

# 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 a) Standalone mode or b) Part of a DeltaV system. In standalone fashion, it can run without any connection to a server, panel HMI, or other typical DCS system elements. 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 swap 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 already had 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<sup>1</sup>. 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 will support 250 DeltaV Continuous Historian tags, which can be scaled up to 3,250 tags. The DeltaV Operator Station can support 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:** Using the 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 reduced 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 added cabinet space or configuration changes.

**Flexibility in I/O:** The following DeltaV I/O may be used with the DeltaV PK Controller: M-Series Series 1 & Series 2 traditional<sup>2, 3</sup>, S-Series traditional with the use of the M-series to S-series I/O Interface Carrier Adapter<sup>4</sup>, 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) can be used as well as any of the traditional DeltaV Bussed cards.

**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)<sup>5</sup>

## Product Description

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

<sup>1</sup> See the DeltaV Workstation and Server Hardware Product Data Sheet for additional details on supported hardware for the Panel HMI and workstation PCs.

<sup>2</sup> M-Series Intrinsically Safe traditional cards are not supported for use with the PK Controller.

<sup>3</sup> 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.

<sup>4</sup> 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.

<sup>5</sup> 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.

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 WirelessHART 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 standalone DeltaV PK Controller can communicate with up to 16 CIOCs, each providing up to 96 individually configurable signal types (Limited to the DST capacity of the installed DeltaV PK Controller). The WirelessHART I/O card (WIOC) provides redundant communication for up to 100 WirelessHART 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, meaning it has the flexibility to be installed where the application requires.

### Sizing

The DeltaV PK Controller can be installed as simplex or redundant node, and can be used for applications in a wide variety of sizes, from 100 to 1500 DSTs, depending on which capacity controller is selected. For Ethernet Device Control,

The DeltaV PK Controller can be used for a variety of Ethernet Devices, supporting Modbus TCP client or EtherNet/IP interface in port P01 and PROFINET(PN1). Port P01 and PROFINET (PN1) can be enabled at the same time for greater functionality. DeltaV PK Controller will be offered in 4 sizes with the following capacities:

| Sizing | # DST's | # Ethernet Devices in port P01 | # Ethernet Devices in PROFINET port PN1 | # Batch Units (Standalone) |
|--------|---------|--------------------------------|---|----------------------------|
| PK100  | 100     | 16                             | 50                                      | 2                          |
| PK300  | 300     | 32                             | 100                                     | 4                          |
| PK750  | 750     | 64                             | 150                                     | 8                          |
| PK1500 | 1500    | 128                            | 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. PK Controller Engineering Software is based on existing DeltaV Software and includes all DeltaV Engineering tools. PK Controller Engineering Software 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 <sup>4</sup>                                  | X     | X   |
| Process History View  | X     | X   |
| Diagnostics <sup>3</sup><br>(Hardware, software, and configuration) | X     | X   |
| AMS Device Configurator   | X     | X   |
| DeltaV Live Standard Workstation Software <sup>1</sup>              | X     | X   |
| DeltaV Live Premium Workstation Software                            |       | X   |
| DeltaV Continuous Historian<br>(up to 50 parameters) <sup>2</sup>   |       | 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<br>(locked composites)      |       | X   |
| Advanced Unit Management  |       | X   |
| Smart Commissioning Applications<br>- I/O Studio                    | X     | X   |
| Smart Commissioning Applications<br>- DeltaV Device Commissioner    |       | X   |
| SIS Configuration (SLS1508 and CSLS)                                |       | X   |

<sup>1</sup> Only supported in v14.LTS and beyond

<sup>2</sup> 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).

<sup>3</sup> The engineering station must be online for Diagnostics to work on the Standalone Operator Workstation or DeltaV Operator panel.

<sup>4</sup> 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 DeltaV Workstation and Server Hardware Product Data Sheet provided it has 16GB 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 which is accessing the virtual client machines. VDA subscriptions must be purchased separately from Microsoft or a Microsoft partner. Proof of VDA subscription or other 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 PK Standalone Controller Engineering Software, Professional, 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 PK Standalone Professional 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<sup>1</sup>. The DeltaV Operator Panel will be available in three sizes: 15.6", 18.5", or 21.5". The PK Controller Engineering software configures and downloads the 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 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 – 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.



