DeltaV™ PK Controller

- Powerful Standalone. Easily Integrated
- Faster module execution
- Designed for use with any DeltaV I/O family or safety system
- Easy controller redundancy
- Retains configuration without power
- Native Ethernet device connections
- Available in 4 sizes: 100 DSTs, 300 DSTs, 750 DSTs, and 1500 DSTs

The DeltaV™ PK Controller makes compact and standalone control applications easy.

Introduction

The DeltaV™ PK Controller provides a feature packed control solution for all types and sizes of applications ranging from individual skid units to large, distributed process plants. It is designed to operate in two modes: Standalone mode or as part of a DeltaV system. In standalone fashion, it can run without any connection to a server, panel HMI, or other typical DCS system components. As part of a DeltaV system it will function as a node of a DCS system.

Any time after being configured to run in a standalone fashion, the standalone DeltaV PK Controller may be merged into a larger DeltaV system. The merging process incorporates the database and graphics from the standalone DeltaV PK Controller into the larger DeltaV Database, resulting in a single, native database and system. This process addresses potential conflicts with tags, thereby eliminating the pains associated with mapping two systems together.

The standalone DeltaV PK Controller is configured in a standalone fashion using the PK Controller Engineering Software. Alternatively, the DeltaV PK Controller may be configured using standard DeltaV Engineering tools on a ProPlus or DeltaV Engineering Workstation.

Finally, control of Ethernet devices is made easy with built-in Ethernet ports and native protocols supported by the controller - extra cards are not required.

Benefits

Runs standalone or as part of a DeltaV system: The PK Controller does not require a connection to its PK Controller Engineering Software in order to run in a standalone fashion. Alternatively, it can be commissioned as a part of a larger DeltaV system - you choose the behavior that best fits your needs.

Seamless merging into DeltaV: With our DeltaV engineering software, a standalone DeltaV PK Controller can be seamlessly merged into a larger DeltaV system, resulting in one native database and system, and the elimination of costly and time-consuming data mapping exercises.

Easily swap and restart a standalone simplex controller: In the event of the failure of a standalone simplex DeltaV PK Controller, another DeltaV PK Controller can be swapped in its place and restarted without any additional recommissioning activities or the need for a laptop. Simply transfer the SD-Card from the old controller to the new controller and insert the new controller onto the carrier—easy.

When standalone, no need to manage databases on laptops: The on-board SD-Card stores a backup of all configuration and HMI files, enabling a laptop to retrieve those files and begin engineering a system without having those files on the laptop to start with. This avoids the pain of having to manage files on servers or drives and ensure the latest is being used.

Local HMI: A Standalone DeltaV PK Controller can be deployed with one DeltaV Operator Station (Panel HMI or workstation PC) to serve local HMI needs[1]. The DeltaV Operator Station will communicate with the standalone PK Controller on a dedicated port on the DeltaV ACN and operate as a Full Span of Control Operator Station. The DeltaV Operator Station supports 250 DeltaV Continuous Historian tags, which can be scaled up to 3,250 tags. It also supports DeltaV Advanced Batch functionalities (Batch Executive and Batch Historian), Quad-monitor support, and DeltaV Mobile Communicator along with many other standard DeltaV functionalities.

Save cabinet space: With six built-in Ethernet ports, the need for additional Ethernet switches is eliminated in many applications. The introduction of the M-Series 4-wide I/O Carrier allows for reduced footprint on installations with lower I/O count needs.

Easy redundancy: The DeltaV PK Controller supports 1:1 redundancy for increased availability. Simply install the redundant controller onto the carrier next to the primary – no additional cabinet space or configuration changes are required.

Flexibility in I/O: The following DeltaV I/O may be used with the DeltaV PK Controller: M-Series Series 1 & Series 2 traditional[2, 3], S-Series traditional with the use of the M-series to S-series I/O Interface Carrier Adapter[4], CHARMs I/O (CIOCs), and Wireless I/O (WIOCs), enabling you to select the I/O family that best meets your needs.

Integrated safety: The DeltaV PK Controller can use either of the DeltaV SIS products, including DeltaV SIS with Electronic Marshalling, or the DeltaV SLS1508 Safety Logic Solver. Both offer unique benefits and are easily scalable.

Easily connect third party devices: Third party devices such as Panel HMIs and variable speed drives are easily connected using the native on-board protocols, without the use of a dedicated Ethernet or I/O card. For protocols not supported natively on the PK, the DeltaV Virtual IO Module 2 (VIM2) or any of the traditional DeltaV Bussed cards can be used.

Secure: The DeltaV PK Controller requires a password to access and edit its configuration. In addition, the carrier has an on-board key that when enabled requires physical presence to download configuration changes to the controller. Files stored on the controller's SD Card are encrypted. These capabilities provide added layers of protection against unauthorized access of the controller in standalone applications. When used with a ProPlus as a part of a broader DeltaV system, laptops cannot connect to the DeltaV PK Controller or to the DeltaV Network, keeping the DeltaV system closed from unauthorized access.

Speed: The DeltaV PK Controller executes control modules as fast as 25ms, enabling control of faster process applications.

Advanced Software: The PK Controller supports all of the advanced DeltaV features that are expected in a world class Distributed Control System:

- DeltaV Class-based control and unit-modules
- DeltaV Model Predictive Control
- DeltaV Neural Networks
- Works with DeltaV Batch Executive
- Works with DeltaV Version Control Audit Trail (VCAT)[5]

[1] See the Workstations and Servers for the DeltaV DCS Product Data Sheet for additional details on supported hardware for the Panel HMI and workstation PCs.

[2] M-Series Intrinsically Safe traditional cards are supported for use with the PK Controller in v15.FP2 or later.

[3] M-Series 8-wide I/O Interface Carriers manufactured prior to 2002 are not compatible with PK Controller. Contact your local sales representative for additional information.

[4] M-Series Vertical Plus I/O Interface Carriers are compatible with the PK Controller when using the M-series to S-series I/O Interface Carrier Adapter. Contact your local sales representative for additional information on installation and setup.

[5] VCAT is only supported when the PK Controller is used as part of an integrated DeltaV system. VCAT is not supported on the Standalone PK Engineering software.

Product Description

The DeltaV PK Controller executes control logic based on the process signals derived from the I/O and Ethernet Device subsystems.

Control modules are automatically scheduled by the controller, based on their assigned scan rates. This allows each control function to be optimized based on the process dynamics. Modules scan times can be set as fast as 25ms, and as slow as 60 seconds. The number of control modules that can be assigned to a controller depends on the complexity and scan rate of each modules. For the fastest loop execution time, use the supported High Density cards in a simplex configuration.

Each controller node can be installed as a simplex or redundant node. Redundancy is provided by adding a second controller, mounted adjacent to the primary controller. Controllers may be connected to DeltaV traditional I/O carriers, which are mounted to the right of the controller carrier. Up to 8 carriers with 8 cards each can be connected to the local bus I/O, for a total of 64 traditional I/O cards. 4-wide I/O carriers may be used in combination with 8-wide I/O carriers, and in this case, the maximum of 8 total I/O carriers is retained.

