Request for Quotation (RFQ) for the supply National Instruments computer hardware to the CSIR

RFQ 9378/30/05/2022

Date of issue	16 May 2022
Closing Date and Time	30 May 2022 at 16h30
For submission of quotations/ Contact details	tender@csir.co.za

1   INVITATION FOR QUOTATION

Quotations are hereby invited for the supply of National Instruments computer hardware to the CSIR.

2   QUOTATION REQUIREMENTS

Please quote separately for each of the 2 systems specified.

2.1   TWT CONTROL AND DAQ SPECIFICATION (SYSTEM 1)

2.1.1   Control Computer (1 OFF)

The control computer proposed for the Test Rig Control and DAQ System (TRCDS) is a National Instruments (NI) CompactRIO (Compact Reconfigurable I/O) with model number: cRIO-9049. The cRIO-9049 is a rugged, high-performance, customizable embedded controller that offers Intel Atom quad-core processing, NI-DAQmx support, and an SD card slot for data-logging, embedded monitoring, and control. It includes a Kintex-7 325T FPGA with LabVIEW FPGA Module support for advanced control and coprocessing. The controller provides precise, synchronized timing and deterministic communications using Time Sensitive Networking (TSN), which is ideal for highly distributed measurements. This controller offers several connectivity ports, including Gigabit Ethernet, USB 3.1, USB 2.0, RS232, and RS485 ports. The USB 3.1 ports can be used to add a local human machine interface (HMI) and program, deploy, and debug software. The cRIO-9049 with the selected DAQ modules installed is shown in Figure 2.1 with its pertinent performance characteristics summarised in Table 2.1.
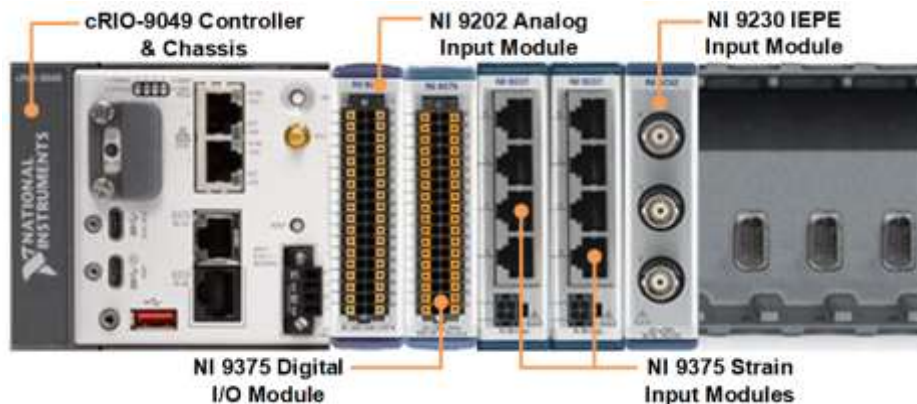

Figure 2.1:Data acquisition and control computer chassis layout with various I/O modules installed

Table 2.1:Pertinent performance specifications of the National Instruments compact RIO 9049

Processor			
CPU	**Intel Atom E3940**	**Number of Cores**	**4**
CPU Frequency	**1.6 GHz (base)**	**On-die L2 cache**	**2 MB**
Memory			
Non-volatile Memory	**16GB (SSD)**	**SSD Type**	**Planar SLC NAND**
Volatile Memory	**4GB (DRAM)**	**Type**	**DDR3L (12.8 GB/s)**
Reconfigurable FPGA			
FPGA type	**Xilinx Kintex-7 7K325T**	**Number of flip-flops**	**407,600**
Number of 6-input LUTs	**203,800**	**Number of DSP slices**	**840**
Available block RAM	**16,020 kbits**	**Number of DMA channels**	**16**
Environmental Specifications			
Operating Temperature	**-20°C to 55°C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2)**		
Ingress Protection	**IP 20**		
Operating Humidity	**10% RH to 90% RH, noncondensing (Tested in accordance with IEC 60068-2-30)**		
Maximum Altitude	**5000 m**		
Vibration Random	**Random (IEC 60068-2-64): 5grms, 10 Hz to 500 Hz**		
Vibration Sinusoidal	**Sinusoidal (IEC 60068-2-6): 5g, 10 Hz to 500 Hz**		
Operating Shock	**(IEC 60068-2-27): 30g, 11ms half-sine; 50g, 3ms half-sine; 18 shocks at 6 orientations**		
Electromagnetism	**EN 61326-1 (IEC 61326-1): Class A emissions; Industrial immunity**		

2.1.2 DAQ Modules

2.1.2.1 Analogue Input Signals (2 OFF)

Analogue inputs shall be acquired via an NI 9202 analogue input module with specifications pertinent to the TWT TRCDS application summarised in Table 2.2.

