slot 2-2-Pin5	Slot 3-2-Pin5	Slot 4-2-Pin5
N	Slot 1-2-Pin6	Slot 2-2-Pin6	Slot 3-2-Pin6	Slot 4-2-Pin6
P	Slot 1-2-GND	Slot 2-2-GND	Slot 3-2-GND	Slot 4-2-GND

Table 6. Pinout for Connectors 1 through 4 (Continued)

Pin	Connector #			
	1	2	3	4
R	Slot 1-3-Pin1	Slot 2-3-Pin1	Slot 3-3-Pin1	Slot 4-3-Pin1
S	Slot 1-3-Pin2	Slot 2-3-Pin2	Slot 3-3-Pin2	Slot 4-3-Pin2
T	Slot 1-3-Pin3	Slot 2-3-Pin3	Slot 3-3-Pin3	Slot 4-3-Pin3
U	Slot 1-3-Pin4	Slot 2-3-Pin4	Slot 3-3-Pin4	Slot 4-3-Pin4
V	Slot 1-3-Pin5	Slot 2-3-Pin5	Slot 3-3-Pin5	Slot 4-3-Pin5
W	Slot 1-3-Pin6	Slot 2-3-Pin6	Slot 3-3-Pin6	Slot 4-3-Pin6
X	Slot 1-3-GND	Slot 2-3-GND	Slot 3-3-GND	Slot 4-3-GND
Y	Slot 1-4-Pin1	Slot 2-4-Pin1	Slot 3-4-Pin1	Slot 4-4-Pin1
Z	Slot 1-4-Pin2	Slot 2-4-Pin2	Slot 3-4-Pin2	Slot 4-4-Pin2
a	Slot 1-4-Pin3	Slot 2-4-Pin3	Slot 3-4-Pin3	Slot 4-4-Pin3
b	Slot 1-4-Pin4	Slot 2-4-Pin4	Slot 3-4-Pin4	Slot 4-4-Pin4
c	Slot 1-4-Pin5	Slot 2-4-Pin5	Slot 3-4-Pin5	Slot 4-4-Pin5
d	Slot 1-4-Pin6	Slot 2-4-Pin6	Slot 3-4-Pin6	Slot 4-4-Pin6
g	Slot 1-4-GND	Slot 2-4-GND	Slot 3-4-GND	Slot 4-4-GND

