

32-Axis Motion Controller

The RMC200 is Delta's newest high-performance motion control platform for hydraulic, electric servo, and pneumatic industrial applications up to 32 axes. User-swappable modules provide flexibility and connectivity to many transducer types.

The RMC200's CPU module comes standard with Ethernet, supporting protocols such as EtherNet/IP, PROFINET, and Modbus/TCP, and is designed to integrate easily with your favorite PLCs, PCs and HMIs.

Delta's RMCTools software handles setup, programming, tuning and diagnostics for the RMC200, RMC150 and RMC75 controllers. Excellent graphing features and easy-to-use wizards complement its user programs designed specifically for motion sequences.

Flexible Multi-axis Capability

As Delta's largest and most capable motion controller, a variety of base sizes accommodate modules that can be "mixed and matched" to support up to 32 axes for tightly synchronized motion.



Industrial Applications

- ▲ Forest products
- ▲ Testing
- ▲ Metals
- ▲ Energy / Petrochemical
- ▲ Automotive
- ▲ Aerospace
- ▲ Plastics and rubber
- ▲ Entertainment
- ▲ Mining

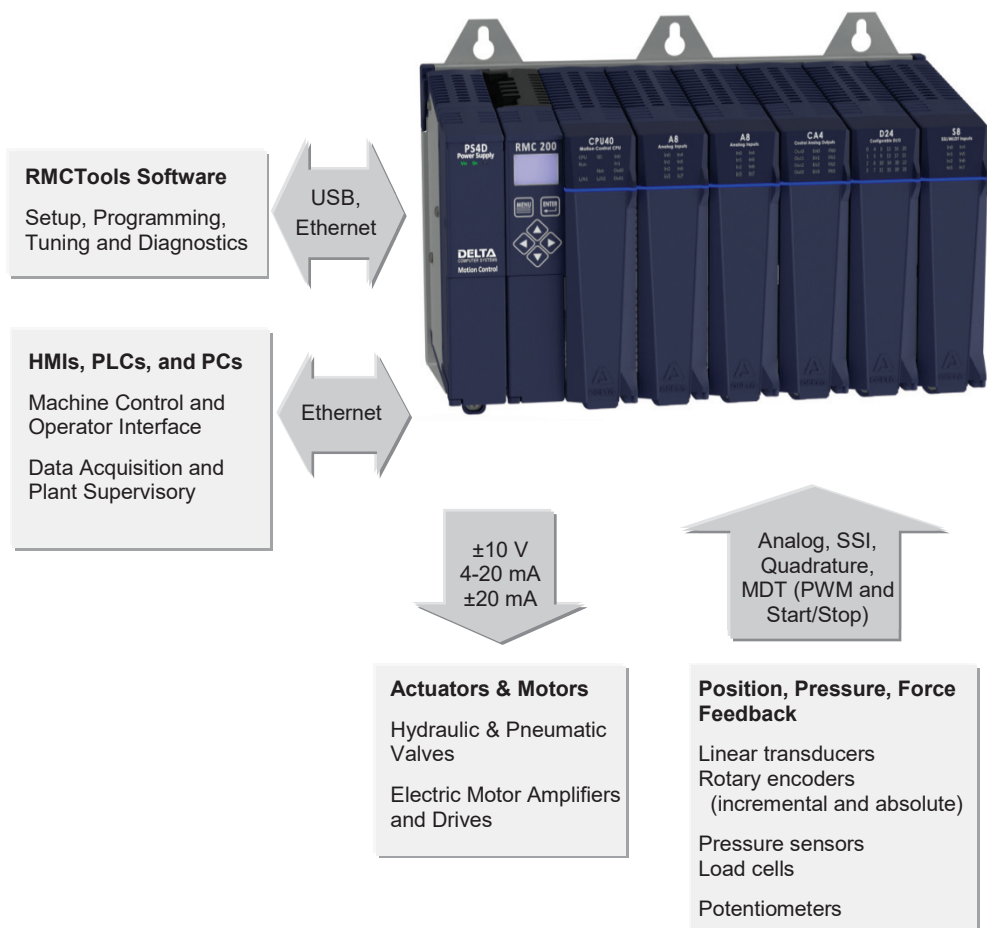
More application notes at deltamotion.com/applications.

Communications

- ▲ **Ethernet** (100 Mbps), built-in on CPU. Dual ports (single IP address) supporting star, linear, and ring topologies.
 - ▲ EtherNet/IP
 - ▲ PROFINET
 - ▲ Modbus/TCP
 - ▲ CSP (Allen-Bradley)
 - ▲ FINS (Omron)
 - ▲ Procedure Exist (Mitsubishi)
- ▲ **USB Port**
For use with RMCTools software and RMCLink ActiveX and .Net assembly.

Feedback Types

- ▲ **Synchronous Serial Interface (SSI)**
Linear and single- or multi-turn rotary
- ▲ **Magnetostrictive Linear Displacement Transducer (MDT)**
RS-422 Start/Stop and PWM
- ▲ **Analog**
±10 V and 4-20 mA
- ▲ **Quadrature Encoder**



Ordering Information

A full motion controller requires a base, a power supply, a CPU, a Feature Key with control loops, and I/O modules.

Base

R200-B5	5-slot base (3 I/O module slots).....	p. 6
R200-B7	7-slot base (5 I/O module slots).....	p. 6
R200-B11	11-slot base (9 I/O module slots).....	p. 6
R200-B15	15-slot base (13 I/O module slots).....	p. 6

Power Supply

R200-PS4D	24 Vdc-input, 35 W output power supply module for the B5, B7 and B11 bases	p. 8
R200-PS6D	24 Vdc-input, 50 W output power supply module for the B15 base	p. 8

CPU

R200-CPU40	RMC200 CPU for up to 32 axes, with dual Ethernet ports, USB, SD card slot, display screen, 2 discrete input, 2 discrete outputs.....	p. 9
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Feature Key

R2-KLnnn	Feature Key: A removable key mounted in the CPU. Must be ordered with desired number of control loops, with a minimum of four loops.....	p. 11
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I/O Modules

R200-A8	Eight analog inputs: ± 10 V or 4-20 mA	p. 12
R200-S8	Eight SSI or MDT inputs, supports one quadrature input: Synchronous Serial Interface (SSI) or Magnetostrictive Displacement Transducer (MDT) with Start/Stop or PWM signals, supports one quadrature input	p. 13
R200-Q4	Four quadrature encoder inputs: RS-422, HTL, or TTL, with home and registration inputs	p. 15
R200-CA4	Four analog outputs: ± 10 V, 4-20 mA, or ± 20 mA, with fault inputs and enable outputs	p. 18
R200-CV8	Eight analog outputs: ± 10 V only, with eight individually-configurable discrete I/O.....	p. 20
R200-D24	24 Discrete I/O: 20 configurable I/O, 4 fixed high-speed inputs for 2 quadrature encoder inputs or 2 pulse counter inputs.....	p. 22

Options

R2-SC	Slot Cover: A cover for empty I/O slots	p. 25
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Accessories

SD Card	p. 25
Cables	p. 25
Voltage-to-Current Converters	p. 26
Terminal Blocks	p. 26

Online Configuration Tool

Create your own RMC200 controller and request a quote!
Go to Delta's website at www.deltamotion.com and choose **Request a Quote Online**.



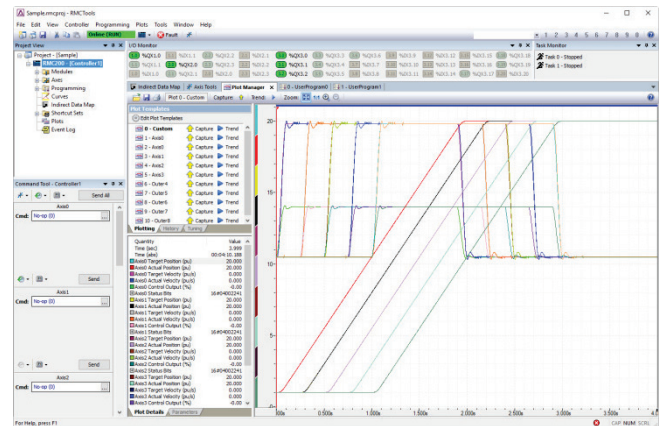
RMCTools Software

RMCTools is a powerful motion control software package for setting up, tuning, troubleshooting, programming, and controlling all features of Delta's multi-axis RMC200 controllers from a PC. RMCTools also supports the RMC75 and RMC150 controllers.