In addition to traditional I/O cards, the local bus supports fieldbus technologies, including FOUNDATION Fieldbus, DeviceNet, Profibus DP, and AS-I protocols, as well as Serial interface cards. These various I/O products provide a wide range of interfaces to meet the needs of your control application. The DeltaV PK Controller also supports CHARMs and *Wireless*HART I/O cards. The CHARM I/O Card (CIOC) connects via the redundant Ethernet ports of the controller carrier to provide Electronic Marshalling capabilities. A DeltaV PK Controller can communicate with up to 16 CIOCs. Starting in v15.FP3, the limit is increased to 32, but going beyond 16 requires the use of CIOC2s. Each CIOC provides up to 96 individually configurable signal types (limited by the DST capacity of the installed DeltaV PK Controller). The *Wireless*HART I/O card (WIOC) provides redundant communication for up to 100 *Wireless*HART devices, providing high availability and reliability of wireless data. DeltaV PK Controller can communicate with up to 16 WIOCs.

The DeltaV PK Controller is designed for harsh environments and is rated for G3 corrosive environments, with an operating temperature range from -40 to 60°C. It is ideally suited for remote installation close to the process equipment. For more traditional installations with central marshalling cabinets, the PK Controller can utilize any DeltaV I/O solution, including Electronic Marshalling and traditional I/O, providing the flexibility to install it wherever the application requires.

Sizing

The DeltaV PK Controller can be installed as simplex or redundant node, and can be used for applications of a wide variety of sizes, depending on which capacity controller is selected. For Ethernet Device Control, the DeltaV PK Controller can be used with a variety of Ethernet Devices, supporting Modbus TCP client or EtherNet/IP interface on port P01 and PROFINET on port PN1. Port P01 and PN1 can be enabled at the same time for greater functionality. DeltaV PK Controller is offered in 4 sizes with the following capacities:

Sizing	#DSTs	#Ethernet Devices (P01)	#PROFINET Devices (PN1) v15.FP1/FP2	#PROFINET Devices (PN1) v15.FP3 or later	# Batch Units (Standalone)
PK100	100	16	50	100	2
PK300	300	32	100	250	4
PK750	750	64	150	250	8
PK1500	1500	128	250	250	12

Simplex DeltaV PK Controller.

Standalone PK Controller Engineering Software

The DeltaV PK Controller is configured in a standalone fashion using the PK Controller Engineering Software. The PK Controller Engineering Software is based on existing DeltaV Software and includes all DeltaV Engineering tools. It includes a PK Controller Administration application which introduces a new environment for standalone DeltaV PK Controller administration enabling users to communicate and authenticate, manage configuration and backups, and manage multiple projects for standalone DeltaV PK Controllers.

There are two tiers of PK Controller Engineering Software: Basic and Professional.

Software Capability	Basic	Pro
Support for all configuration languages in DeltaV Control Studio	X	X
Control Studio Online[3]	X	X
Process History View	X	X
Diagnostics[2] (Hardware, software, and configuration	X	X
AMS Device Configurator	X	X
DeltaV Live Standard Workstation Software	X	X
DeltaV Live Premium Workstation Software		X
DeltaV Continuous Historian (up to 50 parameters)[1]		X
Event Chronicle Database Storage		X
Loop Tuning (DeltaV InSight Basic)		X
Model Predictive Control (DeltaV PredictPro)		X
PK Project Configuration Comparison		X
Control Simulation (Simulate Pro, etc.)		X
Locking & viewing locked configurations (locked composites)		X
Advanced Unit Management		X
Smart Commissioning Applications - I/O Studio	X	X
Smart Commissioning Applications - DeltaV Device Commissioner		X
SIS Configuration (SLS1508 and CSLS)		X

[1] Standalone PK Engineering software can support up to a 50 parameter DVCH. The Standalone Operator workstation comes standard with a 250 parameter DVCH along with scale-up options available (see "Standalone Operator Workstation and DeltaV Operator Panel" section for additional details).

[2] The engineering station must be online for Diagnostics to work on the Standalone Operator Workstation or DeltaV Operator panel.

[3] Control Studio Online is only supported in the Engineering Software. It is not supported in the Operation Workstation or Operator Panel.

PK Controller Engineering Software will be available as a regular media installation or as a Virtual Machine.

The regular media installation of PK Controller Engineering Software will be installed on the new DeltaV rugged laptop or any workstation in the Workstations and Servers for the DeltaV DCS Product Data Sheet, provided it has 16GB or more of RAM. The Virtual Machine media can be installed on any PC of the users choice, provided it meets the minimum system requirements. Virtual Windows client OS machines (e.g. Windows 10) require a Windows Virtual Desktop Access (VDA) license subscription or Microsoft Software Assurance for each device accessing the virtual client machines. VDA subscriptions must be purchased separately from Microsoft or a Microsoft partner. Proof of VDA subscription or another valid client access license is required prior to shipment of DeltaV client OS VM templates from Emerson.

DeltaV rugged laptop running PK Controller Engineering Software.

Standalone PK Controller Advanced Control

A Standalone DeltaV PK Controller supports powerful embedded advanced control technology to improve control performance and optimize plant operations. The Professional version of the PK Controller Engineering Software provides control performance monitoring and on-demand control loop tuning, which helps you identify control problems and easily tune underperforming loops. DeltaV PredictPro Model Predictive Control (MPC) is also supported on the Standalone PK Controller. The Professional PK Controller Engineering Software provides unlimited single manipulated variable (MV) MPC, which is ideal for applications involving constraint override, deadtime compensation, and disturbance rejection. Additional add-on MPC licenses are available for multi-variable applications using up to 20 MVs per Standalone PK Controller.

Standalone Operator Workstation and DeltaV Operator Panel

A Standalone DeltaV PK Controller can be deployed with one DeltaV Operator workstation. To support field mountable workstations, the DeltaV Operator Panel is available which is a fully functional, ruggedized industrial PC running Windows 10 or Windows 11[1]. The DeltaV Operator Panel is available in three sizes: 15.6", 18.5", or 21.5". The PK Controller Engineering software configures and downloads a single operator workstation.

The standalone operator workstation will be licensed as a Standalone Operator Workstation, Full Span of Control. By default, DeltaV Live will be the operator interface, and the Standard tier of DeltaV Live is included with no additional licenses required. DeltaV Operate is also available as an option and is included with no additional licenses required. The Standalone Operator Workstation, Full Span of Control license also includes a 250 parameter DeltaV Continuous Historian and full Event Chronicle database capabilities.