Table 2.2:Pertinent performance specifications of the National Instruments 9202 analogue input module

NI 9202 Analogue Input: Total of 16 Analogue Inputs			
Channels	16	**Voltage Input Range**	**±10 V**
ADC Resolution	**24 bit**	**Sample Frequency**	**10 kS/s/ch**
Environmental			
Operating Vibration	**5 g**	**Operating Shock**	**50 g**
Operating Temperature	**-40°C to 70°C**	**Ingress Protection**	**IP40**

2.1.2.2 Digital I/O (2 OFF)

Digital inputs and outputs shall be acquired via an NI 9375 digital I/O with specifications pertinent to the TWT TRCDS application summarised in Table 2.3.

Table 2.3:Pertinent performance specifications of the National Instruments 9375 digital I/O module

NI 9375 Digital I/O module: 16 Inputs and 16 Outputs			
No. of Inputs	**16**	**Input Logic (Sinking)**	**24 VDC**
No. of Outputs	**16**	**Output Logic (Sourcing)**	**6-30 VDC**
Input Update Time	**7 µs**	**Output Update Time**	**7 µs**
Environmental			
Operating Vibration	**5 g**	**Operating Shock**	**50 g**
Operating Temperature	**-40°C to 70°C**	**Ingress Protection**	**IP40**

2.1.2.3 Strain Input Signals (3 OFF)

Strain measurements shall be acquired via two NI 9237 strain measurement modules with specifications pertinent to the TWT TRCDS application summarised in Table 2.4. The NI 9237 modules contain signal conditioning to power and measure up to four bridge-based sensors simultaneously. The high sampling rate and bandwidth of the NI 9237 offer high-speed strain measurements with zero inter-channel phase delay, and can perform offset/null, as well as shunt calibrations and has remote sensing of excitation. While the said modules have specifications well-beyond that required for the AI-TSR application, the high-speed acquisition rates will aid computation sequences for CTS tests.

Table 2.4:Pertinent performance specifications of the National Instruments 9327 strain measurement modules

2 X NI 9327 Strain Measurement Modules: Total of 8 full-bridged strain measurements			
Input Channels	4	**Sampling Frequency**	50 kS/s/ch
Input Range	±25 mV/V	**Resolution**	24-bit
Bridge Completion	Quarter, half, full	**Internal Excitation**	10 V
Environmental			
Operating Vibration	5 g	**Operating Shock**	50 g
Operating Temperature	-40°C to 70°C	**Ingress Protection**	IP40

2.1.2.4 IEPE Signals (1 OFF)

IEPE signals shall be acquired via an NI 9230 IEPE signal measurement module with specifications pertinent to the TWT TRCDS application summarised in Table 2.5.

Table 2.5:Pertinent performance specifications of the National Instruments 9230 IEPE input module

NI 9230 IEPE Measurement Module			
Input Channels	3	**Sampling Frequency**	12.8 kS/s/ch
TEDS supported	IEEE 1451.4 TEDS Class I	**Resolution**	24-bit
TEDS capacitive drive	3000 pF	**Sampling Mode**	Simultaneous
Environmental			
Operating Vibration	5 g	**Operating Shock**	50 g
Operating Temperature	-40°C to 70°C	**Ingress Protection**	IP40

2.1.2.5 NI Software

Please advise for an NI real-time system using synchronised soft-motion servo axes.

