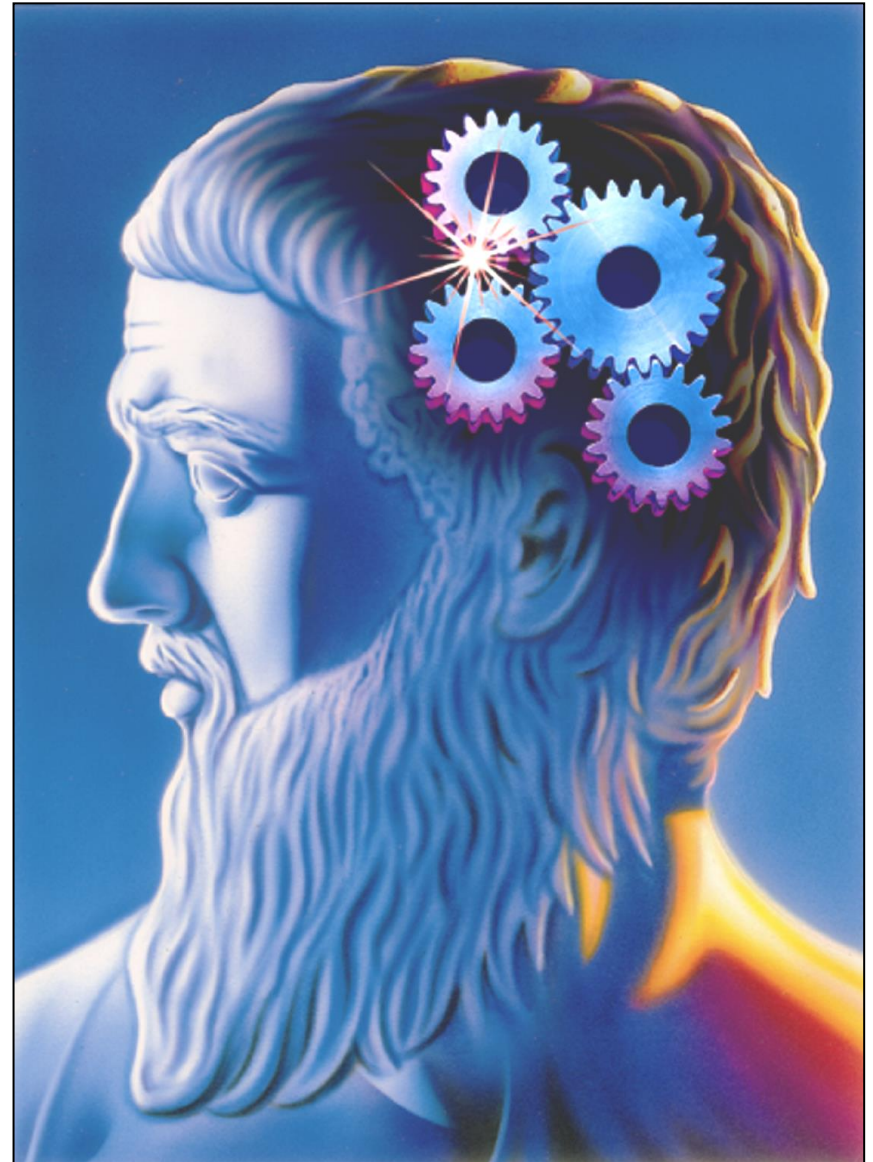


Introduction
to
PLATO Architecture
&
Integration with Test Machines






NVH International Ltd

Eastern House, 15/16 Silver Street, Bradford-on-Avon
Wiltshire, BA15 1JZ, England
tel: +44 (0)1225 970 315
e-mail: sales@nvhint.com



NI Data Acquisition Hardware (“front-end”) - for NVH





Popular options*

Bus	PXIe		USB / Ethernet	
Chassis			4-slot cDAQ-9174 chassis (USB) 1-slot cDAQ-9181 chassis (Ethernet)	8-slot cDAQ-9178 chassis (USB) 8-slot cDAQ-9188 chassis (Ethernet)
Device	 PXIe-4472	 PXIe-4497	 NI 9250	 NI 9234
# Channels	8	16	5	x1, 2, 3, 4, 5, 6, 7, 8
Sample Rate (per channel)	204.8KHz	102.4KHz		4, 8, 12, 16, 20, 24, 28, 32
Gain	X1, x10		X1	
ADC resolution	24-bit			

*Other devices supported on request – please contact NVH International

NI Counter/Timer Hardware for Transmission Error & Backlash Measurement

Popular options*

Device	PCI-6602	PCIe-6612	PXle-6612	cDAQ chassis + 9402 Module(s)
# Simultaneous High-Speed Channels	3	3	8	3
				
Bus	PCI	PCI express	PXle	CompactDAQ™
Clock Frequency (resolution)	80MHz (12.5ns)			

