

# SPECIFICATION FOR IOOS TEST BENCH ELECTRICAL COMPONENTS

TRANSNET ENGINEERING  
KILNER PARK

**Engineer (SIAS):**

Surname & Name: Mokgethi Karabo

Signature: \_\_\_\_\_

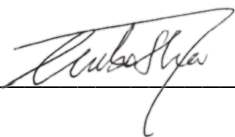


Date: 27/02/2024

**Principal Engineer (SIAS):**

Surname & Name: Mabotha Clifford

Signature: \_\_\_\_\_



Date: 27/02/2024

**Chief Engineer (SIAS)**


Surname & Name: Magae Otsile

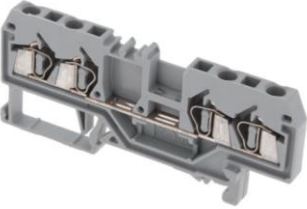


Signature: \_\_\_\_\_






Date: 27/02/2024

# SPECIFICATION

No.	Item	Description	Quantity
<b>POWER SUPPLIES</b>			
1.	Programmable Power Supply	200VDC, 7.5A output programmable single-phase (220V AC) input power supply. <ul style="list-style-type: none"> <li>• Racking Standard EIA-310.</li> <li>• Communication Interfaces (Standard) RS232: DB-9, Female, (Optional) LXI TCP/IP Ethernet: RJ-45</li> </ul>	11
2.	24V Output power supply	Switching Power Supply <ul style="list-style-type: none"> <li>• Output: 24V dc, 14.6A, 350W</li> <li>• Input: 180 → 264 Vac (By Switch), 240 → 370 Vac</li> <li>• Package Type: Enclosed</li> <li>• Length 215mm, Width 115mm and Depth 30mm</li> </ul>	11
3.	12V Output power supply	Switching Power Supply <ul style="list-style-type: none"> <li>• Output: 12V dc, 8.5A, 102W, 1</li> <li>• Input: 125 → 373 V dc, 88 → 264 V ac</li> <li>• Package Type: Enclosed</li> <li>• Length 159mm, Width 97mm and Depth 38mm</li> </ul>	11
<b>ELECTRICAL/ELECTRONIC COMPONENTS</b>			
4.	Ethernet switch	DIN Rail Mount Ethernet Switch, 8 RJ45 Ports, 10/100Mbit/s Transmission Dimensions 99 x 45 x 115mm	11
5.	PoE injector	Single Port Gigabit POE Injector. Power Input: 9-48V Power Supply. 	11
6.	Brainboxes mounting kit	MK-048 Brainboxes Mounting Kit	22
7.	Speaker	8Ω, 20W speaker, Length 102mm Width 102mm and Depth 44mm	11

8.	RJ45 connectors	Male RJ45 Connector	2 packs (100 per pack)
9.	RJ45 dust cap	Boot for use with RJ45 Connectors	4 packs (10 per pack)
10.	Emergency switch	XB4 Series Twist Release Emergency Stop Push Button, Panel Mount, 22mm Cutout, 1NC, IP66	11
11.	10A Circuit breaker	MCB, 2P, 10A Curve D, 400V AC, 125V DC, 10 kA Breaking Capacity. <ul style="list-style-type: none"> <li>Length 88mm, Width 35mm and Depth 69mm</li> <li>Mounting Style: DIN Rail Mount</li> </ul>	11
12.	Terminal block	280 Series Grey Feed Through Terminal Block, Clamp Termination. <ul style="list-style-type: none"> <li>Use with DIN Rail.</li> <li>4 Position Feed Through Gray 12-28 AWG</li> </ul> 	440
13.	Terminal block jumper	280 Series Adjacent Jumper for Use with DIN Rail Terminal Blocks 	220
14.	DIN mount 24V Relays	24V dc Coil Non-Latching Relay, 10mA Switching Current DIN Rail Single Pole 	110