Standalone DeltaV Operator Panel running DeltaV Live.

## 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 will allow 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 will support 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/to Modbus Server devices. The 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 will be performed periodically and outputs will be sent when they are written.

<sup>1</sup>See the DeltaV Workstation and Server Hardware Product Data Sheet for additional details on supported hardware for the Panel HMI and workstation PCs.

## EtherNet/IP

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

The EtherNet/IP interface will support connections for both implicit and explicit messaging to allow 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) require 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 will connect with up to 250 devices such as PLCs, Drives, Remote IO, Transmitters and Valves.

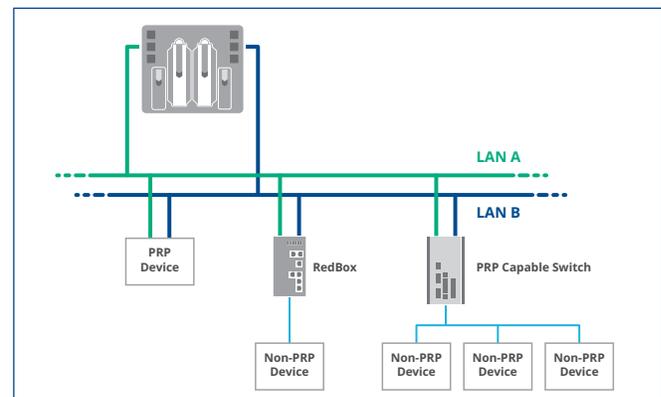
PROFINET in the PK Controller is compliant with version 2.3 and CC-A functionality. Allowing configuration via GSDML files and configuring name and IP address for devices from DeltaV Explorer. It supports connectivity to real time cyclic data coming from the devices to use in control studio for process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

For better trouble shooting, device diagnostics are displayed in DeltaV Diagnostics, and are available for mapping into control studio for 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. In addition to that, PROFINET includes the support of Process Automation Profiles for easy configuration and commissioning of APL devices by removing the need of using vendor specific GSDML files. This makes the PK Controller the perfect platform for use in this emerging technology.

## Parallel Redundancy Protocol (PRP)

Parallel Redundant Protocol (PRP) 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 case of failure in one of the networks it basically provides a zero-time to recovery (no time to switchover) and eliminates any single point of failure in a redundant Ethernet Device Network.

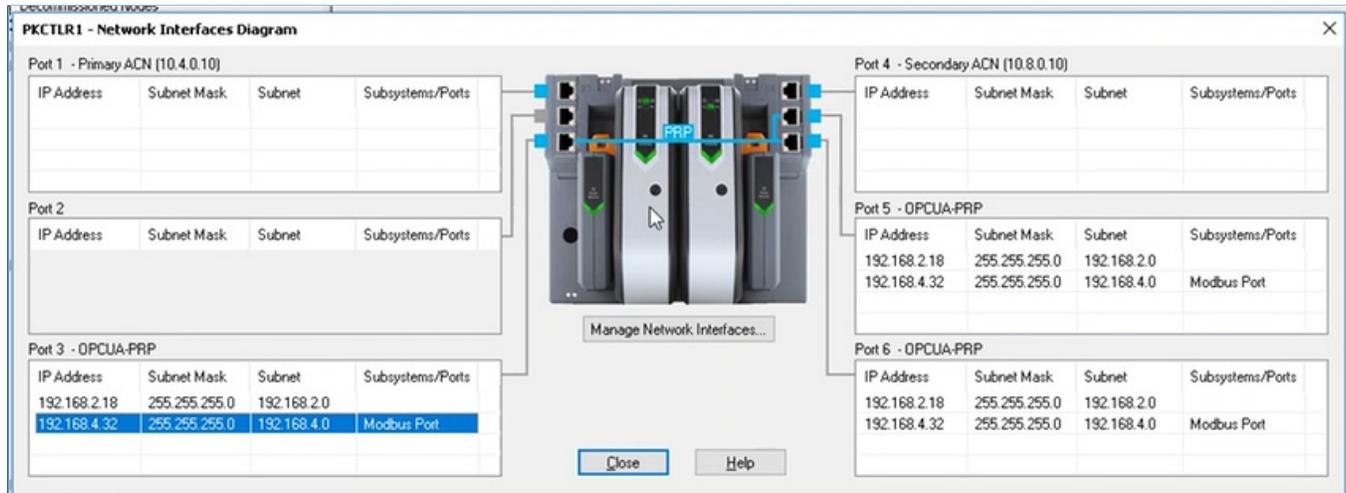


*PK with Parallel Redundant Protocol (PRP) enabled in a redundant Ethernet Device Network, talking directly with native PRP devices and using a RedBox to talk to Non-native PRP devices.*