Delta's intuitive and easy-to-use RMCTools software features flexible User Programs with extensive commands and the ability to embed mathematical expressions. Setup and tuning wizards reduce startup times, and the graphical diagnostics tools speed troubleshooting of the entire motion system. Extensive, context-sensitive help is included in RMCTools.

RMCTools is available for download from www.deltamotion.com.

Supported Operating Systems: Windows® XP SP3/Vista/7/8/10



Communication Software

RMCLink ActiveX Control and .NET Assembly

RMCLink enables full monitoring and control of RMC200 motion controllers via Ethernet and USB communications on Windows®-based PCs from custom applications in languages such as Visual Basic, C++, C#, VBScript, VBA (Microsoft Excel®), LabVIEW™, PHP, Jscript, Python, MATLAB®.

RMCLink comes with fully-functioning sample projects to help you get up and running quickly. The help includes detailed walk-throughs and numerous code samples.

RMCLink, with extensive examples, is available for download from www.deltamotion.com. RMCLink also supports the RMC75 and RMC150 controllers.

Microsoft, Windows, and Excel are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

For non-Windows applications, such as Linux or embedded C, Delta provides sample C code for communicating with the RMC using Delta's simple DMCP protocol.

Instrument Driver for Use with LabVIEW

VIs created by Delta for use with LabVIEW™ software provide full-fledged examples including plot uploading and trending. The VIs are available from the Instrument Driver portion of National Instruments' website.

LabVIEW is a trademark of National Instruments. Neither Delta, nor any software programs or other goods or services offered by Delta, are affiliated with, endorsed by, or sponsored by National Instruments.

RMCTools Features

Delta's powerful RMCTools software makes setup, tuning, and troubleshooting motion systems easier than ever.

Setup

- ▲ **Wizards**
Easy-to-use wizards include New Project, New Controller, Scale & Offset, and Tuning.
- ▲ **Full Parameter Set**
Monitor all axis status registers and modify parameters.

Tuning and Diagnostics

- ▲ **Plots**
Plot any item, up to 32 items per plot, sampled down to the control loop resolution. XY plot view supported.
- ▲ **Tuning Wizard**
Quickly and accurately tune your axes, using a slider bar to choose from a range of gains appropriate for your system.
- ▲ **Event Log**
Speed troubleshooting by recording events such as parameter changes, commands, errors, and communications.

Programming

- ▲ **Commands**
Issue commands directly from RMCTools. Use Shortcut Commands to quickly issue commands to speed the tuning process.
- ▲ **User Programs**
Easily create programs to issue sequences of commands.
- ▲ **Program Triggers**
Start user programs automatically based on user-defined events such as discrete inputs, error conditions, etc.
- ▲ **Mathematical Expressions**
Expressions provide flexible programming capability for advanced calculations and machine control sequences.

RMC200 Control Features

The RMC200 provides an extensive set of motion commands and programming capability for quick and easy yet flexible motion control for virtually every motion application.

Control Modes

Closed Loop Control

Full PID loop control with velocity, acceleration and jerk feed forwards for precise synchronized motion. Directional gain factors support fluid power control.

Position Control

- ▲ Point-to-Point moves
- ▲ S-curves
- ▲ Speed at Position
- ▲ Gearing
- ▲ Cyclic Sinusoidal Motion
- ▲ Splines and Cams
- ▲ Rotary motion (incremental and absolute)

Velocity Control

- ▲ Velocity control with position feedback
- ▲ Velocity control with velocity feedback

Pressure and Force Control

- ▲ Pressure sensor, load cell or differential force
- ▲ Linear or S-curve Ramps
- ▲ Gearing
- ▲ Cyclic Sinusoidal Profile
- ▲ Splines and Cams

Position-Pressure and Position-Force Control

- ▲ Transition seamlessly between position or velocity control and pressure or force control.
- ▲ Pressure or Force Limit – limit the pressure or force during a position or velocity move.

Active Damping

For high-performance control of pneumatics and difficult systems.

Open Loop Control

Seamless transition from open loop to closed loop. Ramp Control Output between two values, or ramp based on position for hard-to-control systems.

Quick Move

Move in open loop and stop in closed loop for fast, smooth motion with accurate stops.

Valve Linearization

For valves with a sharp knee or “kink” in the flow versus command signal diagram.

Custom Feedback

Control using any calculated value as feedback.

- ▲ Sum, difference, average, etc.
- ▲ Switch feedback on-the-fly
- ▲ Redundant feedback
- ▲ Feedback linearization

High-level programming

User Programs

Programs are easy-to-understand sequences of commands. Run multiple programs simultaneously to handle axis commands and machine control functions.

Program Triggers

Start user programs automatically based on user-defined events such as discrete inputs, error conditions, etc.

Variables

Recipes and other user parameters can be stored for use by user programs.

Mathematical Expressions

Expressions provide flexible programming capability for advanced calculations and machine control sequences.

Troubleshooting and Monitoring

Plots

Plot any item, up to 32 items per plot, sampled down to the control loop resolution. XY plot view supported.

Event Log

Speeds troubleshooting by recording events such as parameter changes, commands, errors, and communications.

Fault Handling

Closed Loop stops

Ramp speed to zero at specified rate and hold position.

Open Loop stops

Ramp output voltage to zero at specified rate.

Multi-axis (group) stops

A fault on one axis halts multiple axes when configured as a group.

AutoStops

The response of axes to each fault type is easily configurable.

Modular Design

Modules Rock In, Rock Out

The RMC200 modules are designed to be user-installable and removable. The modules rock in and out, rotating around a pivot point. Modules may be installed and removed without being damaged while the RMC200 is powered. The pivot action ensures the electrical pins engage the base pins in a certain order, preventing damage to the module. Note: this is not hot-swapping in the sense of removing modules while equipment is operating.

Materials and Construction

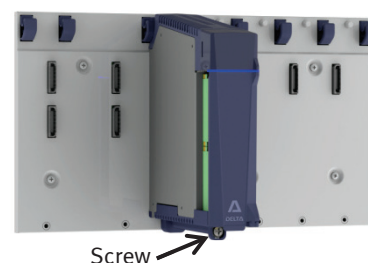
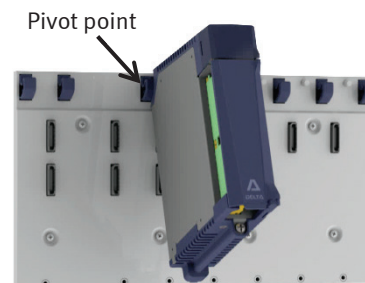
An aluminum base and modules composed of 22 gauge nickel-plated steel sheet metal and PC/ABS plastic provide a long-lasting industrial controller. Indicator LEDs on each module aid troubleshooting, and doors make for a clean appearance. The top of the modules are angled downward to help ensure space for airflow, and to allow the modules to be removed while remaining within the footprint of the base.

Module Hold-down Screws

Each module is secured to the base via a captive screw, which extends toward the front of the module for easy screwdriver access.

Unpluggable Terminal Blocks

Wiring connections are made via unpluggable terminal blocks to facilitate the removal of modules in the field. The terminal blocks latch into place and the push-in wire capture style facilitates efficient and reliable wiring. A wire hold-down clip and cable tie points help keep wiring organized.



General RMC200 Specifications

Mechanical		
Mounting	Panel-mount	
Dimensions with mounting tabs	B5	7.9 x 7.9 x 5.8 in. (WxHxD) (201 x 200 x 146 mm)
	B7	10.7 x 7.9 x 5.8 in. (WxHxD) (270 x 200 x 146 mm)
	B11	16.2 x 7.9 x 5.8 in. (WxHxD) (410 x 200 x 146 mm)
	B15	21.9 x 7.9 x 5.8 in. (WxHxD) (555 x 200 x 146 mm)
Environment		
Operating temperature	-4 to +140°F (-20 to +60°C)	
Storage temperature	-40 to +185°F (-40 to +85°C)	
Humidity	5-95%, non-condensing	
Agency compliance	CE for the following modules: B7, B11, B15, PS4D, PS6D, CPU40, S8, A8, D24, CA4	

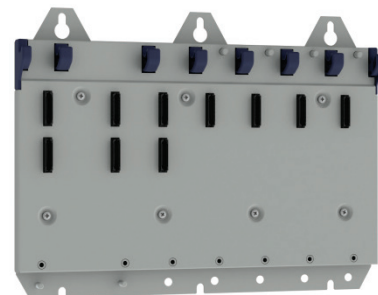
Base Modules

Base modules are available in multiple sizes to accommodate any application.

Base	Total Slots	I/O Module Slots
B5	5	3
B7	7	5
B11	11	9
B15	15	13

For all bases, slot 0 supports a power supply module, and slot 1 supports the CPU module. The first I/O slot (slot 2) supports any I/O module or a high-speed communications module (available in a future release).