15.	DIN mount 12V relays	12V dc Coil Non-Latching Relay, 17mA Switching Current DIN Rail Single Pole	24
16.	Screw On Power Inlet	Screw On Power Inlet, Fast-On Tab 6.3mm, 3-way. 	12
17.	Kettle lead cable	1.8m 10A Black Kettle Lead with 3 pin SA Plug to IEC Socket	36
18.	12V PoE Switch Mode power supply	12 Volt Switched Mode Power Supply (PSU) for CCTV, HDD, Wi-Fi AP <ul style="list-style-type: none"> <li>• 2.1mm DC jack size</li> </ul>	11
19.	Multi adapter - plug	3m 4-way extension cord with (2 x 3 pin, 2 x 2 Euro pin)   OR similar	11
20.	USB to RS 232 cable	Male USB A to Male RS232 USB to Serial Converter Cable, USB 2.0, 1m	15
<b>MISCELLANEOUS COMPONENTS</b>			
21.	Heat Shrink	Medium wall adhesive heat shrinks	10 metres
22.	Braided cable sleeve	Expandable Braided PET Black Cable Sleeve, 10mm Diameter.	220 metres
23.	Silicone sealant Clear	Alcolin Silicone Sealant - Clear (300ml)	5
24.	Insulation tape	Insulation Tape - Black 19mm x 10m	10
25.	0.5mm <sup>2</sup> bootlace ferrules	Insulated Crimp Bootlace Ferrule, 8mm Pin Length, 1.3mm Pin Diameter, 0.5mm <sup>2</sup> Wire Size, White	11 packs (100 per pack)



26.	1.5mm <sup>2</sup> bootlace ferrules	Insulated Crimp Bootlace Ferrule, 8mm Pin Length, 2mm Pin Diameter, 1.5mm <sup>2</sup> Wire Size, Red	3 packs (100 per pack)
27.	Insulated Fork lugs	Insulated Crimp Spade Connector, 0.5mm <sup>2</sup> to 1.5mm <sup>2</sup> , 22AWG to 16AWG, M4 Stud Size	2 packs (100 per pack)
28.	M8 Insulated Ring Terminal	Insulated Ring Terminal, M8 Stud Size, 0.5mm <sup>2</sup> to 1.5mm <sup>2</sup> Wire Size, Red	1 pack (100 per pack)
29.	Battery terminal receptacle	Insulated Crimp Receptacle, female, 6.3 x 0.8mm, 0.5mm <sup>2</sup> to 1.5mm <sup>2</sup> , 22AWG to 16AWG, Tin Plated. 	1 pack (100 per pack)
30.	Shrink sleeve label roll	Shrink sleeve, Roll, white, unlabeled	3 packs (1000 per pack)
31.	Cable ties	Cable tie outside serrated, 200x4.6mm, Ø1.6-50.0mm, natural, 100pcs <ul style="list-style-type: none"> <li>• Outside serrated cable tie with smooth surface to the bundle</li> </ul>	10 packs (100 per pack)
32.	DIN rail	Slotted Top Hat Din Rail <ul style="list-style-type: none"> <li>• Dimensions 1m x 35mm x 7.5mm</li> <li>• Standards DIN 607015, EN 60715.</li> </ul>	32
33.	Drag Chains	e-chain Black Cable Chain - Flexible Slot, W30 mm x D10.5mm, L1m, 38 mm Min. Bend Radius, Igumid G	66
34.	Drag Chains accessories	Polymer Cable Trunking Accessory, 37mm, 6, 7, e-chain	66 packs (2 per pack)
<b>DAQ SYSTEM</b>			
35.	4 slot cDAQ Chassis	Compact DAQ 4 slot, USB Chassis	12
36.	Digital Output Module	32 channel Sourcing Output module, C Series	16
37.	Analog Input Module	±60 V, 800 kS/s, 12-Bit, 8-Channel C Series Voltage	11
38.	37 Channel Terminal Block	Pin female screw terminal with a 37-pin female D-SUB	25

39.	Terminal block	10-Pos Spring Terminal Connector Block for cDAQ	15
40.	Ultra-Flex Low Loss Coaxial Cable Black	Ultra-Flex Low Loss Coaxial Cable Black, LMR240 UF or Similar	350 metres
41.	Ethernet cable bundle	Cat 5 UTP Ethernet cable bundle	150 metres
42.	Wiring cable	Red 0.5 mm <sup>2</sup> Wire, Single-core halogen-free cable	500 metres
43.	Wiring cable	Black 0.5 mm <sup>2</sup> Wire, Single-core halogen-free cable	200 metres
44.	Wiring cable	Red 1.5 mm <sup>2</sup> Wire, Single-core halogen-free cable	100 metres
45.	Wiring cable	Black 1.5 mm <sup>2</sup> Wire, Single-core halogen-free cable	100 metres
46.	Wiring cable	Green 1.5 mm <sup>2</sup> Wire, Single-core halogen-free cable	10 metres