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 the protocol clients supported in the PK. When enabled, PRP runs on top of the protocol that is selected at that time. For PRP to work properly, the Ethernet Devices connected to the redundant network needs to support PRP natively as well. If the devices do not support PRP natively, then a RedBox must be used to allow the connection into the PRP network without having bad status in diagnostics.

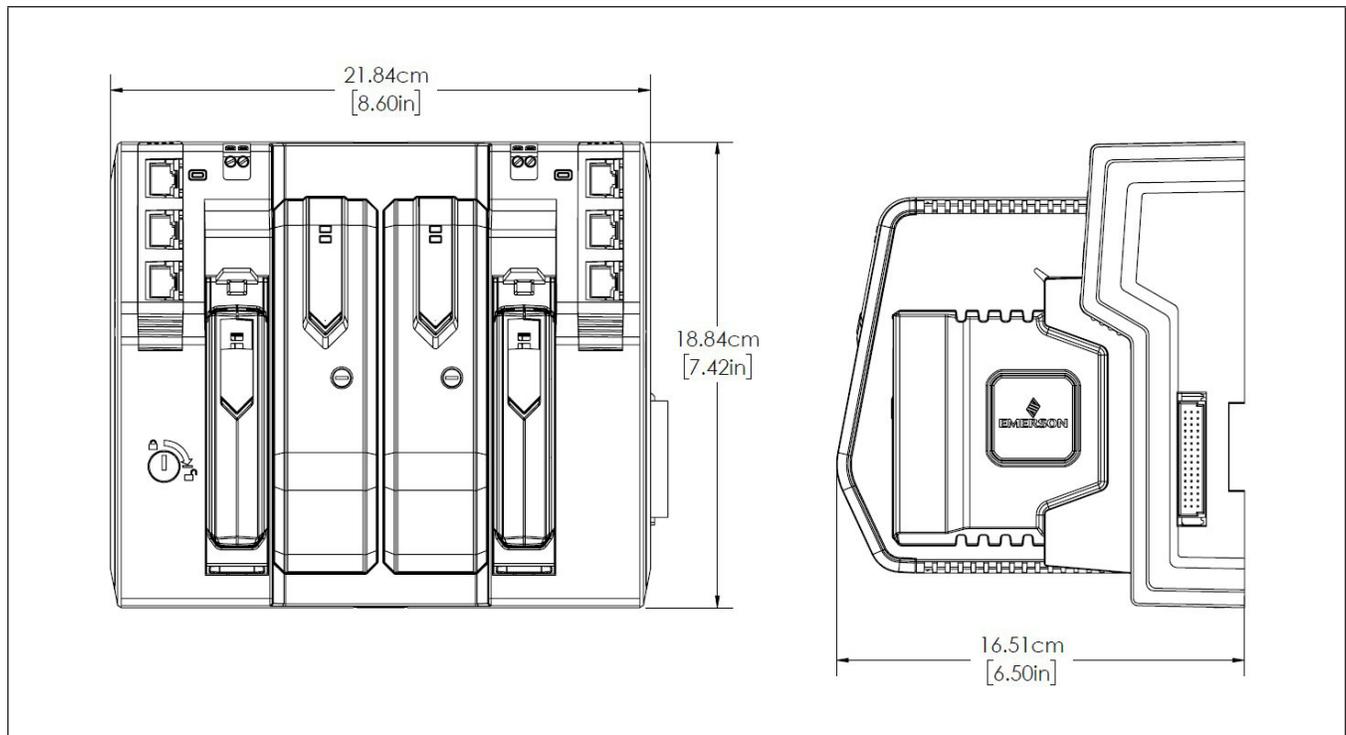
### Advance Networking

With advance 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 in one place you can set up IP Address, define the default gateway, enable PRP, or bond ports to participate in an MRP ring topology.



