Rapid II™ Datasheet

Off-the-shelf test cell control and DAQ

Rapid II™ provides both a powerful **4-axis controller** AND several channels of full-featured, high-speed **data acquisition**. With the software tools provided, configuration and start up is accomplished in a matter of hours requiring **no code whatsoever**. Wineman Technology's menu driven configurator Inertia™ works with National Instruments abstraction engine VeriStand™ for defining and redefining your test environment — from real-time test procedures, user defined alarm profiles, and PID loop control to graphing, custom screens, database interfaces, and logging any channel or variable in the system.

Durability Testing

Servo-Hydraulic Controllers

Load Frame Controllers

Gearbox Testers

Fatigue Testing

Performance Testing

Engine Dynamometers

Powertrain Dynamometers

Production Testers

Quality Audit

Applications range from simple component test systems to complex servo-hydraulic, driveline, or dynamometer test cells. Rapid II™ scales from a single axis control system to multiple axes and runs synchronous or asynchronous test profiles.

INERTIA™ VeriStandUI

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Rapid II™ Datasheet

PIDF Control [i]	
Control/Output Channels	Unlimited
Loop Rates	1 kHz Base (P/N 176500-01, -02 +CAN); 2 kHz Performance (-03, -04 +CAN)
Output Drive	±10 V, ±100 mA, 4-20 mA, Custom
Gain Parameters	Proportional, Integral, Derivative, Feedforward, Limit Loops, Cascade Control
Compensation	Amplitude Control, Peak Detection, Dither, Mode Transfer

Operator PC Interface	
Network Connection	(1) Ethernet RJ45 port, also: (1) USB 2.0 port, (1) EtherCAT port, (1) RS-485 port
Operating System	Windows 7 (Recommended)
Drivers	NATIONAL INSTRUMENTS VeriStand, WTI Inertia
Utilities	PID Tuning, Data Reporting, Test Editor, User Administration, Screen Editor, Error Monitor, Alarm Monitor
Operator Screens	Unlimited number of user customizable screens with dialog driven configuration

I/O (expandable with ECAT) [ii]	
Analog	**Inputs**: (8) 16-bit, ±10 V or 4-20 mA (1 kS/s & simultaneous for AIs and AOs) **Outputs**: (4) 16-bit, ±10 V, optional mA for ch0 and 1; **Connectors**: standard DE-9
Digital	**Inputs**: (12) 5-24 VDC differential, high speed, quadrature; (16) 24 VDC sinking **Outputs**: (16) 24 VDC sourcing; **Connectors**: standard DE-9 and DC-37
Thermocouple	(8) Type-K with voltage suppressor on individual channels
Emergency Stop	(SIL3) Self monitoring safety relay with pushbutton monitoring

Data Logging	
Number of Log Files	Unlimited
File Formats	CSV, TSV, TDMS
Data Rates	Up To Maximum Acquisition Rate
Triggering Modes	Periodic Time, Periodic Cycles, Crash, In-Limit, Out-of-Limit, Pre-trigger, Post-trigger, Single Shot
Trigger Channel	Any System Variable

[i] Actual loop rates determined by system's channel count and processor options

[ii] Data acquisition channel types and number of total channels based on specific configuration

Rapid II™ Datasheet

Detailed Description

Overview

- Preconfigured for quick deployment in test cell
  - Includes desktop computer and monitor
  - Includes VeriStand Full Development System and INERTIA Full Development System
- 120 VAC powered
- Components housed in 5U rack mount enclosure (approx. 19”w x 8.7”h x 17”d)
- Data Acquisition and Control System
  - Data logging
  - Alarming
  - PID control
  - Calculated channels
  - Real-time stimulus profile execution
- Standard hardware configurations
  - Based on the National Instruments CompactRIO real-time controller
  - Integration of wiring, power supply and routing, conditioning, connectors, E-Stop, etc.
- Expandable via EtherCAT

I/O Summary

- Analog Inputs (8): ±10 V or 4-20 mA individually selectable, 1 kS/s simultaneous
- Analog Outputs (4): ±10 V, 1 kS/s simultaneous
  - Servo Valve Outputs (2): ±100 mA or ±20 mA individually selectable, use first 2 AOs
- High Speed Digital Inputs (12): 5-24 VDC, can be used individually or grouped for quadrature
- Digital Inputs (16): 24 VDC
- Digital Outputs (16): 24 VDC, de-energized in emergency stop state
- Thermocouple Inputs (8): Type-K
- Emergency stop safety circuit