PC Requirements

Operating System:



With minimum resources:

- Windows 7, 10 or 11 professional operating system (32 or 64-bit)
- core i7 or i9 processor
- 8GB memory
- 500GB fixed disk (**M.2 NVMe SSD** recommended for high RPM and/or high channel count systems)
- graphics card with at least 4GB on-board memory (in preference to motherboard based graphics)
- monitor, keyboard, pointing device (dedicated or shared via KVM-switch/VNC etc. if PLATO running on a separate PC)

Plus:

- To add DAQ/counter-timer hardware:
 - PCI-slots (for plug-in cards), and/or
 - PCI-express slots (for plug-in cards or PXIe-controller), and/or
 - USB2/USB3-port

Mode of Operation

PC can be:

- **Shared** with test machine control functions
 - **PLATO** runs in Windows background (but needs to be switched to foreground for set-up etc)
 - I/O with test machine controller via OPC (software) – requires OPC-server
 - Product details passed via OPC (or disk file deposit)

OR

- **Standalone** and networked to test machine controller
 - **PLATO** runs in Windows foreground
 - I/O with test machine controller via DCOM-based OPC (software) or 24V hardware
 - Product details passed via OPC (or disk file deposit)

3rd Party Software Requirements



InterBase 2020 SQL-database server (plus 1-client) is required for all **PLATO** systems performing data capture within production test cycles.

It is available as a download from:

<https://store.embarcadero.com>

Priced at GBP 166 (Dec-2020)

Product Shaft Speed Reference

- **1-channel** for tested products without “slip” e.g. transmissions, axles, PTUs, transfer cases

OR

- **2-channels** for ePowertrain products (where eMotor speed signal is not accessible) and for tested products with “slip” e.g. CVTs

- **From any convenient shaft** – typically input driveline for axles, transmissions, PTUs etc.

- **Pulse-train type signal** – or any periodic signal with clear threshold passing for timing

e.g. encoders, tone-wheels & magnetic/inductive sensors etc

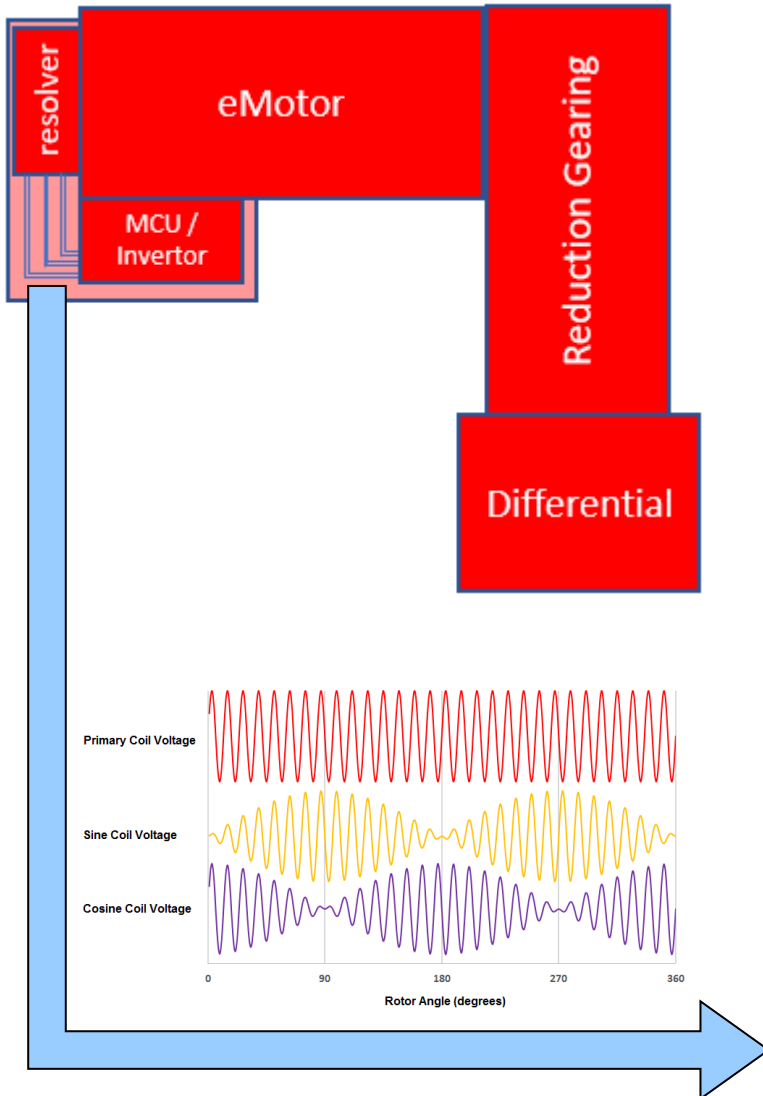
Ideally isolated using a high-frequency opto-coupler