**ELECTRONIC CONNECTORS**

47.	D38999 2-way female	<p>Circular MIL Spec Connector 2P PLG SZ 11 SKT CBL MNT</p> <ul style="list-style-type: none"> <li>• Number of Positions: 2 Position</li> <li>• Contact Gender: Socket (Female)</li> <li>• Insert Arrangement: 11-02</li> <li>• Shell Size: 11</li> <li>• Shell Style: Straight</li> <li>• MIL Type: MIL-DTL-38999 III</li> <li>• Termination Style: Crimp</li> <li>• Mounting Style: Free Hanging</li> <li>• Current Rating: 13 A</li> <li>• Mating Style: Self-Locking</li> <li>• Mounting Angle: Straight</li> </ul>	15
48.	D38999 5-way female connector	<p>Circular MIL Spec Connector 5P size 11 Straight plug socket.</p> <ul style="list-style-type: none"> <li>• Number of Positions: 5 Position</li> <li>• Contact Gender: Socket (Female)</li> </ul>	25


		<ul style="list-style-type: none"> <li>• Insert Arrangement: 11-05</li> <li>• Shell Size: 11</li> <li>• Shell Style: Straight</li> <li>• MIL Type: MIL-DTL-38999 III</li> <li>• Termination Style: Crimp</li> <li>• Mounting Style: Free Hanging</li> <li>• Current Rating: 7.5 A</li> <li>• Mating Style: Self Locking</li> <li>• Mounting Angle: Straight</li> </ul>	
49.	6 pin MIL Spec Male connector	<p>Circular MIL Spec Connector 6P size 11 straight plug pin.</p> <ul style="list-style-type: none"> <li>• Number of Positions: 6 Position</li> <li>• Contact Gender: Pin (Male)</li> <li>• Insert Arrangement: 11-98</li> <li>• Shell Size: 11</li> <li>• Shell Style: Straight</li> <li>• MIL Type: MIL-DTL-38999 III</li> <li>• Termination Style: Crimp</li> <li>• Mounting Style: Free Hanging</li> <li>• Current Rating: 5 A</li> <li>• Contact Plating: Gold</li> <li>• Contact Material: Copper Alloy</li> <li>• Mating Style: Self Locking</li> <li>• Mounting Angle: Straight</li> </ul>	15
50.	Size 11 90° Back shell	<p>Circular MIL Spec Strain Reliefs &amp; Adapters RA Backshell SZ 11 Strain Relief OD CAD</p> <ul style="list-style-type: none"> <li>• Mating style: Non-Self Locking</li> <li>• Shell material: Aluminium alloy</li> <li>• Shell style: Right angled</li> </ul>	46
51.	3 pin MIL Spec Female connector	<p>Circular MIL Spec Connector, 3 pin, Female, with Back Shell plug</p> <ul style="list-style-type: none"> <li>• Number of Positions: 3 Position</li> <li>• Contact Gender: Socket (Female)</li> <li>• Insert Arrangement: 08-33</li> <li>• Shell Size: 8</li> <li>• Shell Style: Plug</li> <li>• MIL Type: MIL-DTL-26482</li> <li>• Termination Style: Solder</li> </ul>	25

		<ul style="list-style-type: none"> <li>• Mounting Style: Cable</li> <li>• Current Rating: 7.5 A</li> <li>• Contact Plating: Gold</li> </ul> 	
52.	8 pin MIL Spec Male connector	<p>Circular MIL Spec Connector, 8 pin, Male, with Back Shell plug</p> <ul style="list-style-type: none"> <li>• Insert Arrangement: 12-08</li> <li>• Shell Size: 12</li> <li>• Shell Style: Plug</li> <li>• MIL Type: MIL-C-26482</li> <li>• Termination Style: Solder</li> <li>• Mounting Style: Panel</li> <li>• Current Rating: 7.5 A</li> <li>• Contact Plating: Gold</li> <li>• Contact Material: Brass</li> <li>• Mating Style: Bayonet</li> <li>• Mounting Angle: Straight</li> </ul>	15
53.	7 pin MIL Spec Female connector	<p>Circular MIL Spec Connector, 7 pin, Female, with Back Shell Plug</p> <ul style="list-style-type: none"> <li>• Insert Arrangement: 10-07</li> <li>• Shell Size: 10</li> <li>• Shell Style: Plug</li> <li>• MIL Type: MIL-DTL-26482</li> <li>• Termination Style: Solder</li> <li>• Mounting Style: Cable</li> <li>• Current Rating: 7.5 A</li> <li>• Contact Plating: Gold</li> <li>• Contact Material: Brass</li> </ul> 	15
54.	7 pin MIL Spec Male connector	<p>Circular MIL Spec Connector, 7 Pin, with Back Shell Plug</p>	15