Ordering part numbers: R200-B5, R200-B7, R200-B11, R200-B15



B7 Base

Specifications

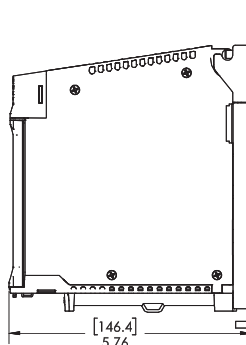
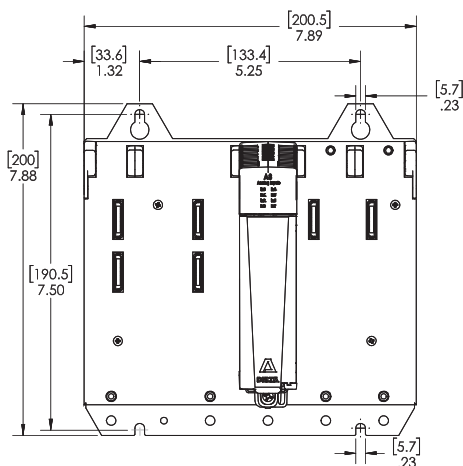
See also General Specifications on page 5.

Mechanical

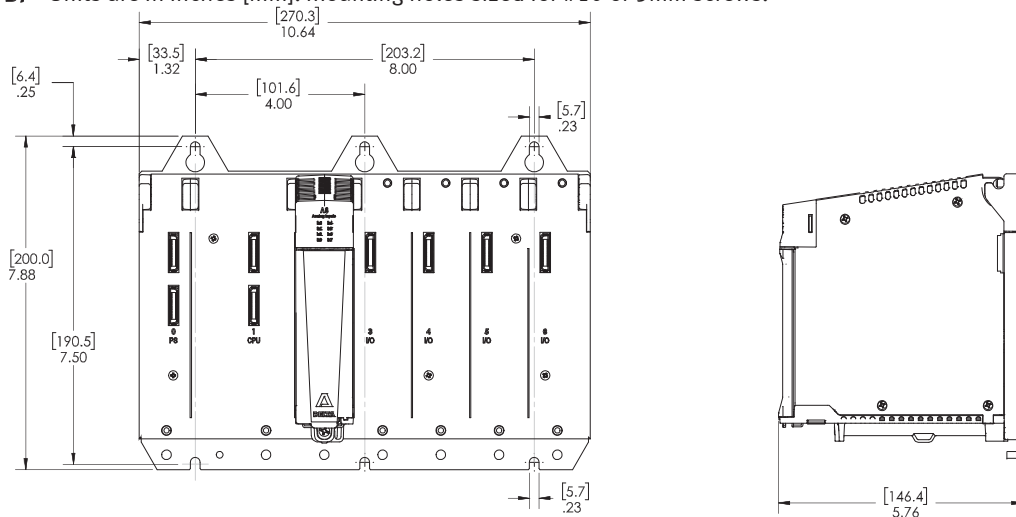
Mounting	Panel-mount. Mounting holes sized for #10 or 5mm screws.
Material	Aluminum

Dimensions

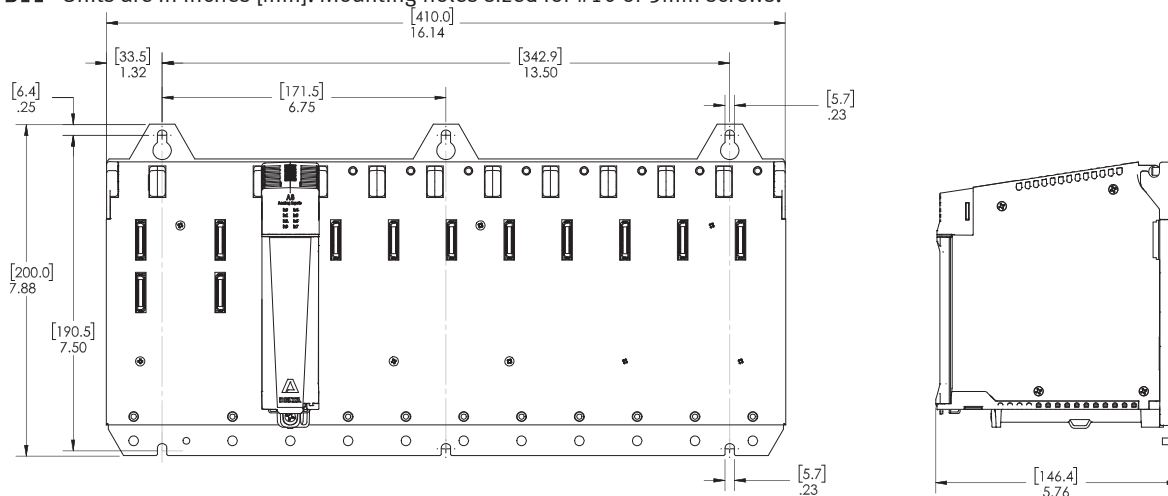
B5 Units are in inches [mm]. Mounting holes sized for #10 or 5mm screws.



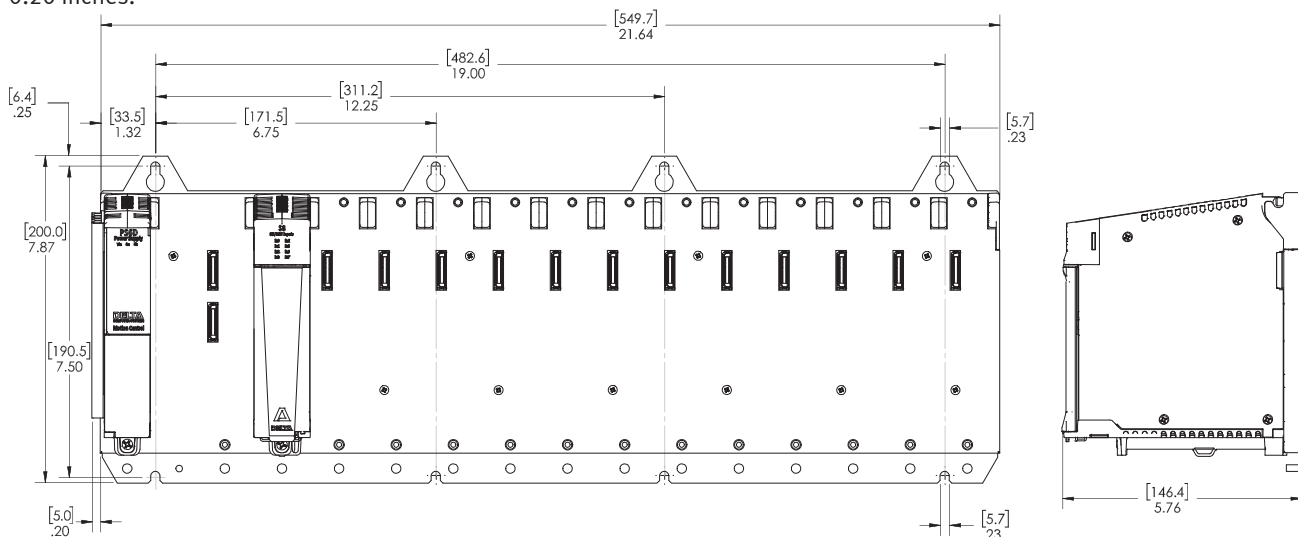
B7 Units are in inches [mm]. Mounting holes sized for #10 or 5mm screws.



B11 Units are in inches [mm]. Mounting holes sized for #10 or 5mm screws.



B15 Units are in inches [mm]. Mounting holes sized for #10 or 5mm screws. The PS6D heat sink protrudes beyond the left of the base by 0.20 inches.



Power Supply Modules: PS4D and PS6D

PS4D: 24 Vdc input, 35 W output, for B5, B7 or B11 base

PS6D: 24 Vdc input, 50 W output, for B15 base

The PS4D and PS6D power supply modules require a nominal 24 Vdc supply. The PS4D is able to power a fully-loaded B5, B7 or B11 base. The PS6D is able to power a fully-loaded B15 base. Both include status indicator LEDs and an unpluggable terminal block.

Ordering part numbers: R200-PS4D, R200-PS6D

Specifications

See also General Specifications on page 5.