e.g. Phoenix Contact DEK00E-24DC/5DC/100KHZ-G for 24V encoders

Phoenix Contact DEK00E-5DC/5DC/100KHZ-G for 5V encoders



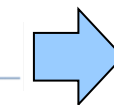
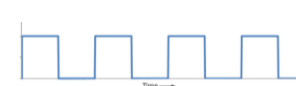
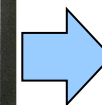
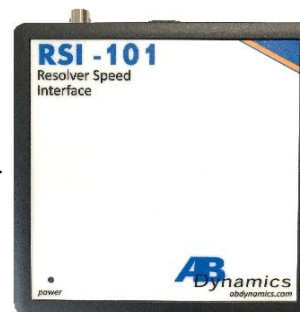
eMotor/Resolver Speed Reference



Although eMotor/ePowertrain NVH testing can be accomplished using speed reference from both output shafts, a higher speed eMotor reference signal is preferable.

Most eMotors include synchronous resolvers for position/speed feedback to the MCU.

If the resolver signals can be accessed on each ePowertrain without invalidating the EOL test, the RSI-101 module can convert those signals into a speed pulse signal suitable for use with **PLATO**.

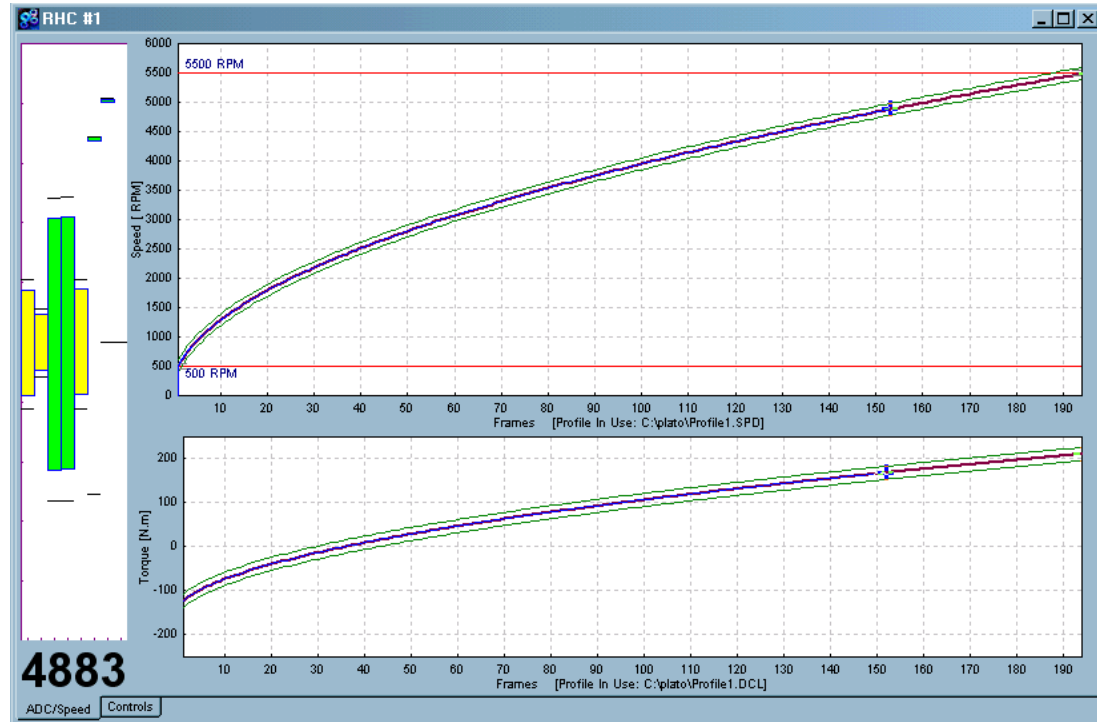


PLATO

“Static” Channels

- Monitored during test stages to ensure consistency of test conditions e.g:
 - static (dc) torque
 - static pressure etc.
- Used by **PLATO** to fail the test (not the tested product)