- Insert Arrangement: 10-07
- Shell Size: 10
- Shell Style: Plug
- MIL Type: MIL-C-26482
- Termination Style: Solder
- Mounting Style: Panel
- Current Rating: 7.5 A
- Contact Plating: Gold
- Contact Material: Brass
- Mating Style: Bayonet
- Mounting Angle: Straight

		 <ul style="list-style-type: none"> <li>• Insert Arrangement: 10-07</li> <li>• Shell Size: 10</li> <li>• Shell Style: Plug</li> <li>• MIL Type: MIL-C-26482</li> <li>• Termination Style: Solder</li> <li>• Mounting Style: Panel</li> <li>• Current Rating: 7.5 A</li> <li>• Contact Plating: Gold</li> <li>• Contact Material: Brass</li> <li>• Mating Style: Bayonet</li> <li>• Mounting Angle: Straight</li> </ul>	
55.	3 PIN MIL Spec female connector	<p>Circular MIL Spec Connector 3P #16 SKT CONTACTS. With Back Shell plug</p> <ul style="list-style-type: none"> <li>• Insert Arrangement: 10SL-03.</li> <li>• Shell Size: 10SL</li> <li>• Shell Style: In-Line</li> <li>• MIL Type: MIL-DTL-5015</li> <li>• Termination Style: Solder</li> <li>• Mounting Style: Free Hanging</li> <li>• Current Rating: 13 A</li> <li>• Contact Plating: Silver</li> <li>• Contact Material: Copper Alloy</li> </ul>	15
56.	Molex male 2 way 2.36mm	Headers & Wire Housings 2 CKT RCPT Housing	2 packs (10 per pack)
57.	Female Crimp terminals	Headers & Wire Housings Socket 24-18AWG Bulk (39-00-0039)	3 packs (10 per pack)
58.	Removal tool	Extraction, Removal & Insertion Tool, 12-16AWG	1
59.	96 pin Harting removal tool	<p>Extraction/Removal tool</p> <ul style="list-style-type: none"> <li>• Contact removal tool.</li> <li>• For Use With: BC / har-bus 64 contacts</li> </ul>	4
60.	Standard .093" Female Connector Housing	<p>Pin &amp; Socket Connectors 2 Position RECPT</p> <ul style="list-style-type: none"> <li>• Female Connector Housing,</li> </ul>	15

		6.7mm Pitch, 2 Way, 1 Row	
61.	Standard .093" Female Connector Housing	Standard .093" Female Connector Housing, 3 Way, 1 Row <ul style="list-style-type: none"> <li>Female Connector Housing, 5.03mm Pitch, 3 Way, 1 Row</li> </ul>	4 packs (10 per pack)
62.	Female Crimp terminals	Standard .062" Female Crimp Terminal 18AWG (02-06-1101)	2 packs (100 per pack)
63.	26 PIN MIL spec female connector	Circular MIL Spec Connector 26P SIZE 17 Cable Mount Socket <ul style="list-style-type: none"> <li>Number of Positions: 26 Position</li> <li>Contact Gender: Socket (Female)</li> <li>Insert Arrangement: 17-26</li> <li>Shell Size: 17</li> <li>Shell Style: Straight</li> <li>MIL Type: MIL-DTL-38999 III</li> <li>Termination Style: Crimp</li> <li>Mounting Style: Free Hanging</li> <li>Current Rating: 7.5 A</li> <li>Contact Plating: Gold</li> </ul>	12
64.	Size 17 90° Back shell	Circular MIL Spec Strain Reliefs & Adapters Backshell SR R/A OD CAD SZ 17 <ul style="list-style-type: none"> <li>Mating style: Non-Self Locking</li> <li>Shell material: Aluminium alloy</li> <li>Shell style: Right Angle</li> </ul>	12
65.	3 PIN MIL spec female connector	Circular MIL Spec Connector, 3 pin, Female, with Back Shell Plug <ul style="list-style-type: none"> <li>Insert Arrangement: 12-03</li> <li>Shell Size: 12</li> <li>Shell Style: In-Line</li> <li>MIL Type: MIL-DTL-26482</li> <li>Termination Style: Solder</li> <li>Mounting Style: Cable</li> <li>Current Rating: 22 A</li> <li>Contact Plating: Gold</li> <li>Contact Material: Copper Alloy</li> <li>Series: 62GB</li> </ul>	12