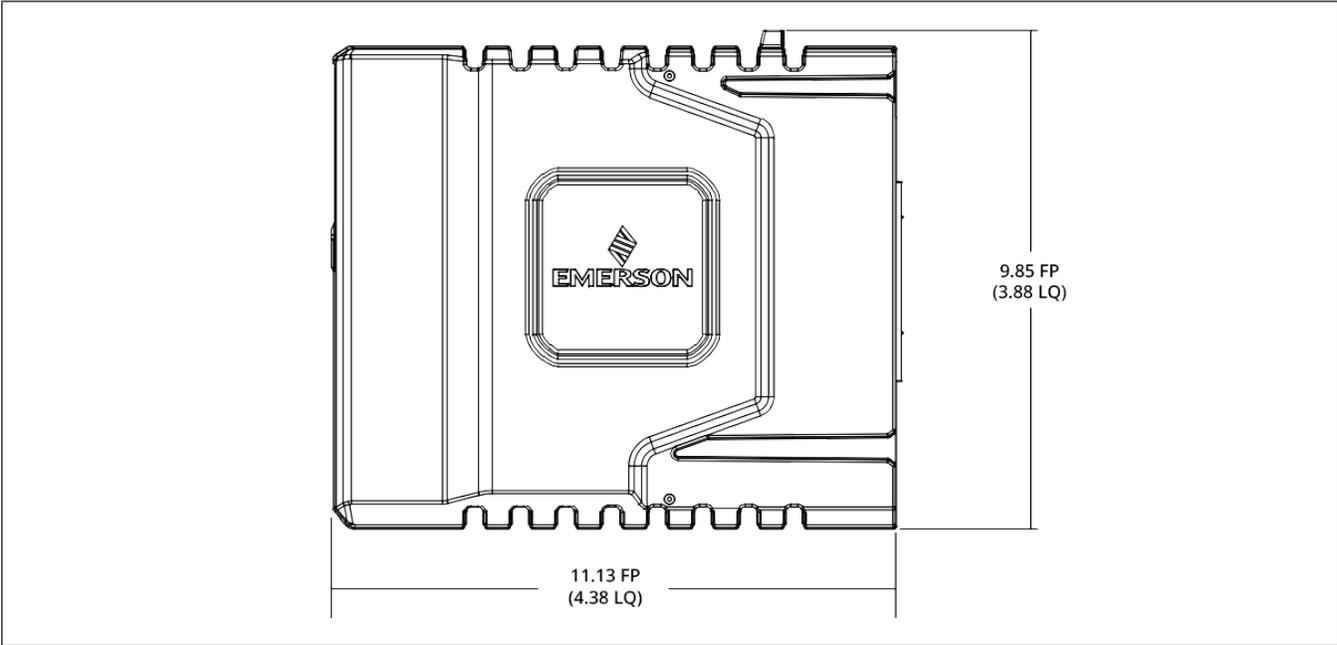
Network Interface Diagram allows you to see the network configuration for all your Ethernet ports in the PK Controller.

### 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 $\pm$ 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 typical 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