- Monitored in background every test



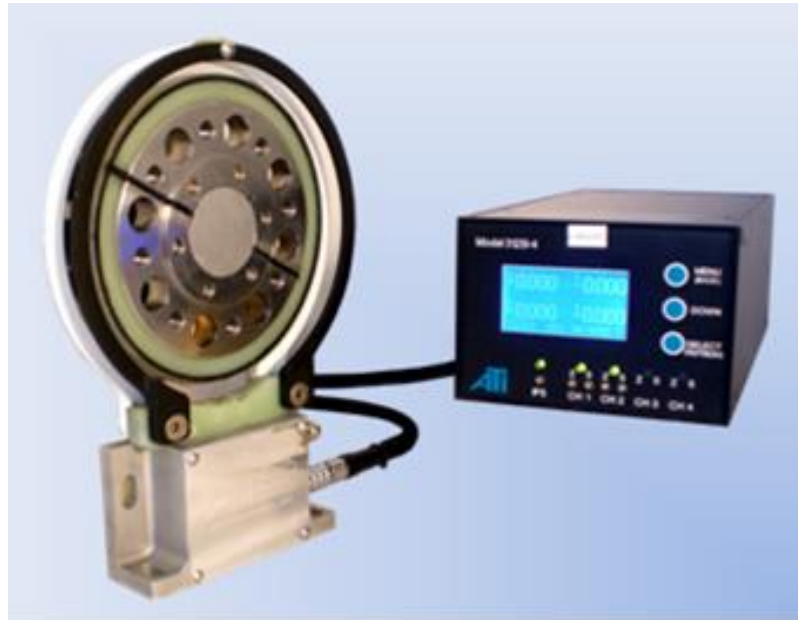
Dynamic (“NVH”) Channels

Channel	Typically Used For
1	Tacho (speed) sensor
2	Static (DC) sensors e.g. driveline torque, pump pressure etc.
3..N	Dynamic (NVH) sensors: Linear: e.g. accelerometers, laser vibrometers, microphones Rotational: e.g. torsional accelerometers, dynamic torque sensors etc.

N = 4, 5, 8, 12, 16, 20, 24, 28, 32 - dependent on frontend hardware



Dual-Range Torque Transducers



Advanced Telemetry International (ATI) – 2140DR Dual-Range Torque Transducer

- Range 1 : static \pm XXXNm (user defined)
- Range 2 : dynamic, scaled to any range down to 1% of Range 1
- Dynamic channel processed independently of static channel (high-pass filtered and then amplified), providing high-fidelity dynamic torque signal with minimal noise.

TE Measurement Channels

Channel	Typically Used For
1	Input side encoder (N pulses/rev, TTL)
2	Output side encoder (N pulses/rev, TTL)
3	Output side encoder (N pulses/rev, TTL)

N = power of 2 - advantageous



IEPE-sensor Powering/Conditioning



Typical DIN-rail mounted 1-channel Unit

- 24Vdc powered (60mA)
- current to IEPE-sensor selectable from 4mA or 10mA (jumper-selectable)
- conditioned output signal to Plato: $\pm 6V$
- analogue gain: x1, x10, 100 (jumper selectable)

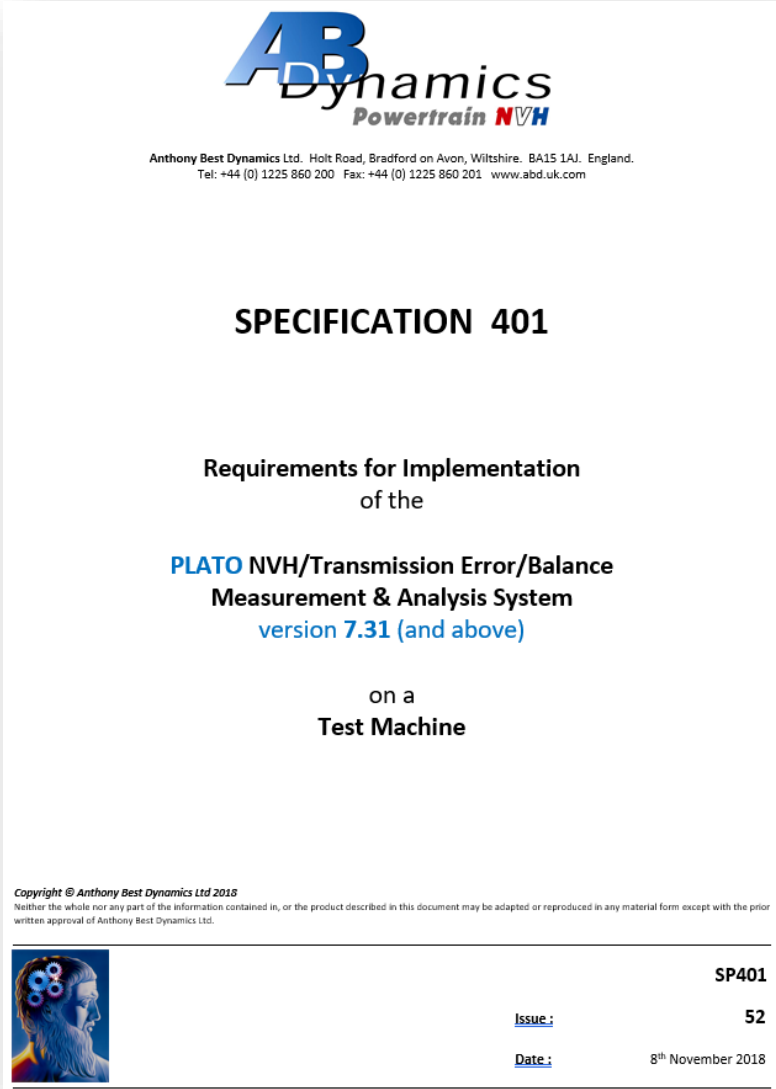
NVHI-manufactured (2, 4, 6 & 8 channel options)