2.2 TVM CONTROL AND DAQ HARDWARE SPECIFICATION (SYSTEM 2)

2.2.1 Control Computer (1 OFF)

The control computer proposed for the TVM-500 DRR control and DAQ system is a National Instruments (NI) CompactRIO (Compact Reconfigurable I/O) with model number: cRIO-9040. The cRIO-9040 is a rugged, high-performance, customizable embedded controller that offers Intel Atom dual-core processing, NI-DAQmx support, and an SD card slot for data-logging, embedded monitoring, and control. It includes a Kintex-7 70T FPGA with LabVIEW FPGA Module support for advanced control and coprocessing. The controller provides precise, synchronized timing and deterministic communications using Time Sensitive Networking (TSN), which is ideal for highly distributed measurements. The controller offers several connectivity ports, including Gigabit Ethernet, USB 3.1, USB 2.0, RS232, and RS485 ports. The USB 3.1 ports can be used to add a local human machine interface and program, deploy, and debug software. The cRIO-9040 with the selected DAQ modules installed is shown in Figure 2.1 with its pertinent performance characteristics summarised in Table 2.1.
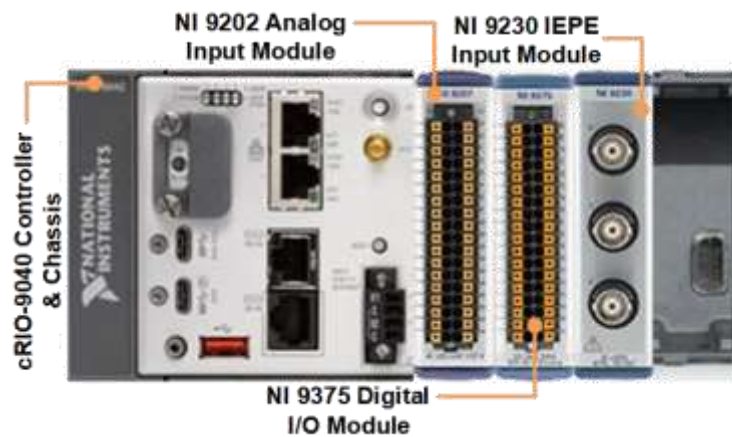

Figure 2.2: **Data acquisition and control computer chassis layout with various I/O modules installed**

Table 2.6: **Pertinent performance specifications of the National Instruments compact RIO 9040.**

Processor			
CPU	Intel Atom E3930	Number of Cores	2
CPU Frequency	1.3 GHz (base)	On-die L2 cache	2 MB
Memory			
Non-volatile Memory	4GB (SSD)	SSD Type	Planar SLC NAND
Volatile Memory	2GB (DRAM)	Type	DDR3L (12.8 GB/s)
Reconfigurable FPGA			
FPGA type	Xilinx Kintex-7 7K70T	Number of flip-flops	82,000
Number of 6-input LUTs	41,000	Number of DSP slices	240
Available block RAM	4,860 kbits	Number of DMA channels	16
Environmental Specifications			
Operating Temperature	-20°C to 55°C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2)		
Ingress Protection	IP 20		
Operating Humidity	10% RH to 90% RH, noncondensing (Tested in accordance with IEC 60068-2-30)		
Maximum Altitude	5000 m		
Vibration Random	Random (IEC 60068-2-64): 5grms, 10 Hz to 500 Hz		
Vibration Sinusoidal	Sinusoidal (IEC 60068-2-6): 5g, 10 Hz to 500 Hz		
Operating Shock	(IEC 60068-2-27): 30g, 11ms half-sine; 50g, 3ms half-sine; 18 shocks at 6 orientations		
Electromagnetism	EN 61326-1 (IEC 61326-1): Class A emissions; Industrial immunity		

2.2.1.1 DAQ Modules

2.2.1.2 Analogue Input Signals (2 OFF)

Analogue inputs shall be acquired via an NI 9207 analogue input module with specifications pertinent to the TVM-500 DRR control and DAQ system application summarised in Table 2.7.

Table 2.7: Pertinent performance specifications of the National Instruments 9207 analogue input module

NI 9207 Analogue Input: Total of 16 Analogue Inputs			
No. of Current Inputs	8	Current Input Range	±20 mA
No. of Voltage Inputs	8	Voltage Input Range	±10 V
Resolution	24 bit	Sample Frequency	500 S/s/ch
Environmental			
Operating Vibration	5 g	Operating Shock	50 g
Operating Temperature	-40°C to 70°C	Ingress Protection	IP40

2.2.1.3 Digital I/O (2 OFF)

Digital inputs and outputs shall be acquired via an NI 9375 digital I/O module with specifications pertinent to the TVM-500 DRR control and DAQ system application summarised in Table 2.8.