Power	
Input Power	PS4D: 42 W max (1.8A at 24Vdc) PS6D: 60 W max (2.5A at 24Vdc)
Input Voltage	Recommended 24Vdc $\pm$ 15% (20.4 – 27.6 V), 30 V max. Overvoltage shutdown at 36 V.
Output Power	PS4D: 35 W max PS6D: 50 W max
Functional Isolation	500 Vac
LEDs	
Vin	Input voltage level indicator: Green: Normal range (20.4 – 27.6 Vdc) Orange: Voltage high or low, still operating Steady Red: Under- or over-voltage (outside of 18 – 36 V), or reverse voltage, not operating
On	Output power indicator: Off: Not providing power to base Green: Providing power to base
Flt	Faults indicator: Orange: Temperature high or power draw high, still operating Flashing Red: Under- or over-voltage, over-power, or over-temperature, output shut down Flashing Red/Green: Module not plugged into base, output shut down



Shown without doors

Pin-out

The unpluggable terminal block with spring-cage connections accepts stranded wire up to 12 gauge.

Terminal Block	
+24V	24 Volt input power
24Cmn	24 Volt input power common
Case	Electrically connected to the power supply metal and base metal.

Stranded Wire and Ferrule Size	
Conductor cross section	24 – 12 AWG 0.2 – 2.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.25 – 2.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.25 – 2.5 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

CPU Module: CPU40

Motion controller central processing unit.

The CPU40 is capable of controlling up to 32 axes. The CPU40 includes:

- ▲ 2 Ethernet ports (single IP address) supporting star, linear, and ring topologies.
- ▲ Supports the following protocols:
 - EtherNet/IP
 - PROFINET
 - Modbus/TCP
 - CSP (Allen-Bradley)
 - FINS (Omron)
 - DMCP (Delta Motion Control Protocol)
 - Procedure Exist (Mitsubishi)
- ▲ High-speed USB 2.0 port (480 Mbps) for communications with RMCTools and RMCLink
- ▲ Two 12-24 Vdc discrete inputs, individually isolated
- ▲ Two solid state relay (SSR) discrete outputs, individually isolated
- ▲ Display screen with navigation buttons
- ▲ SD card slot for saving and restoring the controller project and for general-purpose file storage (SD card purchased separately)
- ▲ Indicator LEDs
- ▲ Feature Key slot, accessible from the back of the module



Shown without doors

Ordering part number: R200-CPU40

CPU40 Specifications

See also General Specifications on page 5.

Motion Control	
Control loop times	250 μ s, 500 μ s, 1 ms, 2 ms, or 4 ms
USB Monitor Port (for setup, programming and maintenance only)	
Connector	USB "B" Receptacle
Data Rate	High-speed (480 Mbps)
Discrete Inputs (2)	
Input type	12-24 Vdc inputs; polarity independent
Logic polarity	True "High"
Functional Isolation	500 Vac, individually isolated
Input "High" range	9 to 26.4 Vdc, 3 mA maximum
Input "Low" range	0 to 5 Vdc, <1 mA
Maximum propagation delay	100 μ s Off to On 750 μ s On to Off (open collector drive)
Discrete Outputs (2)	
Output type	Solid State Relays (SSR)
Load types	DC general use, DC resistance, DC Pilot Duty
Functional Isolation	500 Vac, individually isolated
Rated voltage	max $\pm$ 30 Vdc
Maximum current	$\pm$ 75 mA
Maximum propagation delay	1.5 ms
Logic 1 (True, On)	Low impedance (15 Ω maximum)
Logic 0 (False, Off)	High impedance (<25 nA leakage current at 30 V)

Continued on next page.

CPU40 Specifications (continued)

Ethernet Interface

Ports	2 ports (single IP address)
Supported Topologies	Star, linear, or ring
Hardware interface	IEEE 802.3 for 100BASE-T (twisted pair)
Data Rate	100 Mbps
Duplex	Full Duplex
Features	Auto-negotiation, Auto-crossover (MDI/MDI-X)
Connectors	RJ-45 (2)
Cable	CAT5, CAT5e or CAT6, UTP or STP

Ethernet Configuration

Configuration parameters	IP address, subnet mask, gateway address, enable/disable ports, auto-negotiation
Configuration methods	BOOTP, DHCP, or static

Ethernet Protocol Support

Application protocols	EtherNet/IP PROFINET Modbus/TCP CSP (Allen-Bradley) FINS (Omron) DMCP (Delta Motion Control Protocol) Procedure Exist (Mitsubishi)
Framing protocol	Ethernet II
Internet protocol	IP (includes ICMP, ARP, and Address Collision Detection)
Transport protocols	TCP, UDP
Network management protocols	SNMPv1, SNMPv2c, LLDP
Ring management protocols	Device Level Ring (DLR), Media Redundancy Protocol (MRP)

SD Card Slot (card purchased separately)

Form factor	Standard size (32 mm × 24 mm × 2.1 mm)
Supported families	SD (SDSC) (standard capacity) and SDHC (high capacity)
Supported file system	FAT32 and FAT16
Supported capacities	Up to 32 GB

CPU40 Pin-out

The discrete inputs and outputs are individually isolated. Inputs are polarity-independent.

Terminal Block 1 (TB1)

DIn0+ DIn0-	General-purpose input 0, 12 -24 Vdc
DIn1+ DIn1-	General-purpose input 1, 12 -24 Vdc
DOut0+ DOut0-	General-purpose output 0, Solid State Relay up to 30 Vdc
DOut1+ DOut1-	General-purpose output 1, Solid State Relay up to 30 Vdc

Terminal Blocks

The unpluggable terminal blocks include spring-cage terminals. Ferrules provide for push-in connections.

Stranded Wire and Ferrule Size

Conductor cross section	24 – 16 AWG 0.2 – 1.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.2 – 1.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.2 – 0.75 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

Feature Key

The Feature Key is a rugged, removable and field-upgradable token that is mounted in the CPU. The Feature Key provides the user-specified control features available to the motion controller. Feature Keys are normally ordered together with the CPU module and are ordered together with specified features.

Feature Key Control Features:

Control Loops

The control loops on the feature key define the number of control axes. Four control loops are included for the nominal price of the Key itself (which is required for operation). The number of control loops required per axis are:

- **Single-loop axis: 1 control loop**
An axis is a single-loop axis if it controls one quantity, such as only position, or only force.
- **Dual-loop axis: 2 control loops**
An axis that controls two quantities such as position and force.
- **Reference axis: 0 control loops**
An axis with only an input, and no control output. Also called a half-axis.
- **Virtual axis: 0 control loops**
A type of reference axis with no input and no control output, and provides virtual motion.
- **Output only axis: 0 control loops**
An axis with only an analog output.



Ordering part number: R2-KL nnn , where nnn is the number of loops, with a minimum of four (004).

Feature Key Specifications

Specifications – Apply only to the Feature Key, not the CPU or other modules

Contact Life	10,000 cycles min.
ESD Protection	15 kV
Read Cycles	Unlimited
Write Cycles	100,000 minimum (writes are performed only when applying new features)
Data Life (Storage) at 35°C	30 years minimum, 50 years typical
Operational Temperature	-40°C to +85°C (-40°F to +185°F)
Storage Temperature	-40°C to +100°C (-40°F to +212°F)

I/O Module: A8

8 Analog Inputs, ± 10 V or 4-20 mA

The A8 module provides eight analog inputs for ± 10 V or 4-20 mA signals, with 18 bits of resolution. The A8 module also includes 10 Vdc exciter outputs intended for use with potentiometers. One LED per channel indicates the state of the respective input.

A8 Specifications

See also General Specifications on page 5.