All licensing for the standalone operator workstation is enabled by using a small form factor USB dongle which is attached to the operator workstation PC. The standalone operator workstation can be easily upgraded through the following scale-up licenses:

- DeltaV Continuous Historian Scale-up: 1,000 tag scale-up licenses for up to 3,250 tags
- DeltaV Live Operations Premium Performance Pack add-on: This add-on enables DeltaV Live premium runtime features
- Advanced Batch: Enables Batch Executive and Batch Historian for recipe management, execution, and historization scale-up from 2 to 12 batch units depending on the capacity of the attached PK Controller

Standalone operator workstations can easily merge into larger DeltaV systems and become regular DeltaV Operator Stations. All operator graphics from the standalone operator workstation become available on any other workstation in the system and existing displays already in the system become available on the then merged and integrated operator workstation. At the time of merge, Standalone DeltaV Operator Workstation Merge licenses will be required.

Operator Panel for the Standalone DeltaV System running DeltaV Live.

[1] See the **Workstations and Servers for the DeltaV DCS** Product Data Sheet for additional details on supported hardware for the Panel HMI and workstation PCs.

Supported/Embedded Protocols

OPC UA

The OPC UA Server in the PK Controller provides native server implementation of a Data Access profile (real time data) compliant with OPC UA version 1.02. The OPC UA server supports up to 5,000 reads/second and 500 writes/second.

Modbus TCP

The PK Controller supports Modbus TCP Client and Server interfaces. The Modbus TCP Server interface allows the PK Controller to talk to Modbus Client devices like HMIs for monitoring purposes.

The Modbus TCP Client interface supports Modbus data sources such as PLCs, MCCs, analyzers and similar devices communicating Modbus TCP. In this interface the PK Controller is a Modbus Client reading and writing data from and to Modbus Server devices. These Modbus server devices can be Modbus TCP devices or Modbus serial devices using a Modbus TCP gateway.

The Modbus TCP interface supports the following types of data access:

- Reading input data from Modbus Coils, Discrete Input, Holding Registers, and Input Registers.
- Writing output data to Coils and Holding registers.

All reads are performed periodically and outputs will be sent when written.

EtherNet/IP

The EtherNet/IP protocol allows data sources such as PLCs, Intelligent Field Devices (IFDs), variable-speed drives, MCCs, analyzers, and other EtherNet/IP devices to connect directly in to DeltaV via the PK Controller.

The EtherNet/IP interface supports both implicit and explicit messaging, allowing access to both Class 1 and Class 3 EtherNet/IP I/O adapters. Redundancy with EtherNet/IP Class 1 Implicit and Class 3 Explicit messaging for control (sending outputs to the device) requires special considerations due to exclusive owner communications defined by the protocol. Please refer to the DeltaV System Planning Guide for more information. Class 3 PCCC and UCMM with Logix tags message classes are also supported.

PROFINET

Available in the PK Controller only when integrated into a DeltaV system and starting on v15.FP1, PROFINET is a communication protocol designed to exchange data between controllers and devices in an industrial automation network. PK Controller is a PROFINET controller and can connect with up to 250 devices such as PLCs, Drives, Remote IO, Transmitters and Valves.

PROFINET in the PK Controller is compliant with version 2.3 and CC-A functionality, allowing configuration via GSDML files and enabling device name and IP address assignment from DeltaV Explorer. It supports connectivity to real time cyclic data coming from the devices for use in process control applications (acyclic data and IRT data are not supported).

In addition to that, PROFINET in the PK includes the support of Process Automation (PA) Profiles for easy configuration and commissioning of PROFINET devices.

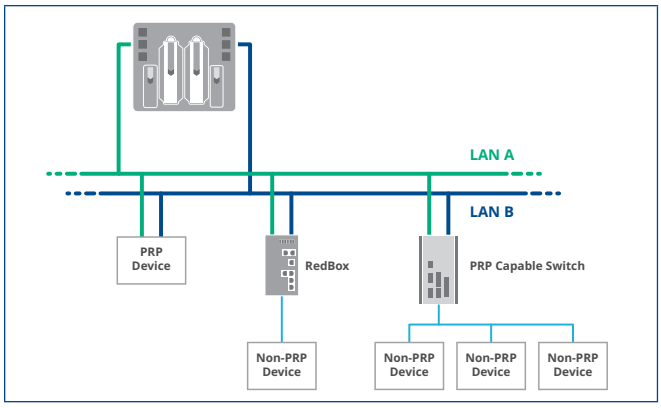
For better trouble shooting, device diagnostics are displayed in DeltaV Diagnostics and available within Control Studio for mapping into alarming or historization.

With the recent adoption of Advance Physical Layer (APL) in the process control industry, the PK Controller can be used with Ethernet-APL Devices, APL switches and PROFINET for greater connectivity.

This makes the PK Controller the perfect platform for use in this emerging technology.

Parallel Redundancy Protocol (PRP)

Parallel Redundant Protocol (PRP) is a network protocol standard for Ethernet that provides seamless failover against failure of any network component. Therefore, it is a great solution when high availability and short switchover time is required. PRP allows for communications in Primary and Secondary ports of the Ethernet Device Network in the PK Controller. This means that a device connected to the Ethernet Device network is getting the same information at the same time, through different network paths. In the event of failure in one of the networks, PRP provides a zero-time to recovery and eliminates any single point of failure in a redundant Ethernet Device Network.



PK with Parallel Redundant Protocol (PRP) enabled in a redundant Ethernet Device Network, talking directly with native PRP devices and using a RedBox to talk to Non-native PRP devices.

PRP is independent of the application-protocol and can be used by most Industrial Ethernet protocols. In the PK Controller, PRP is an optional feature that can be enabled at the Ethernet Device Network level and is available with all protocols except PROFINET. When enabled, PRP runs on top of the selected protocol. For PRP to work properly, the Ethernet devices connected to the redundant network need to support PRP natively as well. If the devices do not support PRP natively, then a RedBox must be used to allow connection to the PRP network without triggering bad status in diagnostics.

Bridging and Bonding PK ports

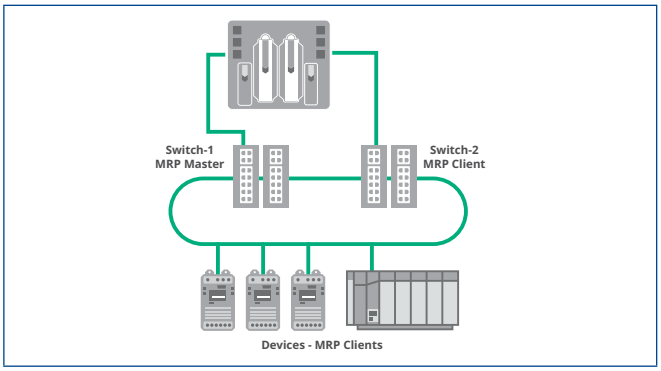
The PK Controller can connect to different network architectures to suit various network topologies by bridging or bonding two Ethernet Ports.

Bridging happens on the PK when you create a logical connection between two ports on the same IOP in DeltaV Explorer. This allows designated subsystems on the PK controller to be connected to two different Local Area Networks (LANs) in the network architecture. This is similar to how the different ports on a network switch operate.