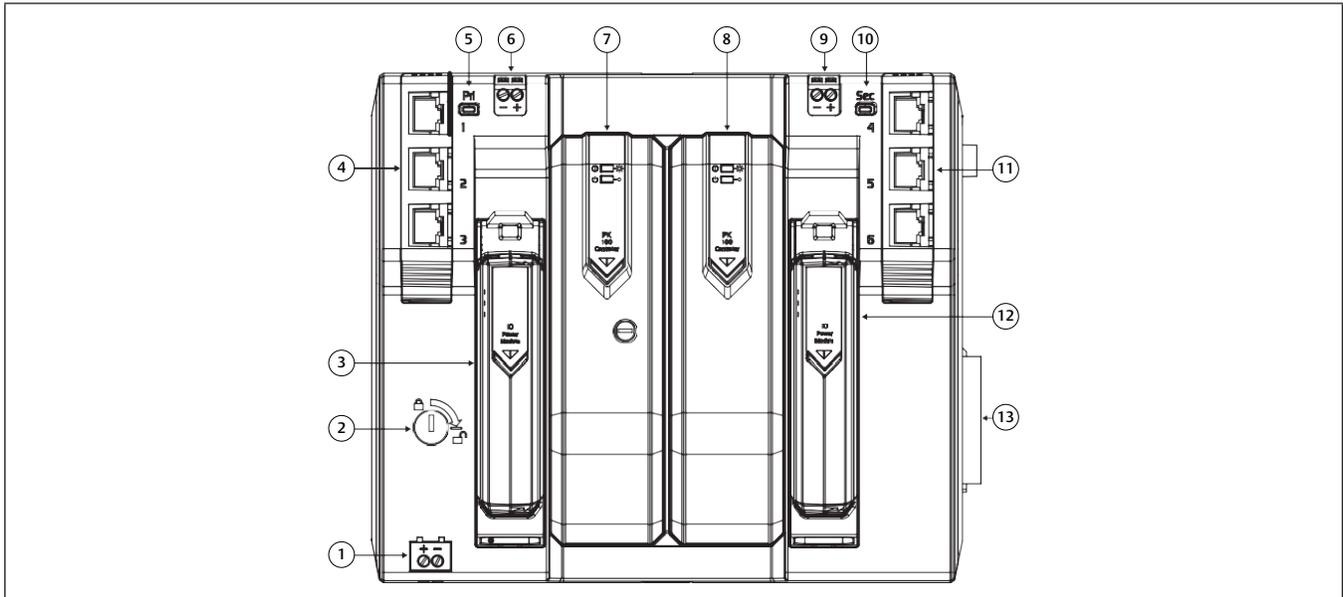
| Item   | Specification  |
|--|--|
| Capacity   | Two PK Controllers   |
| Input power (redundant)  | +24 VDC $\pm$ 10% at 2.75 A maximum  |
| Output power to I/O card carrier(s)*                           | +12.25 VDC at 3.0 A maximum*   |
| Redundant Ethernet connections (six)                           | 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

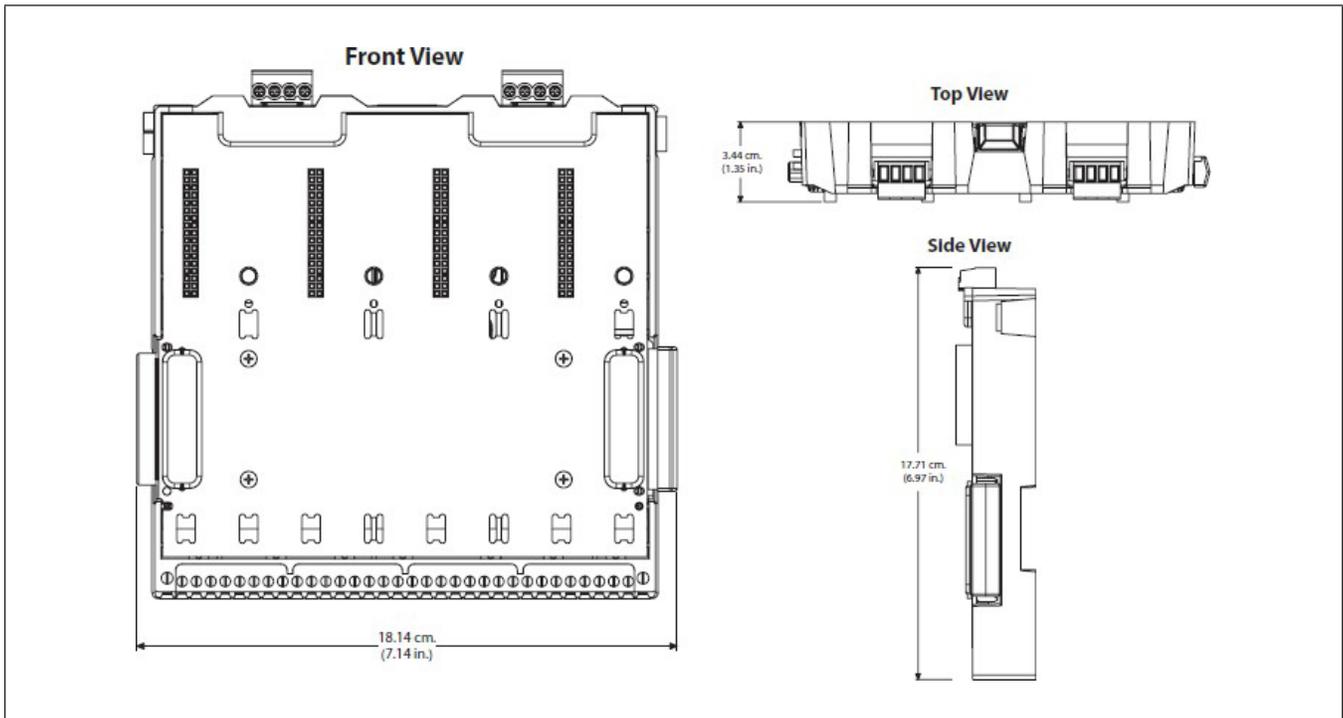
| Item                    | Specification                       |
|-------------------------|-------------------------------------|
| Input power (redundant) | +24 VDC $\pm$ 10% at 2.75 A maximum |
| Output power            | +12.25 VDC at 3.0 A maximum         |
| Power dissipation       | 3.25 W                              |