Communication Interfaces

- One (1) USB 2.0 Port
- One (1) Ethernet Network Port (for connection to client computer)
- One (1) EtherCAT Expansion Port
- One (1) RS485 Port

Variations

176500-01	RAPID II Base Edition
176500-02	RAPID II Performance Edition
176500-03	RAPID II Base Edition with CAN
176500-04	RAPID II Performance Edition with CAN

Rapid II™ Datasheet

Detailed Description

Front Panel

- Power On/Off Button
- Emergency Stop Button
- Emergency Stop Reset Button

Analog Inputs (8)

- ±10 V or 4-20 mA individually selectable 16-bit analog inputs are connected internally to an NI 9220 AI module (1 kS/s)
- DE-9 male back panel connector (1 per channel) for end user connection
- Individual channels can be configured for 0-20 mA by installing jumper on mating connector between pins 4 & 5
- Bias resistors can be selected for floating signals by installing a jumper on the mating connector between pins 6 & 7
- 24 VDC excitation power and DC common provided on pins 8 and 9 respectively to simplify connection of conditioned sensors

Pin	Assignment
1	AI Common
2	AI +
3	AI -
4	mA Sel 1
5	mA Sel 2
6	Bias Sel 1
7	Bias Sel 2
8	24 VDC
9	DC Common

Analog Outputs (4)

- ±10 V 16-bit analog outputs are connected internally to an NI 9263 analog output module (1 kS/s)
- DE-9 female back panel connector is provided (1 per channel) for end user connection
- 20 mA and 100 mA outputs provided for channels AO0 and AO1
- 24 VDC excitation power and DC common provided on pins 8 and 9 respectively to simplify connection of devices requiring external power

Pin	Assignment
1	Reserved
2	AO V+
3	AO V-
4	AO 20 mA+ (AO0 & AO1)
5	AO 20 mA- (AO0 & AO1)
6	AO 100 mA+ (AO0 & AO1)
7	AO 100 mA- (AO0 & AO1)
8	24 VDC
9	DC Common

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Detailed Description

High Speed Digital Inputs (12)

- 5-24 V differential inputs are connected internally to two NI 9411 digital input modules
- Four (4) DE-9 male back panel connectors are provided with three high speed digital inputs each
- Channels can be used individually for measuring frequencies or can be used in groups for quadrature position monitoring
- 24 VDC excitation power and DC common provided on pins 8 and 9 respectively to simplify connection of devices requiring external power

Pin	Assignment
1	A+
2	A-
3	B+
4	B-
5	Z+
6	Z-
7	5 VDC
8	24 VDC
9	DC Common

Digital Inputs (16)

- 24 VDC sinking digital inputs are connected internally to an NI 9425 digital input module
- One (1) DC-37 back panel female connector is provided for end user connection
- Voltage suppressors provided on individual channels

Pin	Assignment	Common Pin
1	DI0	2
3	DI1	4
5	DI2	6
7	DI3	8
9	DI4	10
11	DI5	12
13	DI6	14
15	DI7	16
17	DI8	18
19	DI9	20
21	DI10	22
23	DI11	24
25	DI12	26
27	DI13	28
29	DI14	30
31	DI15	32

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Detailed Description

Digital Outputs (16)

- 24 VDC sourcing digital outputs are connected internally to an NI 9476 digital output module
- One (1) DC-37 back panel female connector is provided for end user connection
- Electronic overcurrent, inrush, flyback, and short-circuit protection provided for each channel

Pin	Assignment	Common Pin
1	DO0	2
3	DO1	4
5	DO2	6
7	DO3	8
9	DO4	10
11	DO5	12
13	DO6	14
15	DO7	16
17	DO8	18
19	DO9	20
21	DO10	22
23	DO11	24
25	DO12	26
27	DO13	28
29	DO14	30
31	DO15	32

Thermocouple Inputs (8)

- Type-K thermocouple inputs are connected internally to an NI 9212 thermocouple input module
- Type-K miniature panel jacks are provided on the back panel (1 per channel)
- Voltage suppressors provided on individual channels

Emergency Stop

- A self-monitoring safety relay is provided for monitoring the state of the E-stop pushbutton
- Safety circuit provides a Safety Integrity Level (SIL) of 3
- Connector provided on back panel for interfacing to system safety circuit as required or for expansion

Terminal	Assignment
1	Remote Reset +
2	Remote Reset -
3	E-Stop Ch 1 +
4	E-Stop Ch 1 -
5	E-Stop Ch 2 +
6	E-Stop Ch 2 -
7	Safe Contact +
8	Safe Contact -