Bonding happens on the PK when you logically connect a port on the left IOP to the correspondent port on the right IOP through DeltaV Explorer. With bonded ports, the PK can make two physical connections to one LAN, providing local and physical redundant access to the underlying network. In turn, this allows the PK to interface with Media Redundancy Protocol over a ring topology to provide network redundancy without a single point of failure.

The Media Redundancy Protocol (MRP) is a specific way used by PROFINET to achieve media redundancy and is designed to increase the reliability of industrial Ethernet networks. Instead of sending copies over two LANs as in Parallel Redundancy Protocol (PRP), in MRP, frames are forwarded via ring topology to MRP Participants with a 'Ring Manager' which allows traffic through only one of its two connections to prevent a network loop. If the ring becomes 'broken', the ring manager will notify the other 'clients' on the ring that there is a failure and then it will switch from a logical ring to a separated/split line topology, ensuring a quick recovery time for the network.

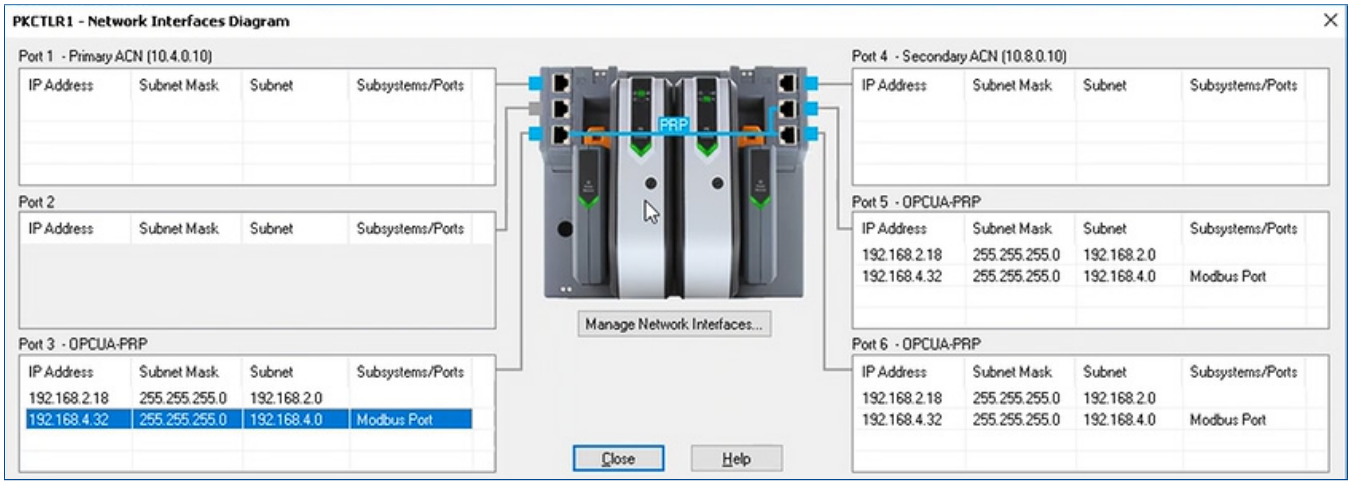
The PK Controller with bonded ports can redundantly connect to a ring topology with or without MRP. However, it does not manage nor participate in the ring architecture directly. You would need to use at least two MRP Switches to provide MRP management functionality to the ring. The MRP Switch enabled as a ring manager (master) will monitor the ring topology for proper operation. If the connection to the PK stops working properly, the PK communication is expected to switch over to the alternative connection within 200 milliseconds. This is typically required in those environments where high availability of process control systems and continuous operation of the process plants are critical.



PK Controller connected to a ring topology with Media Redundancy Protocol (MRP) where an MRP Master Switch is managing the ring.

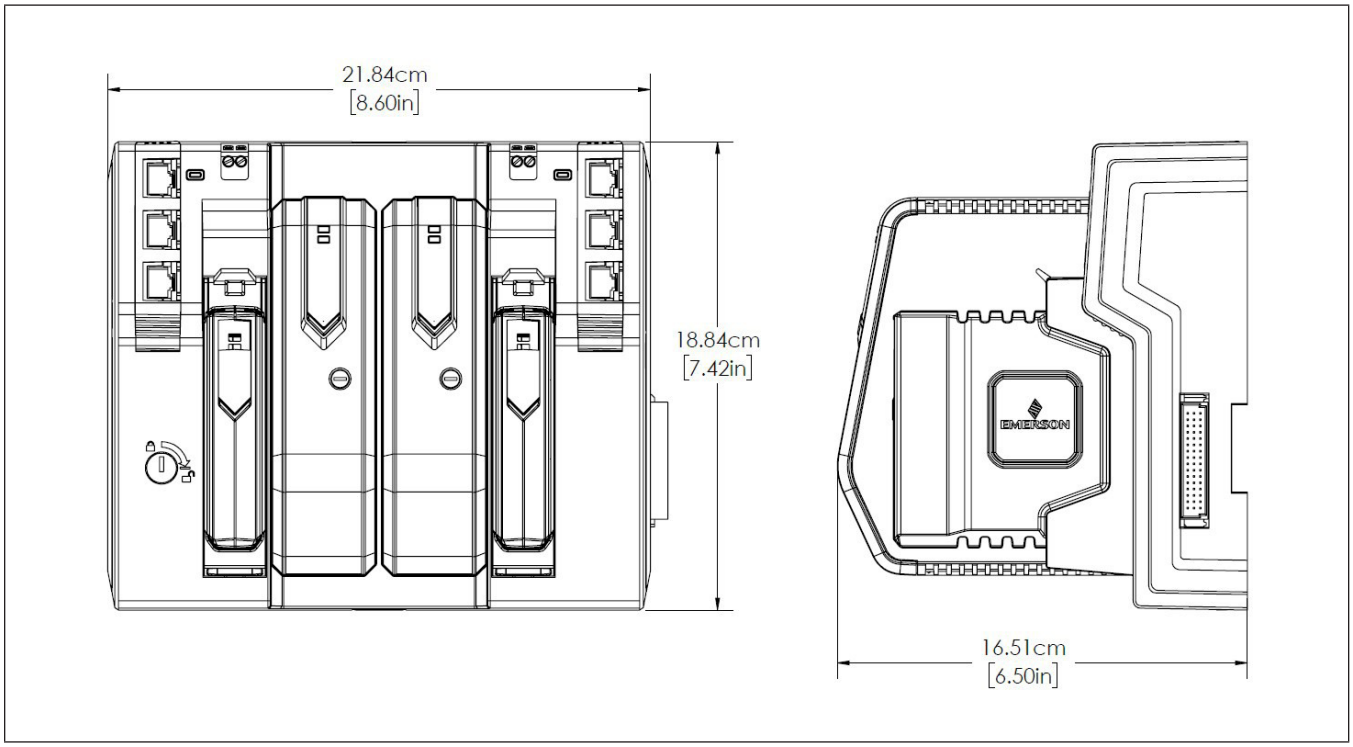
Advanced Networking

With advanced networking in the PK Controller, now it is easier than ever to setup the IP addresses for all the different network configurations used in the Ethernet ports. Now from one place, you can set up IP Address, define the default gateway, enable PRP, or bond ports to redundantly connect to an MRP ring.