- 12Vdc powered (250mA)
- 4mA current to IEPE-sensor
- conditioned output signal to Plato: $\pm 5V$
- configurable low-pass filter (pre-gain), **and then**
- analogue gain: x1, x10, x100 (jumper selectable)
- produces higher fidelity analogue signals without low frequency (often high amplitude) components that might otherwise swamp the ACD analogue input range



Detailed Interaction Specification

- The test machine control software must conform to standard interaction **Specification 401**
- **PLATO** typically operates in “slave” mode i.e. responding to a sequence of requests made by the test stand control system
- Cut-down application-specific documents based on Specification 401 issued once a project is underway



AB Dynamics
Powertrain NVH

Anthony Best Dynamics Ltd. Holt Road, Bradford on Avon, Wiltshire. BA15 1AJ, England.
Tel: +44 (0) 1225 860 200 Fax: +44 (0) 1225 860 201 www.abd.uk.com


SPECIFICATION 401

Requirements for Implementation
of the

**PLATO NVH/Transmission Error/Balance
Measurement & Analysis System**
version 7.31 (and above)

on a
Test Machine

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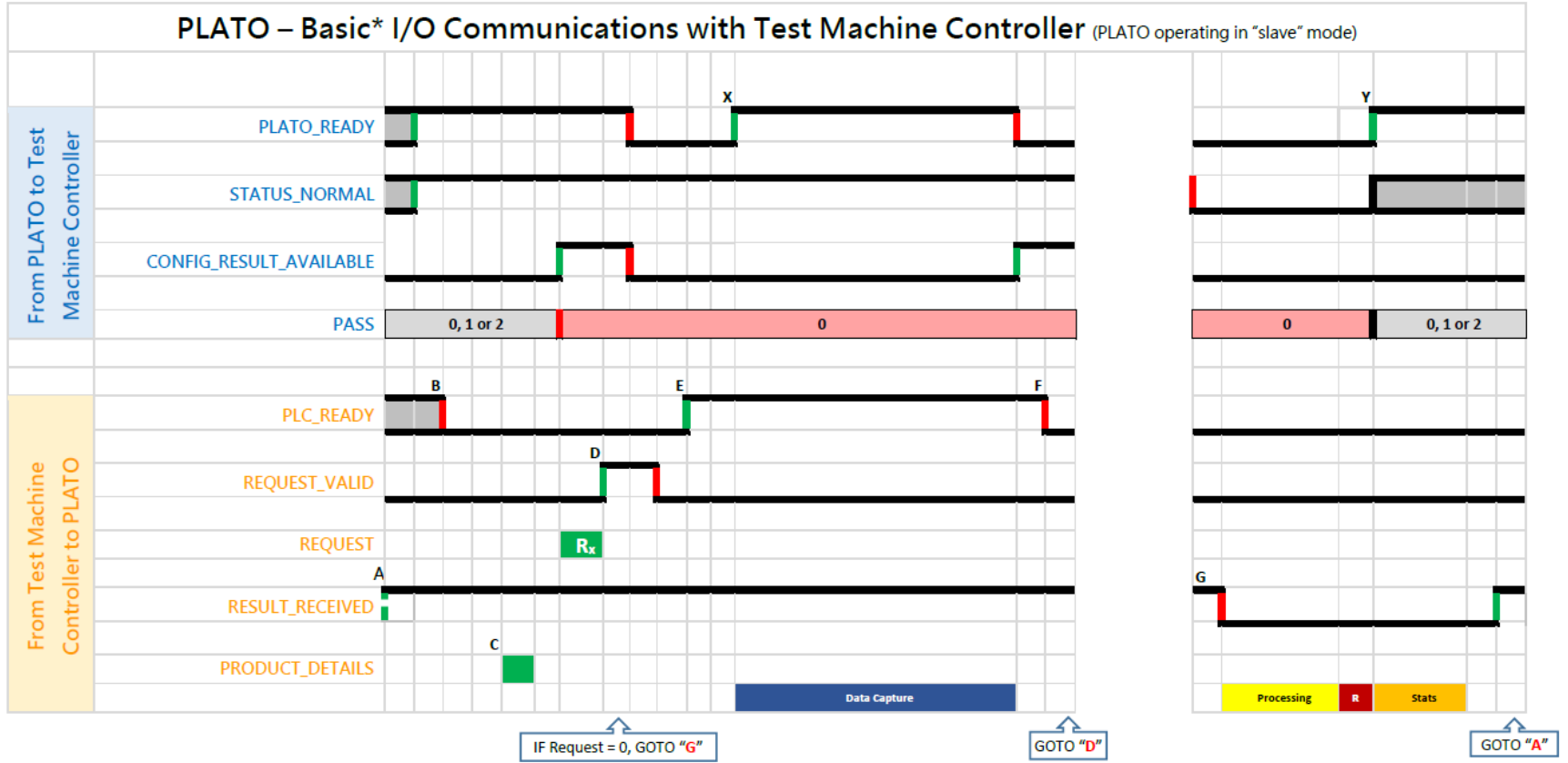