Inputs	
Inputs	Eight 18-bit differential
Functional Isolation	500 Vac
Overvoltage protection	± 24 V, momentary
Input ranges	± 10 V, 4-20 mA (each input independently configurable)
Input impedance	Voltage input: 1 M Ω Current input: 250 Ω
Input filter slew rate	25 V/ms
Sampling frequency	200 kHz internal sampling. Provides one filtered sample per control loop (e.g. 1 msec) to CPU.
Sampling filter	250 Hz – 4 kHz, user-selectable internal low-pass sampling filter.
Offset drift with temperature	0.2 LSB/ $^{\circ}$ C typical (± 10 V range)
Gain drift with temperature	20 ppm/ $^{\circ}$ C typical (± 10 V range)
Non-linearity	12 LSB (counts) typical (± 10 V range)
Exciter output	10 Vdc $\pm 2\%$, 40 mA max total of all exciter outputs per terminal block

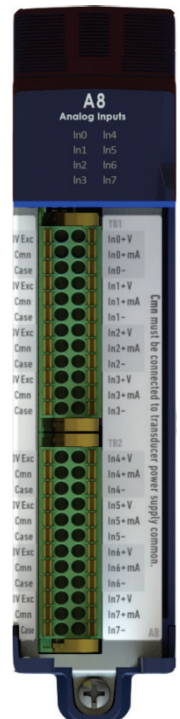
A8 Pin-out

Terminal Block 1 (TB1)

Description	Pin		Description
Input 0 10V Exciter output	10V Exc	1 2	In0+V Input 0+ Voltage
Input 0 Common	Cmn	3 4	In0+mA Input 0+ Current
Input 0 Shield connection	Case	5 6	In0- Input 0-
Input 1	10V Exc	7 8	In1+V
	Cmn	9 10	In1+mA
	Case	11 12	In1-
Input 2	10V Exc	13 14	In2+V
	Cmn	15 16	In2+mA
	Case	17 18	In2-
Input 3	10V Exc	19 20	In3+V
	Cmn	21 22	In3+mA
	Case	23 24	In3-

Terminal Block 2 (TB2)

Description	Pin		Description
Input 4	10V Exc	1 2	In4+V
	Cmn	3 4	In4+mA
	Case	5 6	In4-
Input 5	10V Exc	7 8	In5+V
	Cmn	9 10	In5+mA
	Case	11 12	In5-
Input 6	10V Exc	13 14	In6+V
	Cmn	15 16	In6+mA
	Case	17 18	In6-
Input 7	10V Exc	19 20	In7+V
	Cmn	21 22	In7+mA
	Case	23 24	In7-



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Connection Notes:

When connecting a voltage signal, use the In+V, In-, and Cmn pins. Do not connect In+mA.

When connecting a current signal, use the In+mA, In-, and Cmn pins. Do not connect In+V.

The Cmn pins must be connected to transducer commons.

Inputs 0-7 are isolated as a single group. There is no isolation between inputs.

Exciter outputs are +10 Vdc referenced to Cmn. Maximum current of 40 mA total of all exciter outputs per terminal block.

Terminal Blocks:

The unpluggable terminal blocks include spring-cage terminals. Ferrules provide for push-in connections.

Stranded Wire and Ferrule Size

Conductor cross section	24 – 16 AWG
	0.2 – 1.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.25 – 1.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.25 – 0.75 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

I/O Module: S8 Module

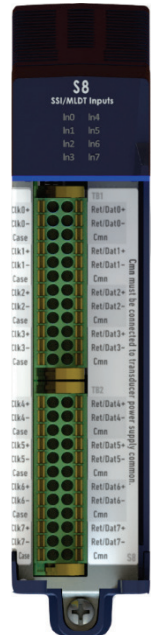
8 SSI or MDT Inputs, supports one quadrature input

The S8 module provides eight inputs, individually software selectable as SSI, or as magnetostrictive Start/Stop or PWM inputs.

When configured as SSI, an S8 input acts as a standard SSI input that can receive data from an SSI device, such as a position sensor. Optionally, one SSI monitor input can be configured in software, using inputs 6 and 7 on the S8 module. This SSI monitor input monitors data that is being transferred between a separate SSI input and an SSI device.

One RS-422 quadrature input (A+, A-, B+, B-) may be configured in software, using inputs 6 and 7 on the S8 module.

The S8 module interfaces with both linear sensors and rotary encoders. One LED per channel indicates the state of the respective input.



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S8 Specifications

See also General Specifications on page 5.

SSI Interface	
Data input	RS-422 differential
Clock output	RS-422 differential
Termination	Software selectable data input impedance: 110 Ω or >200 k Ω
Clock frequency	User-selectable, 100 kHz to 2500 kHz
Cable length maximum	Transducer dependent (approx. 3-2100 ft)
Resolution	Transducer dependent (up to 0.5 μ m for magnetostrictive LDTs)
Count encoding	Binary or Gray Code
Data bits	8 to 32 bits
Bit masking	High or low bits may be masked
Additional Settings	Selectable overflow modes to conform to various SSI transducers Wire break detection
Start/Stop and PWM Interface	
Transducer interface types	MDT with Start/Stop or PWM (Pulse Width Modulated) feedback
Interrogation output	RS-422 differential (transducer must be configured for external interrogation)
Return input	RS-422 differential
Resolution	0.0005 in. with one recirculation
Count rate	240 MHz
Recirculations	Supports multiple recirculations only for PWM transducers with internal recirculations.
Maximum transducer length	440 in. at 4 ms (loop-time dependent)
Quadrature Interface	
Input	5V differential (RS-422) receiver for A+, A-, B+, B-.
Connection	Uses the following pins: A+: Input 6 Ret/Dat+ A-: Input 6 Ret/Dat- B+: Input 7 Ret/Dat+ B-: Input 7 Ret/Dat-
Termination	Software selectable data input impedance: 110 Ω or >200 k Ω
Max Encoder Frequency	8,000,000 quadrature counts/second
Common	
Functional Isolation	500 Vac

Continued on next page.

S8 Pin-out

Terminal Block 1 (TB1)

Description		Pin		Description
Input 0 Interrogate+ or Clock+	Int/Clk0+	1	2	Ret/Dat0+ Input 0 Return+ or Data+
Input 0 Interrogate- or Clock-	Int/Clk0-	3	4	Ret/Dat0- Input 0 Return- or Data-
Input 0 Shield connection	Case	5	6	Cmn Input 0 Common
Input 1	Int/Clk1+	7	8	Ret/Dat1+
	Int/Clk1-	9	10	Ret/Dat1-
	Case	11	12	Cmn
Input 2	Int/Clk2+	13	14	Ret/Dat2+
	Int/Clk2-	15	16	Ret/Dat2-
	Case	17	18	Cmn
Input 3	Int/Clk3+	19	20	Ret/Dat3+
	Int/Clk3-	21	22	Ret/Dat3-
	Case	23	24	Cmn

Terminal Block 2 (TB2)

Description		Pin		Description
Input 4	Int/Clk4+	1	2	Ret/Dat4+
	Int/Clk4-	3	4	Ret/Dat4-
	Case	5	6	Cmn
Input 5	Int/Clk5+	7	8	Ret/Dat5+
	Int/Clk5-	9	10	Ret/Dat5-
	Case	11	12	Cmn
Input 6	Int/Clk6+	13	14	Ret/Dat6+
	Int/Clk6-	15	16	Ret/Dat6-
	Case	17	18	Cmn
Input 7	Int/Clk7+	19	20	Ret/Dat7+
	Int/Clk7-	21	22	Ret/Dat7-
	Case	23	24	Cmn

Stranded Wire and Ferrule Size

Conductor cross section	24 – 16 AWG 0.2 – 1.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.25 – 1.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.25 – 0.75 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

Connection Notes:

For SSI:

Int/Clk = Clock

Ret/Dat = Data

For SSI Monitor Mode:

Ret/Dat6± = Data In ±

Int/Clk6± = unused

Ret/Dat7± = Clock In ±

Int/Clk7± = unused

For Magnetostrictive Start/Stop or PWM:

Int/Clk = Interrogate

Ret/Dat = Return

For Quadrature:

Ret/Dat6± = A±

Int/Clk6± = unused

Ret/Dat7± = B±

Int/Clk7± = unused

The Cmn pins must be connected to transducer commons.

Inputs 0-7 are isolated as a single group. There is no isolation between inputs.

For best noise immunity, use shielded, twisted-pair wires and connect Cmn to transducer common with separate wire.

Terminal Blocks:

The unpluggable terminal blocks include

I/O Module: Q4 Module

4 Quadrature Encoder Inputs

The Q4 module provides four quadrature (A, B, Z) inputs with one home input and one registration input per quadrature input. One LED per channel indicates the state of the respective input.

Each A quad B input is individually software-configurable as one of the following input types:

- ▲ RS-422 differential receiver
- ▲ Single-ended TTL-level input
- ▲ Differential HTL (High Threshold Logic), up to 24 Vdc signals
- ▲ Single-ended HTL (High Threshold Logic), up to 24 Vdc signals

Each Z (index) input is individually software-configurable as one of the above input types, or a DI (discrete input) type, to support an index input that may be external to the encoder.

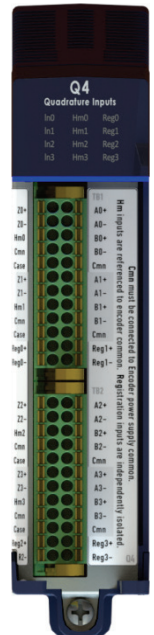
Termination is software-selectable for the A and B inputs, and separately for the Z inputs.

Delta recommends an RS-422 line driver output for quadrature encoders, as it provides the highest speed and very good noise immunity. The TTL and HTL input types are intended for retrofit applications where an existing encoder cannot easily be changed to RS-422. For new machine designs, Delta recommends RS-422.