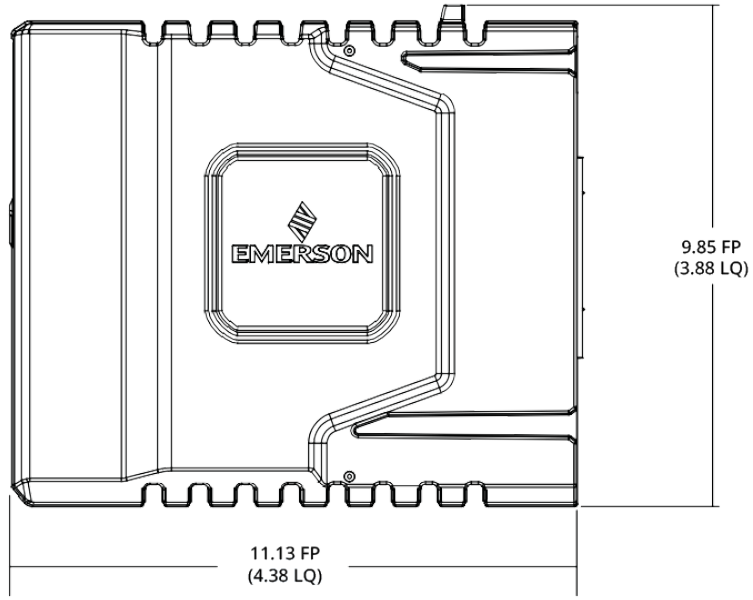
Network Interface Diagram allows you to see the network configuration for all your Ethernet ports in the PK Controller.

Hardware Specifications



Dimensioned Drawing of Redundant DeltaV PK Controller with Carrier and Power Modules.

PK Power Module Dimensions



PK Power Module Dimensions.

PK Controller Specifications

Item	Specification
Input power requirement through the PK Controller carrier	+24 VDC ±10% at 350 mA maximum; 700 mA maximum for redundant.
Externally applied backup power for real-time clock	+5.0 to +12.6 VDC at 15 uA typic for a simplex controller. Double the consumption for redundant PK Controllers.
Power dissipation	7.5 W simplex; 15 W redundant.
Isolation	None. All circuits are referenced to the +24 VDC return.
SD card interface	Supports a removable SDHC version 2.0 memory card of either 2 GB or 8 GB capacity. The memory card is physically accessible only when the PK Controller is removed from the carrier.

PK Controller Carrier Specifications

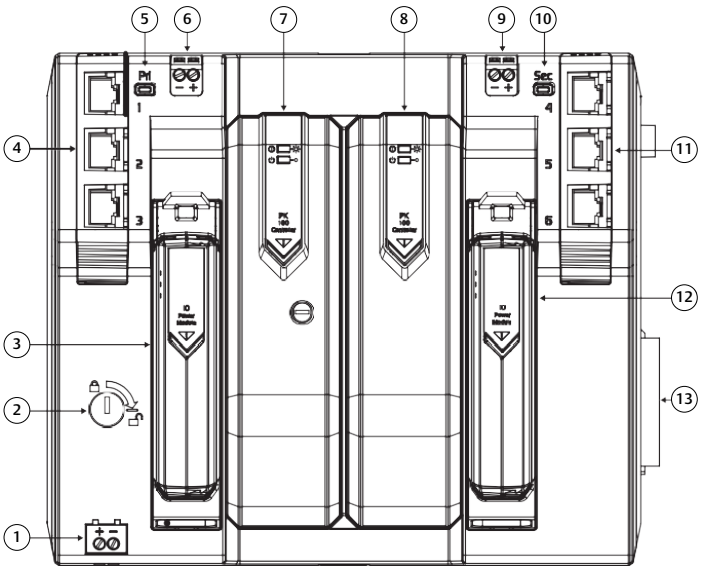
Item	Specification
Capacity	Two PK Controllers
Input power (redundant)	+24 VDC ±10% at 2.75 A maximum
Output power to I/O card carrier(s)*	+12.25 VDC at 3.0 A maximum*
Redundant Ethernet connections (six)	Copper twisted pair: 10/100BASE-TX with RJ45 connectors; full duplex operation
Ethernet port power requirement, each (provided by controller)	+5.0 VDC at 200 mA maximum; carrier supports +5.0 VDC at 300 mA maximum
Mounting	Upright on a horizontal DIN rail

*For systems that require additional power (more than the power modules supply), use one of our recommended methods for injecting power into the I/O card carrier. See DeltaV M-Series I/O Subsystem Horizontal Carriers PDS for more information.

PK Power Module Specifications

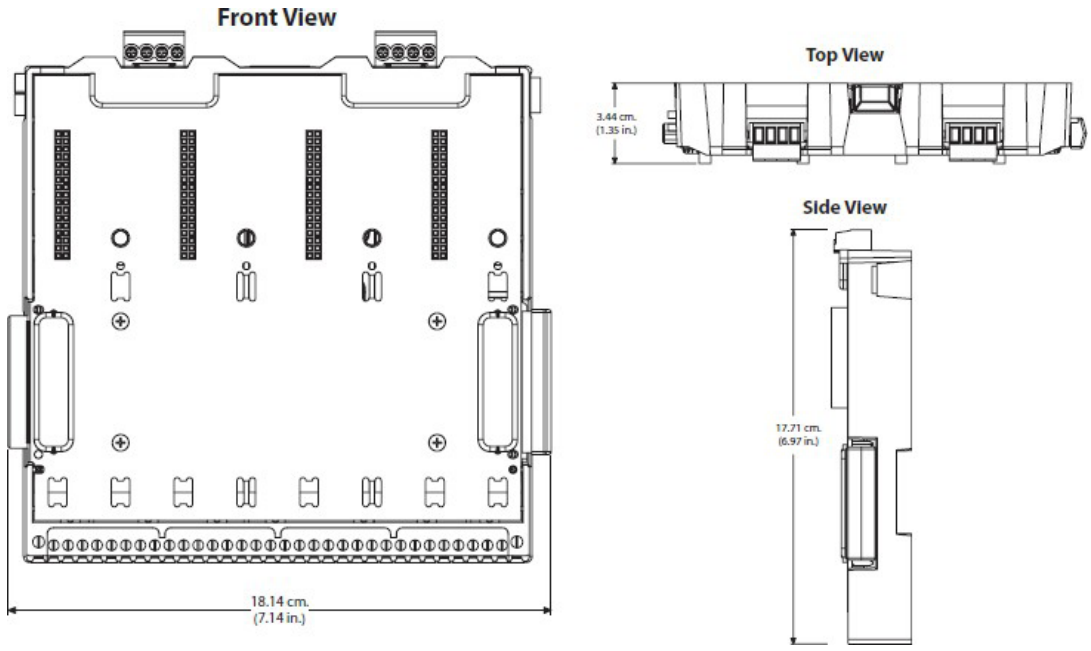
Item	Specification
Input power (redundant)	+24 VDC ±10% at 2.75 A maximum
Output power	+12.25 VDC at 3.0 A maximum
Power dissipation	3.25 W