SP401

Issue : 52

Date : 8th November 2018

Interaction Handshake



Messages:

- A – "WAITING FOR RESULTS RECEIVED"
- B – "WAITING FOR NOT PLC_READY"
- C – "WAITING FOR PRODUCT DETAILS"
- D – "WAITING FOR CONFIGURATION REQUEST"
- E – "WAITING FOR PLC_READY"
- F – "WAITING FOR NOT PLC_READY"
- G – "WAITING FOR NOT RESULTS RECEIVED"

Waypoints:

- X = Plato waits for start speed and/or torque conditions to be achieved
- Y = Indicating availability of overall result
- R = Reporting

warning, alarm and warning/alarm valid lines from PLATO omitted for clarity

SYSTEM OK (Plato to TMC*) will remain HIGH under normal operation. If LOW sensed by TMC*, Plato is indicating an error and testing cannot proceed. Retest functionality via RETEST (Plato to TMC*) not covered by above.

* TMC = Test Machine Controller

OPC Servers



KEP Server EX

Connects disparate devices and applications, from plant control systems to enterprise information systems

Licensing starts at
\$452.00

[Download Free Demo](#) [Search KEP Server EX Products](#)

PRODUCTS

Product Overview

KEP Server EX is the industry's leading connectivity platform that provides a single source of industrial automation data to all of your applications. The platform design allows users to connect, manage, monitor, and control diverse automation devices and software applications through one intuitive user interface. KEP Server EX leverages **OPC** (the automation industry's standard for interoperability) and **IT-centric** communication protocols (such as SNMP, ODBC, and web services) to provide users with a single source for industrial data. The platform is developed and tested to meet our customers' performance, reliability, and ease-of-use requirements.

Watch our two-minute video below to see how KEP Server EX solves common connectivity challenges—providing secure and reliable access to real-time industrial data so everyone from the shop floor to the top floor can make smarter decisions.

<https://www.kepware.com/en-us/products/kepserverex/>

Just two of hundreds available

PLATO supports:

- legacy **OPC-DA** (Direct Access) and
- **OPC-UA** (Unified Architecture) protocols

Telit
Search

You are here: IoT Gateway User Guide > System administration > OPC-DA Server

Topic updated on December 13, 2021

OPC-DA Server

The OPC-DA Server tab is used to configure the OPC-DA Server feature of a node. This feature enables the node to act as an OPC-DA Server, exposing devices defined within the node to external OPC-DA Clients. The variables contained in the devices will be exposed to OPC-DA Clients as OPC Tags.

The OPC-DA Server will ensure that the data types that are used in the native device drivers are mapped to the corresponding OPC data types. The read and write access defined for the device variables will be assigned appropriately to the Access Rights property for each OPC tag.

For information on the different device types and the device drivers that are supported, see [Device types](#). Any of the devices defined on the node can have their variables exposed as OPC Tags. This includes logical devices, such as Global Variables devices and Property File Reader devices, and physical devices such as the Mitsubishi, Modbus, Omron, Rockwell and Siemens devices.

This feature is available for Enterprise Gateway for Windows 32-bit (x86) nodes only. The OPC-DA Server is compliant with the OLE for Process Control (OPC®) Data Access (DA) Custom Interface Standard 3.0 and 2.05 Specifications.

Installing the OPC-DA Server

The task of configuring the OPC-DA Server fits into the overall process as follows:

1. Installing your OPC-DA Client software.
An OPC-DA Client will be used to communicate with the OPC-DA Server. This client **must be installed on the same node** that is running the OPC DA-Server. The detailed installation of your OPC-DA Client software is beyond the scope of this documentation. Refer to the documentation for your OPC-DA Client.
2. Installing the product software and Workbench.
Refer to the appropriate [Installing product software](#) section for installation information.
3. Ensure the node has the OPC DA Server package installed and the required license to enable the OPC DA Server functions.
 - For information on how to add the OPC DA Server package, refer to [System Administration > Packages](#).
 - For information on how to install a license, refer to [System Administration > Licenses](#).

Once the OPC-DA Server package and its associated license has been installed and the system has re-started, an **OPC-DA Server** tab will be available on the Administration panel.