Q4 Specifications

See also General Specifications on page 5.

Quadrature Inputs	
A and B Input Types, software selectable	RS-422 (5V differential receiver for A+, A-, B+, B-) HTL differential (A+, A-, B+, B-) HTL single-ended 12V (A, B) HTL single-ended 24V (A, B) TTL single-ended (A, B)
Z Input Types, software selectable	RS-422 (Z+, Z-) HTL differential (Z+, Z-) HTL single-ended 12V (Z) HTL single-ended 24V (Z) TTL single-ended (Z) DI (discrete input) (Z)
Termination	Software selectable for A and B or for Z. Input impedance: 115 Ω or >200 k Ω
Home Inputs	
Input Types, software selectable	TTL single-ended DI (discrete input)
RS-422 Input	
Max Count Rate	12,000,000 counts per second
Edge Alignment	45 ns time between A edge and B edge
Input Threshold	+/-200 mV max/min
Input Hysteresis	230 mV typical
HTL Differential Input	
Max Count Rate	2,000,000 counts per second
Edge Alignment	60 ns time between A edge and B edge
Input Threshold	+/-900 mV max/min
Input Hysteresis	1 V typical



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Q4 Specifications (continued)

HTL Single-ended 12V Input	
Max Count Rate	1,000,000 counts per second
Edge Alignment	71 ns time between A edge and B edge
Input Threshold	6 V to 8 V
Input Hysteresis	270 mV typical
HTL Single-ended 24V Input	
Max Count Rate	1,000,000 counts per second
Edge Alignment	71 ns time between A edge and B edge
Input Threshold	11 V to 13 V
Input Hysteresis	270 mV typical
TTL Single-ended Input	
Max Count Rate	1,000,000 counts per second
Edge Alignment	95 ns time between A edge and B edge
Input Threshold	0.8 V to 2.0 V
Input Hysteresis	530 mV typical
DI Input	
Input Threshold	5.5 V to 8 V
Input Hysteresis	1.2 V typical
Registration Inputs	
Input Characteristics	5 or 12-24 Vdc (software selectable)
Input "High" range	5 Vdc input: 3.5 to 5.5 Vdc, 7.5 mA max 12-24 Vdc input: 9 to 26.4 Vdc, 7 mA max
Input "Low" range	5 Vdc input: 0 to 1.7 Vdc, <1 mA 12-24 Vdc input: 0 to 5 Vdc, <1 mA
Maximum propagation delay	Off to On: 5 Vdc input: 0.3 μ s 12-24 Vdc input: 0.3 μ s On to Off: 5 Vdc input: 0.3 μ s, (1.2 μ s, open collector drive, 5V) 12-24 Vdc input: 0.5 μ s, (11 μ s, open collector drive, 24V)
Maximum input frequency	5 Vdc input: 1,000 kHz, (400 kHz, open collector drive, 5V) 12-24 Vdc input: 500 kHz, (25 kHz, open collector drive, 24V)
Common	
Functional Isolation	500 Vac

Continued on next page.

Q4 Pin-out

Terminal Block 1 (TB1)

Description		Pin		Description	
Input 0 Z+	Z0+	1	2	A0+	Input 0 A+
Input 0 Z-	Z0-	3	4	A0-	Input 0 A-
Input 0 Home	Hm0	5	6	B0+	Input 0 B+
Encoder and Home Common	Cmn	7	8	B0-	Input 0 B-
Shield connection	Case	9	10	Cmn	Encoder and Home Common
Input 1 Z+	Z1+	11	12	A1+	Input 1 A+
Input 1 Z-	Z1-	13	14	A1-	Input 1 A-
Input 1 Home	Hm1	15	16	B1+	Input 1 B+
Encoder and Home Common	Cmn	17	18	B1-	Input 1 B-
Shield connection	Case	19	20	Cmn	Encoder and Home Common
Registration 0 Input	Reg0+	21	22	Reg1+	Registration 1 Input
	Reg0-	23	24	Reg1-	

Terminal Block 2 (TB2)

Description		Pin		Description	
Input 2 Z+	Z2+	1	2	A2+	Input 2 A+
Input 2 Z-	Z2-	3	4	A2-	Input 2 A-
Input 2 Home	Hm2	5	6	B2+	Input 2 B+
Encoder and Home Common	Cmn	7	8	B2-	Input 2 B-
Shield connection	Case	9	10	Cmn	Encoder and Home Common
Input 3 Z+	Z3+	11	12	A3+	Input 3 A+
Input 3 Z-	Z3-	13	14	A3-	Input 3 A-
Input 3 Home	Hm3	15	16	B3+	Input 3 B+
Encoder and Home Common	Cmn	17	18	B3-	Input 3 B-
Shield connection	Case	19	20	Cmn	Encoder and Home Common
Registration 2 Input	Reg2+	21	22	Reg3+	Registration 3 Input
	Reg2-	23	24	Reg3-	

Stranded Wire and Ferrule Size

Conductor cross section	24 – 16 AWG 0.2 – 1.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.25 – 1.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.25 – 0.75 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

Connection Notes:

The Cmn pins must be connected to the encoder commons.

Inputs 0-3 are isolated as a single group. There is no isolation between inputs.

The Home input uses the same common as the A and B encoder. Therefore, the Home input will not support an active low home signal such as an NPN open collector. The Home input will support a PNP open collector.

For best noise immunity, use shielded, twisted-pair wires and connect Cmn to transducer common with separate wire.

Terminal Blocks:

The unpluggable terminal blocks include spring-cage terminals. Ferrules provide for push-in connections.

I/O Module: CA4 Module

4 Analog Outputs, ± 10 V, 4-20 mA, or ± 20 mA, with Fault Inputs and Enable Outputs

The CA4 module provides four analog outputs specifically designed for control outputs to valves, amplifiers, or drives. The outputs are individually software selectable as ± 10 V, 4-20 mA, or ± 20 mA for connection to a wide variety of actuators. The CA4 also supports custom ranges within the ± 10 V and ± 20 mA ranges, such as 0-10 V, 0-5 V, 1-5 V, etc.

Each analog output has an associated 12-24 Vdc Fault Input and a solid state relay Enable Output. The Fault Inputs and Enable Outputs may be dedicated to the respective output, or may be used as general-purpose discrete I/O.

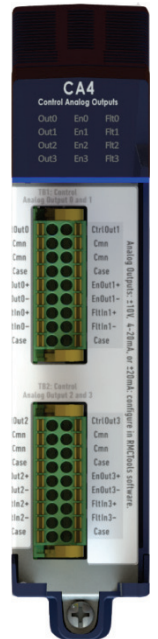
Three LEDs per channel indicate the state of the respective analog output, Enable Output, and Fault Input.

CA4 Specifications

See also General Specifications on page 5.

Analog Outputs	
Range	Voltage mode: ± 10 V @ 15 mA (670 Ω or greater load) Current mode: ± 20 mA @ 10 V (500 Ω or lower load)
Tolerance at full output	Voltage mode: ± 5 mV at 10 V Current mode: ± 10 μ A at 20 mA
Resolution	18 bits
Hardware Output Filter	First-order filter, time constant 100 μ sec
Functional Isolation	500 Vac
Overload protection	Continuous short to common
Overvoltage protection	Outputs are protected by clamp diodes
Enable Output	
Output type	Solid State Relay
Load types	DC general use, DC resistance, DC Pilot Duty
Logic polarity	User selectable to Active Open or Active Closed
Functional Isolation	500 Vac
Rated voltage	max ± 30 Vdc
Maximum current	± 75 mA
Maximum propagation delay	1.5 ms
Closed	Low impedance (15 Ω maximum)
Open	High impedance (<25 nA leakage current at 30 V)
Fault Input	
Input characteristics	12-24 Vdc; polarity independent, sinking or sourcing load
Logic polarity	User selectable to Active Input "High" or Active Input "Low" (Open when module not powered)
Functional Isolation	500 Vac
Input "High" range	9 to 26.4 Vdc (polarity independent), 3 mA maximum
Input "Low" range	0 to 5 Vdc (polarity independent), <1 mA
Maximum propagation delay	100 μ s Off to On 750 μ s On to Off (open collector drive)

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CA4 Pin-out

Terminal Block 1 (TB1)

Description		Pin		Description
Voltage or current output 0	CtrlOut0	1	2	CtrlOut1
Output common	Cmn	3	4	Cmn
Output common	Cmn	5	6	Cmn
Shield connection	Case	7	8	Case
Enable Output 0+	EnOut0+	9	10	EnOut1+
Enable Output 0-	EnOut0-	11	12	EnOut1-
Fault Input 0+	FltIn0+	13	14	FltIn1+
Fault Input 0-	FltIn0-	15	16	FltIn1-
Shield connection	Case	17	18	Case

Output 1

Terminal Block 2 (TB2)

Description		Pin		Description
	CtrlOut2	1	2	CtrlOut3
	Cmn	3	4	Cmn
	Cmn	5	6	Cmn
	Case	7	8	Case
Output 2	EnOut2+	9	10	EnOut3+
	EnOut2-	11	12	EnOut3-
	FltIn2+	13	14	FltIn3+
	FltIn2-	15	16	FltIn3-
	Case	17	18	Case

Output 3

Connection Notes:

The CtrlOut pin is normally $\pm 10V$. May be configured to ± 20 mA or 4-20 mA in RMCTools.