PK Controller Carrier Parts



Callout	Description
1	Screw terminals for backup battery connection.
2	**Physical key switch** When the switch is in the locked position, the KeyLockStatus parameter of the controller has a value of TRUE and you cannot download, decommission, upgrade or Telnet to the PK Controller. When locked, you can commission and authenticate the PK Controller; and, backup or retrieve the PK Controller's project.
3	**Redundant Power Module** Provides power to connected I/O.
4	**Ethernet ports 1-3. These appear in software as Network Portx.** The three RJ45 connectors on the primary ports are connections for separate networks. These have an electrically isolated shield for each port. The Faraday shield for each RJ45 connector has no DC ground connection (floats) and only used to extend the shield onto the electronics around the Ethernet circuitry.
5	Pushbutton release for Ethernet ports 1-3
6	Screw terminals for primary power
7	Redundant PK Controller
8	Redundant PK Controller
9	Screw terminals for secondary power
10	Pushbutton release for Ethernet ports 4-6
11	**Ethernet ports 4-6. These appear in software as Network Portx.** The three RJ45 connectors on the secondary ports are connections for separate networks. These have an electrically isolated Faraday shield for each port. The Faraday shield for each RJ45 connector has no DC ground connection (floats) and only is used to extend onto the electronics around the Ethernet circuitry.
12	Redundant Power Module Provides power to connected I/O
13	Carrier connector

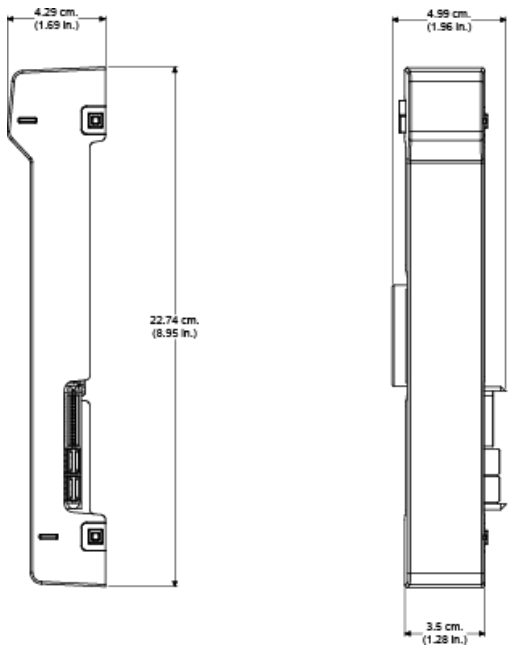
4-wide Horizontal I/O Interface Carrier Dimensions



4-wide I/O Carrier Specifications

Item	Specification
Capacity	Four I/O cards with terminal blocks.
Maximum Current	Bussed field power bus (per I/O card): 3.2 A at 30 VDC or 250 VAC for each connection.
LocalBus Cable Lengths	0.87m (2.8ft) 1.2m (3.9ft) (standard) 1.53m (5.0ft)

M-series to S-series I/O Interface Carrier Adapter



M-series to S-series I/O Interface Carrier Adapter Specifications

Item	Specification
Maximum Current	LocalBus (Powers IO cards): 8A

Certifications

The following certifications are available for the DeltaV PK Controller:

- **CE**

  EMC-EN 61326-1

- **FM**

  FM 3600

  FM 3610

  FM 3611

  FM 3810, Jan 2005

- **CSA**

  CAN/CSA C22.2 No.213

  CAN/CSA C22.2 No. 61010-1

- **ATEX**

  EN 60079-0

  EN 60079-15

- **Marine Certifications:** IACS E10

  ABS Certificate of Design Assessment

  DNV GL Type Approval Certificate

- **Security Certifications**

  Achilles Level 2*

Hazardous Area/Location

The following standards are available for the DeltaV PK Controller:

- **FM (USA)**

  Installation: Class 1, Division 2, Groups A, B, C, D, T4

- **cFM (Canada)**

  Installation: Class 1, Division 2, Groups A, B, C, D, T4

- **ATEX**

  [Ex] II 3 G Ex nA IIC Gc

- **IEC Ex**

  Installation: Ex nA IIC T4 Gc

For installation instructions, please refer to: DeltaV Scalable Process System Zone 2 Installation Instructions.

* PRP communications are not included in the certification.

Specifications for the DeltaV PK Controller	
DST Limit	100, 300, 750, or 1500
Module Execution Rates	25ms, 50ms, 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s, 30s, 60s
User Memory	Controller memory SD-Card memory
Input Power Required	+24 VDC ±10% at 2.75 A maximum
Protocols Supported	Protocols Supported Natively on the PK Controller: Modbus TCP (Server & Client), Ethernet/IP (Client: Class 1 & Class 3), PROFINET controller (real time cyclic data) and OPC UA Server (real time data).Non-native protocols available through dedicated Bussed cards or the DeltaV Virtual I/O Module 2 (VIM2).
Environmental Specifications	
Operating Temperature	-40° to 60°C (-40° to 140°F)
Storage Temperature	-40° to 85°C (-40° to 185°F)
Relative Humidity	5 to 95%, non-condensing
Protection Rating	IP20, NEMA 12
Airborne Contaminants	ISA-S71.04-1985 Airborne Contaminants Class G3 Conformal Coating
Shock (Normal Operating Conditions)	10g ½-sine wave for 11ms
Vibration (Operative Limit)	1mm peak-to-peak from 5Hz to 13.2Hz, 0.7g from 13.2Hz to 150Hz
LED Indicators[1]	
Power – Green V	Indicates DC power is available
Error – Red Continuous	Indicates an internal error condition
Error – Red Flashing	Indicates the controller is decommissioned
Active – Green	Indicates the controller is operating as the primary controller
Active – Green Flashing	Indicates the active controller is not configured or a download is in progress
Standby – Green	Indicates the controller is operating as the backup controller
Standby – Green Flashing	Indicates the standby controller is not configured or a download from the active is in progress

[1] For additional information refer to DeltaV Books Online.