Table 2.8:   Pertinent   performance   specifications   of   the   National Instruments 9375 digital I/O module

NI 9375 Digital I/O module: 16 Inputs and 16 Outputs			
No. of Inputs	16	Input Logic (Sinking)	24 VDC
No. of Outputs	16	Output Logic (Sourcing)	6-30 VDC
Input Update Time	7 μs	Output Update Time	7 μs
Environmental			
Operating Vibration	5 g	Operating Shock	50 g
Operating Temperature	-40°C to 70°C	Ingress Protection	IP40

2.2.1.4 IEPE Signals (1 OFF)

IEPE signals shall be acquired via an NI 9230 IEPE signal measurement module with specifications pertinent to the TVM-500 DRR control and DAQ system application summarised in Table 2.9.

Table 2.9:   **Pertinent performance specifications of the National Instruments 9230 IEPE input module**

NI 9230 IEPE Measurement Module			
Input Channels	3	Sampling Frequency	12.8 kS/s/ch
TEDS supported	IEEE 1451.4 TEDS Class I	Resolution	24-bit
TEDS capacitive drive	3000 pF	Sampling Mode	Simultaneous
Environmental			
Operating Vibration	5 g	Operating Shock	50 g
Operating Temperature	-40°C to 70°C	Ingress Protection	IP40

2.2.1.5 NI Software

Please advise for an NI real-time system using synchronised soft-motion servo axes.

3   EVALUATION CRITERIA

- Selection of suppliers will be based on the 80/20 preference point system.
- Send SANAS approved and valid B-BBEE certificate. No B-BBEE status will equal zero points.
- Indicate CSD number (National Treasury Central Supplier Database) on quotation. If not registered yet on CSD, use www.csd.gov.za to register.
- No order will be issued, or no contract will be signed without a valid CSD number.

4   PRICING QUOTATION

- Price needs to be provided in South African Rand (excl. VAT), with details on price elements that are subject to escalation and exchange rate fluctuations clearly indicated.
- Price should include additional cost elements such as freight, insurance until acceptance, duty where applicable, etc.
- Payment will be according to the CSIR Payment Terms and Conditions.

5   OTHER TERMS AND CONDITIONS

- The supplier shall under no circumstances offer, promise, or make any gift, payment, loan, reward, inducement, benefit, or other advantage, which may be construed as being made to solicit any favour, to any CSIR employee or its representatives. Such an act shall constitute a material breach of the Agreement and the CSIR shall be entitled to terminate the Agreement forthwith, without prejudice to any of its rights.
- A validity period of 90 days will apply to all quotations except where indicated differently on the quote.
- No goods and/or services should be delivered to the CSIR without an official CSIR Purchase order. CSIR purchase order number must be quoted on the invoice. Invoices without CSIR purchase order numbers will be returned to supplier.

6   Note: This is not a Purchase Order.

DECLARATION BY TENDERER

Only tenderers who completed the declaration below will be considered for evaluation.

RFQ No: 9378/30/05/2022

I hereby undertake to render services described in the attached tendering documents to CSIR in accordance with the requirements and task directives / quotation specifications stipulated in RFQ 9378/30/05/2022 at the price/s quoted. My offer/s remains binding upon me and open for acceptance by the CSIR during the validity period indicated and calculated from the closing date of the quotation.
I confirm that I am satisfied with regards to the correctness and validity of my quotation; that the price(s) and rate(s) quoted cover all the services specified in the quotation documents; that the price(s) and rate(s) cover all my obligations and I accept that any mistakes regarding price(s) and rate(s) and calculations will be at my own risk.
I accept full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on me under this quotation as the principal liable for the due fulfilment of this quotation.

I declare that I have no participation in any collusive practices with any tenderer or any other person regarding this or any other quotation.

I accept that the CSIR may take appropriate actions, deemed necessary, should there be a conflict of interest or if this declaration proves to be false.
I confirm that I am duly authorised to sign this quotation.

NAME (PRINT) ………………………….

CAPACITY ……………………….

SIGNATURE ……………………………

NAME OF FIRM ………………………….…

     DATE   ………………………………..

WITNESSES
1   …………………………………
2   …………………………………
DATE:………………………….