## PK Controller Carrier Parts



| Callout | Description   |
|---------|---|
| ①       | Screw terminals for backup battery connection.  |
| ②       | <b>Physical key switch</b><br>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       | <b>Redundant Power Module</b><br>Provides power to connected I/O.   |
| ④       | <b>Ethernet ports 1-3. These appear in software as Network Portx.</b><br>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       | <b>Ethernet ports 4-6. These appear in software as Network Portx.</b><br>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<br>Provides power to connected I/O   |
| ⑬       | Carrier connector   |

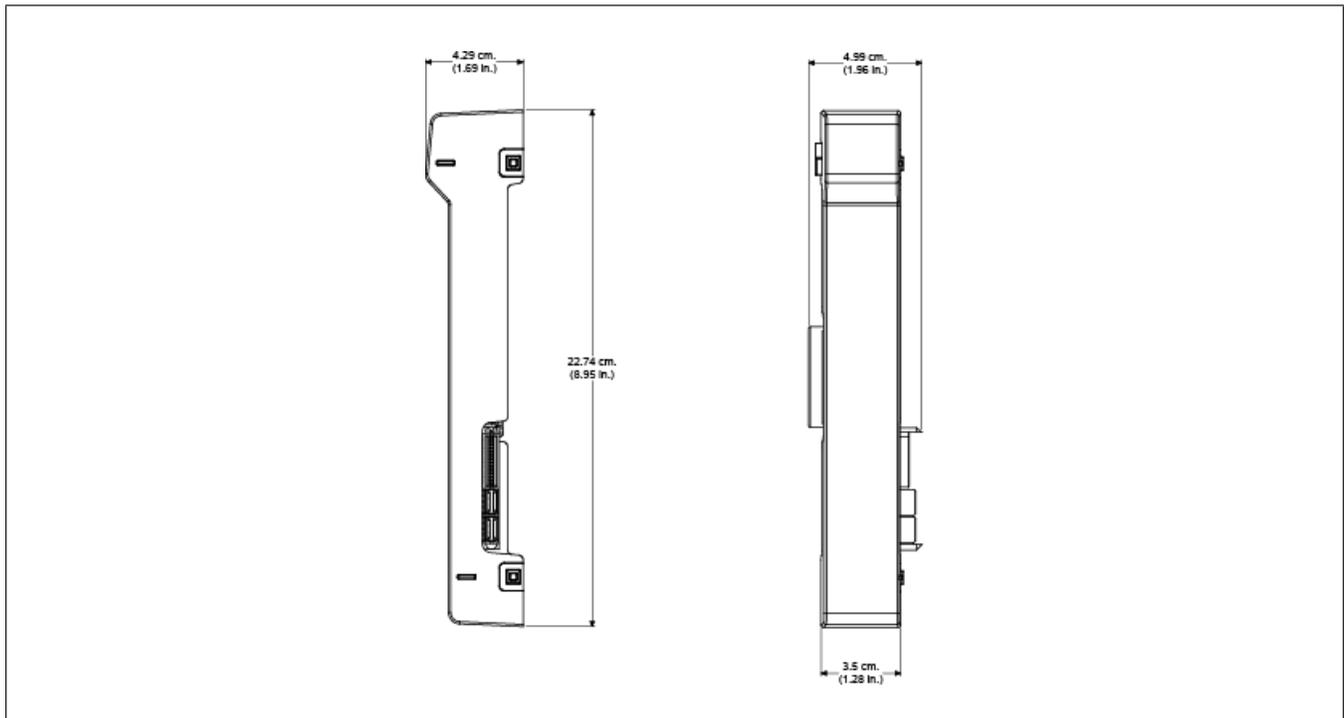
### 4-wide Horizontal I/O Interface Carrier Dimensions