Software Specifications

Minimum Host Computer Requirements for VM Version of Engineering Software	
Operating System	Windows 10 (recommended)
Memory	16 GB RAM
CPU	64-Bit Processor
Space	160 GB hard drive available space
Networking	1 physical NIC adapter with RJ45 jack (use of wireless network adapters is not supported)
Peripherals	1 USB 2 port

Protocol specifications of the PK Controller	
Modbus TCP (Server)	■ Modbus TCP protocol as specified by **www.modbus.org**. ■ PK Controller as a Server reads and writes data from and to Modbus Client devices. ■ Supports 8 connections. ■ Uses MODICON (PLC) based addressing (Modbus absolute addressing is not supported). ■ No license is required to enable this protocol, and it does not consume DSTs. *Please review the VIM2 product data sheet as an alternative to provide added Modbus TCP functionality (e.g. Modbus RTU, Modbus ASCII,etc.)
Modbus TCP (Client)[1]	■ Modbus TCP protocol as specified by **www.modbus.org** ■ For non-extended address ranges, register addresses fall within the following ranges: ● Coils: 1 – 9999 ● Discrete Inputs: 10001 – 19999 ● Input Registers: 30001 – 39999 ● Holding Registers: 40001 – 49999 ■ In v15.FP2 or later, the Full Modbus Addressing range can be enabled, in which case register addresses will fall within the following ranges: ● Coils: 1 - 65536 ● Discrete Inputs: 100001 - 165536 ● Input Registers: 300001 - 365536 ● Holding Registers: 400001 - 465536 ■ PK Controller as the Modbus Client reads and writes data from and to Modbus Server devices. ■ The number of supported connections is different for each model of the PK Controller as indicated in the sizing table. ■ Available in port P01. No license is required to enable this protocol. When integrated to a DeltaV system, adding Ethernet connected I/O (EIOC and PK) licenses for each device connected in port P01 is required. Then one DSTs will be consumed for every LDT that is configured. *Please review the VIM2 product data sheet as an alternative to provide added Modbus TCP functionality

EtherNet/IP Interface[1]	■ EtherNet/IP interface in the PK is a Scanner Device (Client) that reads and writes data from EtherNet/IP Adapter devices (Servers). ■ EtherNet/IP interface supports the following types of messaging connections: ● Implicit messages (Class 1) ● Explicit messages (Class 3) ● Class 3 with PCCC ● UCMM with Logix Tags ■ Configuration of this messages connections is only supported via manual configuration on the DeltaV Explorer at the LDT level or bulk edit configuration. EDS files are not supported. ■ Available in port P01. No license is required to enable this protocol. When integrated to a DeltaV system, adding Ethernet connected I/O (EIOC and PK) licenses for each device connected in port P01 is required. Then one DSTs will be consumed for every LDT that is configured. *Please review the VIM2 product data sheet as an alternative to provide added EtherNet/IP functionality (e.g. EDS file support.).
OPC UA Server	■ PK Controller is a Server and allows reads and writes from OPC UA Clients. ■ Supports up to 6 concurrent sessions that can be consumed by 3 clients. ■ Allows up to 5000 reads/sec and 500 writes/sec. ■ Supports only the DA profile (real time data). ■ Is based on OPC UA standard version 1.02 that supports the following: ● OPC Binary Transportation ● 128 or 256-bit encryption levels ● Message Signing ● Digital Certificates – Self Signed and Certificate Authority (CA) ● Support online browsing ■ No license is required to enable this protocol, and it does not consume DSTs. *Please review the DeltaV OPC UA product data sheet for more information regarding other OPC UA clients and servers available in DeltaV

PROFINET Controller	■ Not supported in PK Standalone. ■ Compliant with PROFINET version 2.3 and CC-A. ■ Configuration using GSDML files. ■ DCP operations. Discovery and basic Configuration Protocol that allow users to discover, identify, and configure PROFINET device name and IP address using DeltaV Engineering tools. ■ Support reading and writing to Real time cyclic data and reading Device Diagnostics. ■ Does not support Real time Acyclic data and Isochronous Real Time Data (IRT). ■ Maximum of 250 devices. ■ When configuring and commissioning Ethernet-APL devices, Process Automation profiles are supported but expanded diagnostics and drop-in device replacement for a shared profile are not supported. ■ PK Controller can redundantly connect to a ring topology with bonding ports but cannot be a member of the ring. ■ The use of PRP is not supported with PROFINET. ■ DeltaV v15.FP1 and v15.FP2 support only S1 devices. That means that when using redundant controllers, there will be a bump during a controller switchover due to reconnection time with any S1 device (This is per definition of S1 devices in PROFINET standard). ■ Starting in v15.FP3, DeltaV supports S2 Devices. Switchovers are expected to be bumpless for redundant PK Controllers connected to only S2-enabled devices on the device network. For a redundant pair, connect to a mixed of S1 and S2 devices, there will be a bump similar to the S1 only environment described above. ■ AMS Device Manager is not supported natively through the PK Controller. Consult AMS Device Manager product data sheet for connectivity with PROFINET. ■ To enable you need the PK Controller PROFINET interface License and add Ethernet connected I/O licenses for each device connected in the PN1 network. ■ The consumption of DSTs will happen in the following way for systems in v15.FP1 and v15.FP2. • If device has 1 or 2 Physical Slots (or Modules) defined in the GSDML file (most common in small devices like Motor starters & transmitters): – 1 DST for the first 16 values (the highes value from the I/O types configured). – After the first 16 values we charge one DST for every signal. • If the device has more than 2 Physical Slots (or Modules) defined in the GSDML file (most common in large devices like Remote I/O & PLCs): – All inputs and outputs are counted and charged with a DST. ■ The consumption of DSTs will happen in the following way for systems in v15.FP3 or later: • For Remote I/O devices and gateways, the system consumes one DST of the most expensive type used for the first 16 signals. Each additional signal requires one DST of the correspondent I/O type (AO, AI, DO, DI). • For all other PROFINET device types, the system consumes one DST of the most expensive I/O type for every 16 signals. *Please review DeltaV Engineering guide for communication and redundancy performance of PROFINET

[1] The PK Controller can natively support running either the Modbus TCP Client or the EtherNet/IP Scanner interface but not both simultaneously in P01. The Modbus TCP Server and OPC UA Server can be run simultaneously alongside one of the chosen protocol Clients in P01 and PROFINET.

Standalone System Compatibility

Standalone PK Controller is compatible with DeltaV System version 15.LTS.

Hardware Ordering Information

Description	Model Number
Simplex PK100 Controller Assembly (includes 1 PK100 Controller, 1 Carrier, 2 IOPs, 1 Power Module, and 1 Power Module Blank Cover)	PK0100S
Redundant PK100 Controller Assembly (includes 2 PK100 Controllers, 1 Carrier, 2 IOPs, and 2 Power Modules)	PK0100R
Simplex PK300 Controller Assembly (includes 1 PK300 Controller, 1 Carrier, 2 IOPs, 1 Power Module, and 1 Power Module Blank Cover)	PK0300S
Redundant PK300 Controller Assembly (includes 2 PK300 Controllers, 1 Carrier, 2 IOPs, and 2 Power Modules)	PK0300R
Simplex PK750 Controller Assembly (includes 1 PK750 Controller, 1 Carrier, 2 IOPs, 1 Power Module, and 1 Power Module Blank Cover)	PK0750S
Redundant PK750 Controller Assembly (includes 2 PK750 Controllers, 1 Carrier, 2 IOPs, and 2 Power Modules)	PK0750R
Simplex PK1500 Controller Assembly (includes 1 PK1500 Controller, 1 Carrier, 2 IOPs, 1 Power Module, and 1 Power Module Blank Cover)	PK1500S
Redundant PK1500 Controller Assembly (includes 2 PK1500 Controllers, 1 Carrier, 2 IOPs, and 2 Power Modules)	PK1500R
Simplex PK100 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 1 PK100 Controller, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK0100S-B
Redundant PK100 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 2 PK100 Controllers, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK0100R-B
Simplex PK300 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 1 PK300 Controller, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK0300S-B
Redundant PK300 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 2 PK300 Controllers, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK0300R-B
Simplex PK750 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 1 PK750 Controller, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK0750S-B
Redundant PK750 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 2 PK750 Controllers, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK0750R-B