WinCPU Test 3 19.1.5-004 / Administration

Status: Stopped

Alert Management: Attention Bit Automated Log Export Crypto Database Deployment Debugging Diagnostics File Viewer FTP Server Packages Persistence Security Service Socket Debugging Staging Browser System Events System Variables TRISO API Tester Hash Map Variables HTTP Server License Pooling Licenses Memory Debugging Node Administration Notifications OPC-DA Server

OPC-DA Server

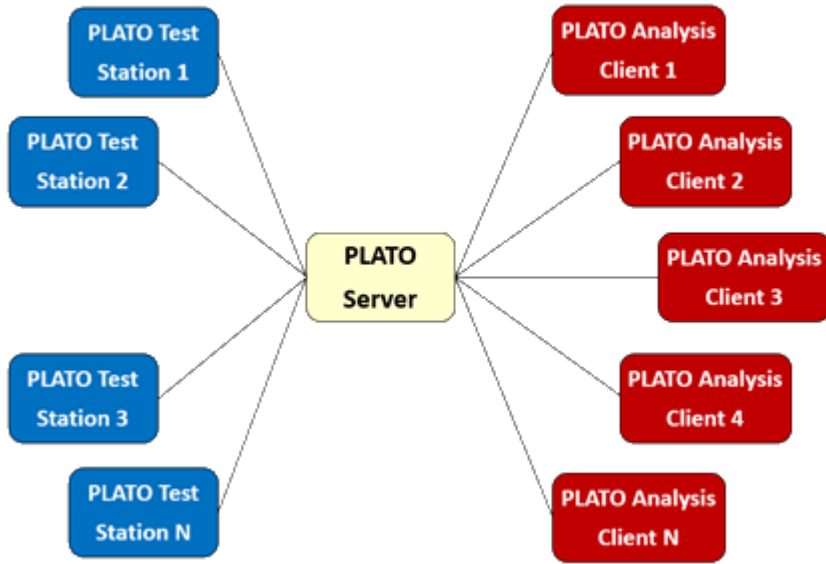
Visible Devices:

Available	Selected
<input type="checkbox"/> ControlLogix_14_67_slot5	<input checked="" type="checkbox"/> ControlLogix_14_67_slot0
<input type="checkbox"/> ControlLogix_SLOT5	

<https://docs.devicewise.com/Content/Products/GatewayDevelopersGuide/Administration/OPC-DA-Server-tab.htm>



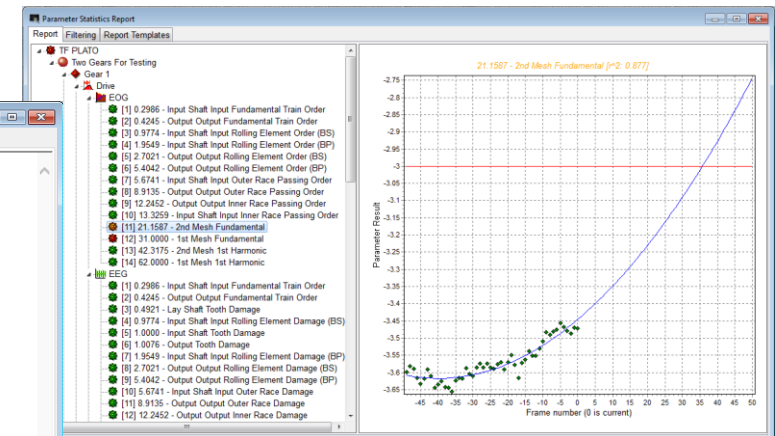
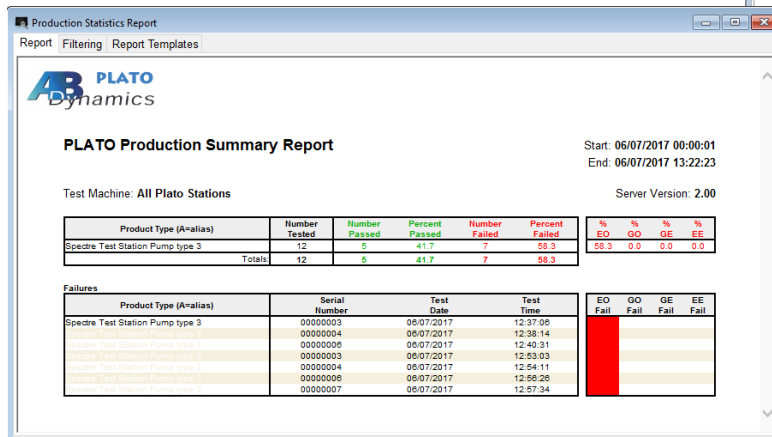
Plato-SERVER and Plato Analysis Clients (PACs)