### 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)<br>1.2m (3.9ft) (standard)<br>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 (v14.FP1)\*

## 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.

| 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<br>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 acyclic 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). |

\*PRP communications are not included in the certification.

| 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<br>Conformal Coating                             |
| Shock<br>(Normal Operating Conditions) | 10g ½-sine wave for 11 ms   |
| Vibration (Operative Limit)            | 1mm peak-to-peak from 5Hz to 13.2Hz, 0.7g from 13.2Hz to 150Hz                                  |
| LED Indicators <sup>1</sup>            |   |
| 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 |

<sup>1</sup>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)                          | <ul style="list-style-type: none"> <li>■ Modbus TCP protocol as specified by <a href="http://www.modbus.org">www.modbus.org</a>.</li> <li>■ PK Controller as a Server reads and writes data from and to Modbus Client devices.</li> <li>■ Supports 8 connections.</li> <li>■ Uses MODICON (PLC) based addressing (Modbus absolute addressing is not supported).</li> <li>■ No license is required to enable this protocol, and it does not consume DSTs.</li> </ul> <p><small>*Please review the VIM2 product data sheet as an alternative to provide added Modbus TCP functionality (e.g. Modbus RTU, Modbus ASCII, etc.)</small></p>   |
| Modbus TCP (Client) <sup>1</sup>             | <ul style="list-style-type: none"> <li>■ Modbus TCP protocol as specified by <a href="http://www.modbus.org">www.modbus.org</a> except for a limited amount of register types, it only allows 9999 of each category.</li> <li>■ Register addresses are limited in the following ranges:                             <ul style="list-style-type: none"> <li>● Coils: 1 – 9999</li> <li>● Discrete Inputs: 10001 – 19999</li> <li>● Input Registers: 30001 – 39999</li> <li>● Holding Registers: 40001 – 49999</li> </ul> </li> <li>■ PK Controller as the Modbus Client reads and writes data from and to Modbus Server devices.</li> <li>■ The number of supported connections is different for each model of the PK Controller as indicated in the sizing table.</li> <li>■ 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.</li> </ul> <p><small>*Please review the VIM2 product data sheet as an alternative to provide added Modbus TCP functionality (e.g. Modbus RTU, Modbus ASCII, etc.)</small></p> |
| EtherNet/IP Interface <sup>1</sup>           | <ul style="list-style-type: none"> <li>■ EtherNet/IP interface in the PK is a Scanner Device (Client) that reads and writes data from EtherNet/IP Adapter devices (Servers).</li> <li>■ EtherNet/IP interface supports the following types of messaging connections:                             <ul style="list-style-type: none"> <li>● Implicit messages (Class 1)</li> <li>● Explicit messages (Class 3)</li> <li>● Class 3 with PCCC</li> <li>● UCMM with Logix Tags</li> </ul> </li> <li>■ 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.</li> <li>■ 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.</li> </ul> <p><small>*Please review the VIM2 product data sheet as an alternative to provide added EtherNet/IP functionality (e.g. EDS file support.).</small></p>  |