Description	Model Number
Simplex PK1500 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 1 PK1500 Controller, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK1500S-B
Redundant PK1500 Controller Assembly; for installations not using DeltaV traditional local I/O (includes 2 PK1500 Controllers, 1 Carrier, 2 IOPs, and 2 Power Module Blank Covers)	PK1500R-B
SD Card (8GB) for use with DeltaV PK Controllers	PK7001S8
M-series 4-wide I/O Interface Carrier with Carrier Shield Bar; for use with PK Controllers	PK4040E0C0
M-series to S-series I/O Interface Carrier Adapter for PK Controller	PK4059

Software Ordering Information

Description	Model Number
DeltaV PK Controller Engineering Software, Basic version; v15.LTS; English	PK2301PR15LTSL39B
DeltaV PK Controller Engineering Software, Professional version; v15.LTS; English	PK2301PR15LTSL39P
DeltaV PK Controller Engineering Software, Basic version; Virtual Machine (VM); v15.LTS; English	PK2301PR15LTSL39B-VM
DeltaV PK Controller Engineering Software, Professional version; Virtual Machine (VM); v15.LTS; English	PK2301PR15LTSL39P-VM

[1] Proof of a valid Microsoft license (e.g., Virtual Desktop Access "VDA" subscription) for these templates is required prior to delivery.

[2] PK Controller Engineering Software Virtual Machine templates are for use with VMware Workstation Pro v15 and later.

Standalone Licensing Ordering Information

Description	Model Number
Operator Station, Full Span of Control; for use with DeltaV Operator Panel or Workstation on Standalone PK Controller systems only; v15.LTS; English	PK2104R15LTSL39
DeltaV Live Operations Premium Performance Pack add-on for DeltaV Operator Panel or Workstation on Standalone PK Controller systems only	PK2104P01
Advanced Batch for DeltaV Operator Panel or Workstation on Standalone PK Controller systems only; 2 Units, Base License	PK2248S002
Advanced Batch for DeltaV Operator Panel or Workstation on Standalone PK Controller systems only; 1 Unit, Scaleup License	PK22UPS066
DeltaV Continuous Historian Scaleup for DeltaV Operator Panel or Workstation on Standalone PK Controller systems only; 1000 Parameters	PK22UPS042

Description	Model Number
DeltaV PredictPro MPC add-on for Standalone PK Controller, 2 MV Outputs[1]	PK3152S002
DeltaV PredictPro MPC add-on for Standalone PK Controller, 5 MV Outputs[1]	PK3152S005
DeltaV PredictPro MPC add-on for Standalone PK Controller, 10 MV Outputs[1]	PK3152S010
DeltaV PredictPro MPC add-on for Standalone PK Controller, 20 MV Outputs[1]	PK3152S020
Quad-Monitor Workstation License for use with approved Operator Panel or Workstation on DeltaV Standalone Systems only	PK2104K01

Merged and Integrated Licensing Ordering Information

Description	Model Number
Controller Redundancy	VE31REDP
PK Controller PROFINET Interface License	VE4108PS01
Ethernet connected I/O (EIOC and PK): nn Physical Devices*	VE4109Sxxx*
Operator Station, Full Span of Control; only for merging an existing PK2104 with a DeltaV system	VE2104PKM
DeltaV Live Operations Premium Performance Pack; only for merging an existing PK2104P01 with a DeltaV system	VE2104P01PKM
Advanced Batch Units, 2 Units; only for merging an existing PK2248S002 with a DeltaV system that does not contain a Batch Executive already. Otherwise, use the VE22UPS066PKM	VE2248S002PKM
Advanced Batch Units, 1 Unit Scaleup; only for merging an existing PK22UPS066 with a DeltaV system	VE22UPS066PKM
DeltaV Continuous Historian 1000 Parameters Scaleup; only for merging an existing PK22UPS042 with a DeltaV system	VE22UPS042PKM
Quad-Monitor Workstation License; only for merging an existing PK2104K01 with a DeltaV system	VE2104K01PKM
DeltaV Continuous Historian, 1250 Parameters; Only for PK Merging	VE22UPS042OPPKM1
DeltaV Continuous Historian, 2250 Parameters; Only for PK Merging	VE22UPS042OPPKM2
DeltaV Continuous Historian, 3250 Parameters; Only for PK Merging	VE22UPS042OPPKM3

* Where xxx and nn is the number of Physical Devices that you want to license in the EIOC and PK. VE4109Sxxx licenses are system wide and are shared across the EIOC and PK Controllers on the system. Also, VE4109Sxxx license is additive in the system and therefore you just need to buy more licenses if you want to increase the number of physical devices in the system (there is no scale up license).

[1] DeltaV PredictPro MPC add-on license is per Standalone PK Controller, with a maximum of 20 MVs per controller. DeltaV PredictPro can only be configured using the Professional version of the PK Controller Engineering Software.

PK Controller Spare Part Ordering Information

Description	Model Number
PK100 Controller	KL2002X1-BA1
PK300 Controller	KL2002X1-BB1
PK750 Controller	KL2002X1-BC1
PK1500 Controller	KL2002X1-BD1
PK Controller Protection Cover	KL4002X1-DA1
Power Module for PK Controller Carrier	KL1502X1-BA1
Power Module Protection Cover; for PK Controller Carrier	KL1502X1-BB1
I/O Port Switch Module; Copper; for PK Controller Carrier	KL1605X1-BA1
PK Controller Carrier	KL4002X1-BA1

Related Products

- Workstation and Server Hardware for the DeltaV DCS
- DeltaV M-Series Traditional I/O
- DeltaV M-Series Intrinsically Safe I/O (support starting in v15.FP2)
- DeltaV S-Series Traditional I/O
- DeltaV M-Series I/O Subsystem Horizontal Carriers
- DeltaV Live
- DeltaV Operate
- S-Series Horizontal Carriers
- M-series Virtual I/O Module 2
- S-series Virtual I/O Module 2
- DeltaV PK Flex controller
- DeltaV OPC UA servers and clients

Prerequisites

- For each DeltaV PK Controller (or pair of redundant controllers), a PK Controller carrier is required.
- Each PK Controller requires a dedicated system bulk power supply. Please refer to DeltaV Bulk Power Supplies product data sheet for details.
- The DeltaV PK Controller requires PK Controller Engineering Software, or DeltaV software.
- For PROFINET S1 Functionality, DeltaV v15.FP1 or later is required.
- For PROFINET S2 Functionality, DeltaV v15.FP3 or later is required.

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