		<ul style="list-style-type: none"> <li>• Mating Style: Bayonet</li> </ul>	
66.	6 PIN Box mount connector	<p>6-way Female Cylindrical Receptacle with Bayonet Lock and Box Mount (MIL-C-24682)</p> <ul style="list-style-type: none"> <li>• Number of Positions: 6 Position</li> <li>• Contact Gender: Socket (Female)</li> <li>• Insert Arrangement: 10-06</li> <li>• Product: Receptacles</li> <li>• Shell Size: 10</li> <li>• Shell Style: Box Mount</li> <li>• Termination Style: Solder</li> <li>• Mounting Style: Panel</li> <li>• Current Rating: 7.5 A</li> <li>• Contact Plating: Gold</li> <li>• Contact Material: Copper Alloy</li> </ul>	25
67.	Male Connector Housing, 4.2mm Pitch, 2 Row	<p>Mini-Fit Jr Male Connector Housing, 4.2mm Pitch, 6 Way, 2 Row</p> 	25
68.	Male Crimp Terminals	30490 Male Crimp Terminal	2 packs (100 per pack)
69.	Female Connector Housing	<p>Headers &amp; Wire Housings 6 CKT RCPT Housing, 4.2mm Pitch, 6 Way, 2 Row</p> 	25
70.	Female crimp Terminal	Headers & Wire Housings Socket 24-18AWG Bulk	2 packs (100 per pack)
<b>RF CONNECTORS</b>			
71.	SMA Crimp Plug	<p>Plug Cable Mount SMA Connector, 50Ω, Crimp Termination, Straight Body</p> <ul style="list-style-type: none"> <li>• Contact Material: Brass</li> <li>• Contact Plating: Gold</li> </ul>	30

72.	SMA Bulkhead	Adapter SMA bulkhead JACK-JACK. <ul style="list-style-type: none"> <li>• SMA Bulkhead Adaptor</li> <li>• Gender: Female to female</li> </ul>	30
73.	TNC Crimp Plug	50Ω RF Plug Cable Mount TNC Connector, Crimp Termination, Straight Body	15
74.	TNC Right Angle Crimp Plug	50Ω RF Plug Cable Mount TNC Connector, Crimp Termination, Right Angle Body	15
75.	TNC Bulkhead	RF Straight 50Ω Coaxial Adapter TNC Socket to TNC Socket 11GHz <ul style="list-style-type: none"> <li>• Gender: Female to female</li> </ul>	35
76.	BNC Connector	Plug Cable Mount BNC Connector, 50Ω, Crimp Termination, Straight Body, Cable type: LMR-240 	15
77.	BNC bulkhead	Straight 50Ω RF Coaxial Adapter BNC Jack to BNC Jack <ul style="list-style-type: none"> <li>• Gender: Female to female</li> </ul> 	15
78.	TRD150G Train Antenna	Rugged, low-profile antenna and designed for use on locomotives, bus, or trucks. It covers VHF, GSM Cellular / WiFi, and GPS	11
79.	TRD450G Train Antenna	Rugged, low-profile antenna and designed for use on locomotives, bus, or trucks  Or Similar	22
<b>PERSONAL COMPUTER</b>			
80.	Computer: NUC 13 Pro 13th Gen Core i7 Mini PC Kit	<ul style="list-style-type: none"> <li>• 13th Generation Core i7-1360P Turbo up to 5.00GHz Processor</li> <li>• Iris Graphics</li> <li>• Wi-Fi 6 AX211 Wireless LAN</li> <li>• Bluetooth / Intel Gigabit LAN</li> <li>• Front: 2x USB-A, 1x Audio I/O</li> <li>• Rear: 2x USB-A, 2x USB Type-C, 2x HDMI, 1x RJ-45</li> </ul>	11

		<p>Include and pre-install the following configuration to the NUC PC kit above:</p> <ul style="list-style-type: none"> <li>• 8GB RAM</li> <li>• 512GB SSD</li> <li>• Windows 11 Home</li> </ul>	
81.	Monitor	<p>22" inch monitor with the following:</p> <ul style="list-style-type: none"> <li>• HDMI port</li> <li>• Power slot and Ports that are facing downwards, and mounting point e.g.</li> </ul> 	11
82.	Keyboard + Mouse	Wireless Keyboard + Mouse	11
83.	Microsoft Office	Microsoft Office Home & Student 2021 or similar	11
84.	HDMI cable	2.0M HDMI cable (Male to Male)	11