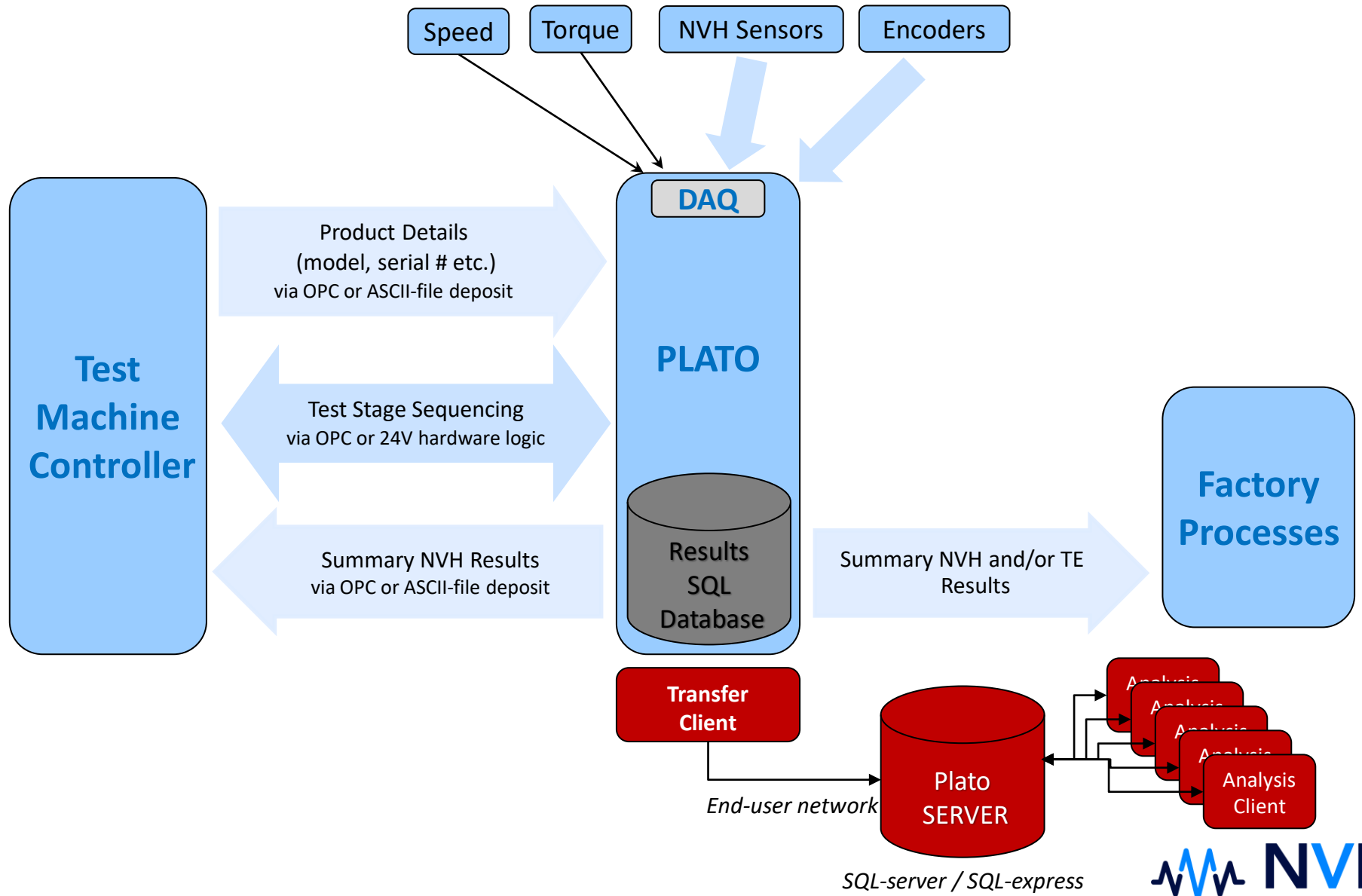
Plato-SERVER software (without support) is available free-of-charge to provide the following functionality:

- Common storage of results from N-networked PLATO test systems
- A client application (PLATO Analysis Client, or "PAC") to allow retrieval of results for analysis etc. across the network.

Network and server hardware, plus SQL-server or SQL-express must be provided and configured by the end-user.



Interaction Summary





LEADING-EDGE NVH PRODUCT TESTING TECHNOLOGY.

OVER 30 YEARS EXPERIENCE **DESIGNING** PRODUCTION TESTING
SYSTEMS

Eastern House, 15/16 Silver Street,
Bradford-on-Avon, Wiltshire UK
BA15 1JZ UK

sales@nvhint.com

With technical representatives in
major automotive territories
worldwide, see nvhint.com
for details.

PLATO - CORE NVH MEASUREMENT & ANALYSIS SOFTWARE

Leading-edge NVH product testing
technology. Over 30-years of experience
designing, deploying and supporting
production testing systems.

Our supply model is based on:

- ✓ Advice – on test machine design,
sensor choice and location, data
capture and analysis options
- ✓ Product – feature-rich and robust
application software
- ✓ Services – software set-up, test proving,
training
- ✓ Support – ongoing assistance for new
test set-up, result interpretation, fault-
finding etc.