Table 7. Pinout for Connectors 5 through 8

Pin	Connector #			
	5	6	7	8
A	Slot 5-1-Pin1	Slot 6-1-Pin1	Slot 7-1-Pin1	Slot 8-1-Pin1
B	Slot 5-1-Pin2	Slot 6-1-Pin2	Slot 7-1-Pin2	Slot 8-1-Pin2
C	Slot 5-1-Pin3	Slot 6-1-Pin3	Slot 7-1-Pin3	Slot 8-1-Pin3
D	Slot 5-1-Pin4	Slot 6-1-Pin4	Slot 7-1-Pin4	Slot 8-1-Pin4
E	Slot 5-1-Pin5	Slot 6-1-Pin5	Slot 7-1-Pin5	Slot 8-1-Pin5
F	Slot 5-1-Pin6	Slot 6-1-Pin6	Slot 7-1-Pin6	Slot 8-1-Pin6
G	Slot 5-1-GND	Slot 6-1-GND	Slot 7-1-GND	Slot 8-1-GND
H	Slot 5-2-Pin1	Slot 6-2-Pin1	Slot 7-2-Pin1	Slot 8-2-Pin1
J	Slot 5-2-Pin2	Slot 6-2-Pin2	Slot 7-2-Pin2	Slot 8-2-Pin2
K	Slot 5-2-Pin3	Slot 6-2-Pin3	Slot 7-2-Pin3	Slot 8-2-Pin3
L	Slot 5-2-Pin4	Slot 6-2-Pin4	Slot 7-2-Pin4	Slot 8-2-Pin4
M	Slot 5-2-Pin5	Slot 6-2-Pin5	Slot 7-2-Pin5	Slot 8-2-Pin5
N	Slot 5-2-Pin6	Slot 6-2-Pin6	Slot 7-2-Pin6	Slot 8-2-Pin6
P	Slot 5-2-GND	Slot 6-2-GND	Slot 7-2-GND	Slot 8-2-GND
R	Slot 5-3-Pin1	Slot 6-3-Pin1	Slot 7-3-Pin1	Slot 8-3-Pin1
S	Slot 5-3-Pin2	Slot 6-3-Pin2	Slot 7-3-Pin2	Slot 8-3-Pin2
T	Slot 5-3-Pin3	Slot 6-3-Pin3	Slot 7-3-Pin3	Slot 8-3-Pin3
U	Slot 5-3-Pin4	Slot 6-3-Pin4	Slot 7-3-Pin4	Slot 8-3-Pin4
V	Slot 5-3-Pin5	Slot 6-3-Pin5	Slot 7-3-Pin5	Slot 8-3-Pin5
W	Slot 5-3-Pin6	Slot 6-3-Pin6	Slot 7-3-Pin6	Slot 8-3-Pin6
X	Slot 5-3-GND	Slot 6-3-GND	Slot 7-3-GND	Slot 8-3-GND
Y	Slot 5-4-Pin1	Slot 6-4-Pin1	Slot 7-4-Pin1	Slot 8-4-Pin1
Z	Slot 5-4-Pin2	Slot 6-4-Pin2	Slot 7-4-Pin2	Slot 8-4-Pin2
a	Slot 5-4-Pin3	Slot 6-4-Pin3	Slot 7-4-Pin3	Slot 8-4-Pin3
b	Slot 5-4-Pin4	Slot 6-4-Pin4	Slot 7-4-Pin4	Slot 8-4-Pin4
c	Slot 5-4-Pin5	Slot 6-4-Pin5	Slot 7-4-Pin5	Slot 8-4-Pin5
d	Slot 5-4-Pin6	Slot 6-4-Pin6	Slot 7-4-Pin6	Slot 8-4-Pin6
g	Slot 5-4-GND	Slot 6-4-GND	Slot 7-4-GND	Slot 8-4-GND

Figure 13. Labelling convention for 3-pin connector

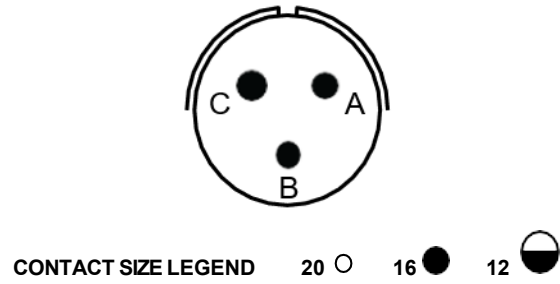


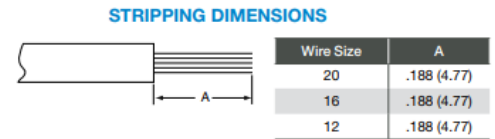
Table 8. Pinout for connector 9

Pin	Connector #
	9
A	24VDC
B	0VDC
C	GND

Assembly Instructions Military (MS3476)

WIRE STRIPPING

1. Strip wire to required length. (See Figure at right). When using hot wire stripping do not wipe melted insulation material on wire strands; with mechanical strippers do not cut or nick strands.
2. See [Table 9](#) for proper finished outside wire dimensions.
3. Twist strands together to form a firm bundle.
4. Insert stripped wire into contact applying slight pressure until wire insulation butts against wire well. Check inspection hole to see that wire strands are visible. If there are strayed wire strands, entire wire end should be re-twisted. When wire is stripped and properly installed into contact, the next step is to crimp the wire inside the contact by using the proper crimping tool.