Analog outputs 0-3 are isolated as a single group. There is no isolation between outputs.

For best noise immunity, use shielded, twisted-pair wires. When connecting to a differential input, connect CtrlOut and Cmn as a twisted pair to the receiver differential inputs, and also run a separate wire from Cmn to the differential input common.

Terminal Blocks:

The unpluggable terminal blocks include spring-cage terminals. Ferrules provide for push-in connections.

Stranded Wire and Ferrule Size

Conductor cross section	24 – 16 AWG 0.2 – 1.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.25 – 1.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.25 – 0.75 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

I/O Module: CV8 Module

8 Analog Outputs, ± 10 V only, with eight individually-configurable discrete I/O

The CV8 module provides eight analog outputs specifically designed for control outputs to valves, amplifiers, or drives. The ± 10 V outputs support custom ranges within the ± 10 V range, such as 0-10 V, 0-5 V, 1-5 V, etc.

The CV8 provides eight discrete I/O points, individually configurable as inputs or outputs. These discrete I/O may be used for general purpose I/O, Fault Inputs, or Enable Outputs.

Each analog output has an associated LED, and each discrete I/O point has an associated LED.

CV8 Specifications

See also General Specifications on page 5.

Analog Outputs

Range	± 10 V @ 5 mA (2000 Ω or greater load)
Tolerance at full output	± 5 mV at 10 V
Resolution	18 bits
Hardware Output Filter	First-order filter, time constant 75 μ sec
Functional Isolation	500 Vac
Overload protection	Continuous short to common
Overvoltage protection	Outputs are protected by clamp diodes

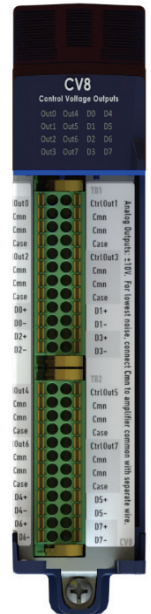
Discrete Outputs (up to 8 per module)

Output type	Solid State Relay, individually isolated
Load types	DC general use, DC resistance, DC Pilot Duty
Logic polarity	User selectable to Active Open or Active Closed
Functional Isolation	500 Vac
Rated voltage	max ± 30 Vdc
Maximum current	± 75 mA
Maximum propagation delay	2.5 ms
Closed	Low impedance (15 Ω maximum)
Open	High impedance (<25 nA leakage current at 30 V)

Discrete Inputs (up to 8 per module)

Input characteristics	12-24 Vdc; polarity independent, individually isolated
Logic polarity	User selectable to Active Input "High" or Active Input "Low" (Open when module not powered)
Functional Isolation	500 Vac
Input "High" range	9 to 26.4 Vdc (polarity independent), 3 mA maximum
Input "Low" range	0 to 5 Vdc (polarity independent), <1 mA
Maximum propagation delay	100 μ s Off to On 750 μ s On to Off (open collector drive)

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CV8 Pin-out

Terminal Block 1 (TB1)

Description		Pin		Description
Voltage output 0	CtrlOut0	1	2	CtrlOut1
Output common	Cmn	3	4	Cmn
Output common	Cmn	5	6	Cmn
Connection to case	Case	7	8	Case
Output 2	CtrlOut2	9	10	CtrlOut3
	Cmn	11	12	Cmn
	Cmn	13	14	Cmn
	Case	15	16	Case
Discrete I/O 0+	D0+	17	18	D1+
Discrete I/O 0-	D0-	19	20	D1-
Discrete Input 2	D2+	21	22	D3+
	D2-	23	24	D3-

Terminal Block 2 (TB2)

Description		Pin		Description
Output 4	CtrlOut4	1	2	CtrlOut5
	Cmn	3	4	Cmn
	Cmn	5	6	Cmn
	Case	7	8	Case
Output 6	CtrlOut6	9	10	CtrlOut7
	Cmn	11	12	Cmn
	Cmn	13	14	Cmn
	Case	15	16	Case
Discrete I/O 4	D4+	17	18	D5+
	D4-	19	20	D5-
Discrete I/O 6	D6+	21	22	D7+
	D6-	23	24	D7-

Connection Notes:

Analog outputs 0-7 are isolated as a single group. There is no isolation between outputs.

For best noise immunity, use shielded, twisted-pair wires. When connecting to a differential input, connect CtrlOut and Cmn as a twisted pair to the receiver differential inputs, and also run a separate wire from Cmn to the differential input common.

Terminal Blocks:

The unpluggable terminal blocks include spring-cage terminals. Ferrules provide for push-in connections.

Stranded Wire and Ferrule Size

Conductor cross section	24 – 16 AWG 0.2 – 1.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.25 – 1.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.25 – 0.75 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

I/O Module: D24 Module

24 Discrete I/O

The D24 discrete I/O module contains 20 configurable discrete I/O points for 24 Vdc and 4 high-speed discrete inputs for either 5 or 24 Vdc signals.

The four high-speed inputs of the D24 module are software configurable as general-purpose inputs, or quadrature or pulse counter inputs. The D24 quadrature input supports single-ended encoders and encoders with complements, and up to 24 V signals. The D24 quadrature input is not designed for RS-422 drivers, but will function at a reduced input frequency.

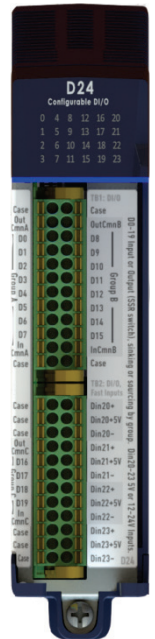
Delta always recommends an RS-422 line driver output for quadrature encoders, as it provides high speed and very good noise immunity. RS-422 quadrature signals are best supported by the Q4 module and on the S8 module (only one input on the S8). The D24 quadrature is intended for retrofit applications where an existing encoder cannot easily be changed to RS-422. For new machine designs, use RS-422.

20 general-purpose discrete I/O points:

- ▲ 24 Vdc signals
- ▲ Individually software-configurable as an input or output (solid state relay).
- ▲ Arranged in 3 isolated groups of 8, 8, and 4 I/O points.

4 high-speed inputs:

- ▲ 5 or 24 Vdc signals (separate pin for 5 or 12-24 Vdc connection)
- ▲ Software configurable as general-purpose or specific high-speed functionality
- ▲ Quadrature encoder, software-configurable as one of the following options:
 - 1 single-ended quadrature input with A, B, and Z, using inputs 20-22.
 - 1 quadrature input with complements (A+, A-, B+, B-) and wire break detection, using inputs 20-23.
 - 2 single-ended quadrature inputs with A and B, using inputs 20-23.
- ▲ Pulse counter, using inputs 20 and 22, software configurable as rising edge, falling edge, or rising and falling edge counter.
- ▲ Supports Event Timers – high-speed timing between input events



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D24 Specifications

See also General Specifications on page 5.

General Purpose Inputs	
Input Characteristics	12-24 Vdc; polarity independent, sinking or sourcing load
Logic polarity	True High
Functional Isolation	500 Vac
Input "High" range	9 to 26.4 Vdc (polarity independent), 3 mA maximum
Input "Low" range	0 to 5 Vdc (polarity independent), <1 mA
Maximum propagation delay	100 µsec, (750 µsec, open collector "Off")
General Purpose Outputs	
Outputs	Solid State Relay
Load types	DC general use, DC resistance, DC Pilot Duty
Functional Isolation	500 Vac
Maximum voltage	max ±30 Vdc
Maximum current	±75 mA
Maximum propagation delay	1.5 ms
Logic 1 (True, On)	Low impedance (15 Ω maximum)
Logic 0 (False, Off)	High impedance (<100 nA leakage current at 30 V)

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D24 Specifications (continued)

See also General Specifications on page 5.