For additional information & specifications on the wire crimping see pages 11-13 of [26482_2016.pdf](#)

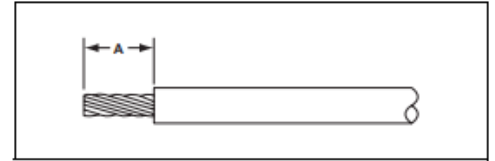
Table 9. Wire crimping for Amphenol MS3476 Series

Contact size	Wire range		Finished wire diameter range		Finished wire length		Crimping tool part number	Turret or positioner part number
	AWG	mm ²	Inch	mm	Inch	mm		
20	24-20	0.2-0.6	0.040-0.083	1.02-2.11	4.77	0.188	M22520/1-01 M22520/2-01	M22520/1-02 M22520/2-02
16	20-16	0.5-1.4	0.053-0.103	1.34-2.62	4.77	0.188	M22520/1-01	M22520/1-02
12	14-12	2-3	0.097-0.158	2.46-4.01	4.77	0.188	M22520/1-01	M22520/1-02

Assembly Instructions 97 Series (10SL-3)

WIRE STRIPPING

1. Strip wire to required length. (See Figure at right). When using hot wire stripping do not wipe melted insulation material on wire strands; with mechanical strippers do not cut or nick strands.
2. See [Table 10](#) for proper finished outside wire dimensions.
3. Twist strands together to form a firm bundle.
4. Insert stripped wire into contact applying slight pressure until wire insulation butts against wire well. Check inspection hole to see that wire strands are visible. If there are strayed wire strands, entire wire end should be re-twisted. When wire is stripped and properly installed into contact, the next step is to crimp the wire inside the contact by using the proper crimping tool.



For additional information & specifications on the 97 series connector assembly see pages 27-29 of [97 series catalog.pdf](#)

Table 10. Wire crimping for Amphenol 97 Series

Contact size	Wire range	Stripping Length "A"	Contact part number	Crimping tool part number	Insertion/Extraction Tool part number
	AWG	Inch			
16	20-16	0.140 - 0.160	9755-1622X-X	357-578	M81969/14-03

Additional Technical Documentation

Additional technical documentation for smart hardware components used in the SINGRI System can be found and downloaded from the following table:

Table 11. SINGRI System - Additional Technical Documentation

Hardware	OEM Part #	Technical Document
8-Slot Embedded Real-Time Controller with Reconfigurable FPGA	NI-9066	View Datasheet
4-Ch Universal Measurements, 100 S/s Simultaneous Module	NI-9219	View Datasheet
Amphenol Circular Connector Catalog	MIL-DTL-26482, Series 2, Matrix	View Catalog
CONEC Series Cat6a RJ45 Inline Coupler	17-150134	View Datasheet
Amphenol 97 Series Circular Connectors	97-3102A-10SL-3P	View Catalog

Valkyrie Warranty & Support

The SINGRI System comes with a 1-year replacement warranty that covers any defective hardware as specified by the original OEM. All control panels including the SINGRI system undergo an extensive quality control & assurance process. All panels are UL508A certified (Standard). CSA General purpose certification is available upon request.

Our Engineers are available to answer any technical or troubleshooting questions regarding products, installation and future design updates. Contact us directly at info@valkyriecontrols.com or through LinkedIn at www.linkedin.com/in/valkyrie-controls.

You can learn more about our other pre-engineered systems or request a free industrial panel design at www.valkyriecontrols.com

Valkyrie is committed to designing and manufacturing products in an environmentally responsible manner. Valkyrie recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to Valkyrie customers. Valkyrie Systems Inc. makes no express or implied warranties as to the accuracy of the OEM information contained herein and shall not be liable for any errors. U.S. Government Customers: The data contained in this manual was developed at private expense and is subject to the applicable limited rights and restricted data rights as set forth in FAR 52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.