High-Speed Inputs	
Input Characteristics	5 or 12-24 Vdc (separate pins for 5 or 12-24 Vdc)
Logic polarity	True High
Functional Isolation	500 Vac
Input "High" range	5 Vdc input: 3.5 to 5.5 Vdc, 7.5 mA max 12-24 Vdc input: 9 to 26.4 Vdc, 7 mA max
Input "Low" range	5 Vdc input: 0 to 1.7 Vdc, <1 mA 12-24 Vdc input: 0 to 5 Vdc, <1 mA
Maximum propagation delay	Off to On: 5 Vdc input: 0.3 μ s 12-24 Vdc input: 0.3 μ s On to Off: 5 Vdc input: 0.3 μ s, (1.2 μ s, open collector drive, 5V) 12-24 Vdc input: 0.5 μ s, (11 μ s, open collector drive, 24V)
Maximum input frequency	5 Vdc input: 1,000 kHz, (400 kHz, open collector drive, 5V) 12-24 Vdc input: 500 kHz, (25 kHz, open collector drive, 24V)

D24 Pin-out

Terminal Block 1 (TB1)

Description		Pin			Description
Shield connection	Case	1	2	Case	Shield connection
Common for Group A outputs	OutCmnA	3	4	OutCmnB	Common for Group B outputs
Group A, DI/O point 0	D0	5	6	D8	Group B, DI/O point 8
Group A, DI/O point 1	D1	7	8	D9	Group B, DI/O point 9
Group A, DI/O point 2	D2	9	10	D10	Group B, DI/O point 10
Group A, DI/O point 3	D3	11	12	D11	Group B, DI/O point 11
Group A, DI/O point 4	D4	13	14	D12	Group B, DI/O point 12
Group A, DI/O point 5	D5	15	16	D13	Group B, DI/O point 13
Group A, DI/O point 6	D6	17	18	D14	Group B, DI/O point 14
Group A, DI/O point 7	D7	19	20	D15	Group B, DI/O point 15
Common for Group A inputs	InCmnA	21	22	InCmnB	Common for Group B inputs
Shield connection	Case	23	24	Case	Shield connection

Terminal Block 2 (TB2)

Description		Pin			Description
Shield connection	Case	1	2	Din20+	Input 20+ for 12-24 Vdc signals
Shield connection	Case	3	4	Din20+5V	Input 20+ for 5 Vdc signals
Shield connection	Case	5	6	Din20-	Input 20- for all signals
Common for Group C outputs	OutCmnC	7	8	Din21+	Input 21
Group C, DI/O point 16	D16	9	10	Din21+5V	
Group C, DI/O point 17	D17	11	12	Din21-	Input 22
Group C, DI/O point 18	D18	13	14	Din22+	
Group C, DI/O point 19	D19	15	16	Din22+5V	
Common for Group C inputs	InCmnC	17	18	Din22-	Input 23
Shield connection	Case	19	20	Din23+	
Shield connection	Case	21	22	Din23+5V	
Shield connection	Case	23	24	Din23-	

Terminal Blocks:

The unpluggable terminal blocks include spring-cage terminals. Ferrules provide for push-in connections.

Stranded Wire and Ferrule Size	
Conductor cross section	24 – 16 AWG 0.2 – 1.5 mm ²
Conductor cross section, ferrule no plastic sleeve	0.25 – 1.5 mm ²
Conductor cross section, ferrule with plastic sleeve	0.25 – 0.75 mm ²
Stripping Length	10 mm
Ferrule Length	10 – 12 mm

D24 Configurability and Connection Notes

I/O Points 0-19:

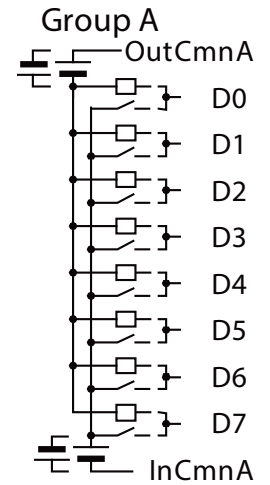
Divided into groups A, B, and C. Each group contains I/O points with a shared output common and input common. Each individual point is configured in the RMCTools software to be an input or an output.

All inputs in a group share the same common, and all outputs in a group share the same common.

Within each group, all inputs must be the same polarity, and all outputs must be the same polarity, but inputs need not be the same polarity as outputs, that is, outputs can switch high side or low side, and inputs can be active high or low.

Inputs 20-23:

Inputs only, individually isolated. For 12-24 Vdc inputs, wire to Din+ and Din-. For 5 Vdc inputs, wire to Din+5V and Din-. Do not wire both Din+ and Din+5V on the same input.



Blank Slot Covers

The blank slot covers protect the base connector from foreign particles. The covers hinge on the top hooks of the base and magnetically attach to the base. In addition, a hole allows the user to supply and install a screw for firm attachment to the base. Recommended screw size is #6-32 x 1/2" or #6-32 x 5/8".

Part number: R2-SC



SD Card

Delta recommends using industrial-grade SD (SDSC) or SDHC cards with the CPU40. Industrial grade cards provide many benefits over commercial grade, including a wide temperature range and long data retention life. Customers may purchase a card from Delta or supply their own standard form factor SDSC or SDHC card up to 32 GB with a FAT32 or FAT16 file system. Delta offers an industrial rated, SDSC, 1 GB card:

R2-MEM-SD-1G	
Card family	SDSC
File system	FAT16
Form factor	Standard
Capacity	1 GB
Memory type	SLC
Temperature range	-40 to +85°C



Part number: R2-MEM-SD-1G

Cables

Pigtail cables provide a compact, convenient option for RMC200 modules. These cables are for short distances between the RMC200 and terminal blocks within the same cabinet. For long cable runs, use cables with lower resistance and better shielding.

Part Number	For Module	For Terminal Block	Number Required per Module	Length
R2-CB-A8-06A	A8	TB 1 or TB 2	2	6 ft. (1.83 m)*
R2-CB-S8-06A	S8	TB 1 or TB 2	2	
R2-CB-Q4-06A	Q4	TB 1 or TB 2	2	
R2-CB-CA4-06A	CA4	TB 1 or TB 2	2	
R2-CB-CV8-06A	CV8	TB 1 or TB 2	2	
R2-CB-D24TB1-06A	D24	TB1	1 of each cable	
R2-CB-D24TB2-06A		TB2	assembly (2 total)	

*Contact Delta for other lengths.



Voltage-to-Current Converters

Delta's voltage-to-current converters are designed for converting a voltage control output to current for current-controlled servo valves. Delta offers several voltage-to-current converters to fit your needs. The maximum output current is adjustable in increments of 10 mA up to the maximum output current range.

Notice that the CA4 analog output module supports up to ± 20 mA and does not need a converter for valves rated for ± 20 mA or less.

Part Number	Description	Output Current Range*	Power Supply
VC2124	2-channel voltage-to-current converter	± 100 mA per channel	24 Vdc
VC2100	2-channel voltage-to-current converter	± 100 mA per channel	± 15 Vdc
VC2100-HS	2-channel voltage-to-current converter – high speed**	± 100 mA per channel	± 15 Vdc



VC2124



VC2100



VC2100-HS

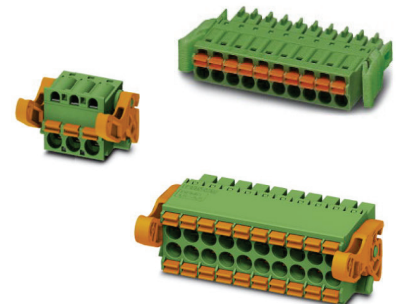
* Channels can be connected in parallel to provide higher current. For example, two ± 100 mA channels connected in parallel will provide ± 200 mA.

**Most hydraulic control applications do not require the high-speed converter.

Terminal Blocks

All RMCs ship with connectors. Connectors are also available for order individually from Delta. The table below lists the available connectors. These parts are also available from connector manufacturer Phoenix using these part numbers.

Phoenix Connector Part No	Delta Part No	Connector Description	For Modules
FKC 2,5/ 3-ST-5,08-LR - 1792520	EPA0078	3-pin Terminal Block	PS4D, PS6D
FMC 1,5/ 8-ST-3,5-RF - 1952089	EPA0081	8-pin Terminal Block	CPU40
DFMC 1,5/ 9-ST-3,5-LR - 1790551	EPA0079	18-pin Terminal Block	CA4
DFMC 1,5/12-ST-3,5-LR - 1790580	EPA0080	24-pin Terminal Block	A8, S8, Q4, CV8, D24



Notes

The RMC Family of Motion Control



Connect. Control. Optimize.