|                            |  |
|----------------------------|--|
| <p>OPC UA Server</p>       | <ul style="list-style-type: none"> <li>■ PK Controller is a Server and allows reads and writes from OPC UA Clients.</li> <li>■ Supports up to 6 client connections.</li> <li>■ Allows up to 5000 reads/sec and 500 writes/sec.</li> <li>■ Supports only the DA profile (real time data).</li> <li>■ Is based on OPC UA standard version 1.02 that supports the following:                         <ul style="list-style-type: none"> <li>● OPC Binary Transportation</li> <li>● 128 or 256-bit encryption levels</li> <li>● Message Signing</li> <li>● Digital Certificates – Self Signed and Certificate Authority (CA)</li> <li>● Support online browsing</li> </ul> </li> <li>■ No license is required to enable this protocol, and it does not consume DSTs.</li> </ul> <p><small>*Please review the DeltaV OPC UA product data sheet for more information regarding other OPC UA clients and servers available in DeltaV</small></p>  |
| <p>PROFINET Controller</p> | <ul style="list-style-type: none"> <li>■ Not supported in PK Standalone.</li> <li>■ Compliant with PROFINET version 2.3 and CC-A.</li> <li>■ Configuration using GSDML files.</li> <li>■ 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.</li> <li>■ Support reading and writing to Real time cyclic data and reading Device Diagnostics.</li> <li>■ Does not support Real time Acyclic data and Isochronous Real Time Data (IRT).</li> <li>■ Maximum of 250 devices.</li> <li>■ 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.</li> <li>■ Participates in an MRP ring with bonding ports but cannot be MRP manager.</li> <li>■ The use of PRP is not supported with PROFINET.</li> <li>■ Supports only S1 devices. That means that when using redundant controllers there will be a bump during a controller switchover due to reconnection time with devices after switchover (This is per definition of S1 devices in PROFINET standard).</li> <li>■ AMS Device Manager is not supported natively through the PK Controller. Consult AMS Device Manager product data sheet for connectivity with PROFINET.</li> <li>■ To enable you need the PK Controller PROFINET interface License and add Ethernet connected I/O (EIOC and PK) licenses for each device connected in the PN1 network. The consumption of DSTs will happen in the following way:                         <ul style="list-style-type: none"> <li>● If device has 1 or 2 Physical Slots (or Modules) defined in the GSDML file (most common in small devices like Motor starters &amp; transmitters):                                 <ul style="list-style-type: none"> <li>- 1 DST for the first 16 values (the highest value from the I/O types configured).</li> <li>- After the first 16 values we charge one DST for every signal.</li> </ul> </li> <li>● 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 &amp; PLCs):                                 <ul style="list-style-type: none"> <li>- All inputs and outputs are counted and charged with a DST.</li> </ul> </li> </ul> </li> </ul> <p><small>*Please review DeltaV Engineering guide for communication and redundancy performance of PROFINET</small></p> |

<sup>1</sup>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 the following DeltaV System versions

| Release version          | v14.LTS | v14.FP1 | V14.FP2 | V14.FP3 | v15.LTS | v15.FP1 |
|--------------------------|---------|---------|---------|---------|---------|---------|
| Standalone PK Controller | Yes     | Yes     | Yes     | Yes     | Yes     | No      |

## 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    |
| 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 (2GB) for use with DeltaV PK Controllers   | PK7001S2     |
| 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; v14.LTS; English   | PK2301PR14LTSL39B    |
| DeltaV PK Controller Engineering Software, Professional version; v14.LTS; English  | PK2301PR14LTSL39P    |
| DeltaV PK Controller Engineering Software, Basic version; Virtual Machine (VM); v14.LTS; English <sup>1,2</sup>                            | PK2301PR14LTSL39B-VM |
| DeltaV PK Controller Engineering Software, Professional version; Virtual Machine (VM); v14.LTS; English <sup>1,2</sup>                     | PK2301PR14LTSL39P-VM |
| DeltaV PK Controller Engineering Software, Basic version; v14.FP1 with Feature Pack 1; English   | PK2301PR14FP1L39B    |
| DeltaV PK Controller Engineering Software, Professional version; v14.FP1 with Feature Pack 1; English                                      | PK2301PR14FP1L39P    |
| DeltaV PK Controller Engineering Software, Basic version; Virtual Machine (VM); v14.FP1 with Feature Pack 1; English <sup>1,2</sup>        | PK2301PR14FP1L39B-VM |
| DeltaV PK Controller Engineering Software, Professional version; Virtual Machine (VM); v14.FP1 with Feature Pack 1; English <sup>1,2</sup> | PK2301PR14FP1L39P-VM |
| DeltaV PK Controller Engineering Software, Basic version; v14.FP2 with Feature Pack 2; English   | PK2301PR14FP2L39B    |
| DeltaV PK Controller Engineering Software, Professional version; v14.FP2 with Feature Pack 2; English                                      | PK2301PR14FP2L39P    |
| DeltaV PK Controller Engineering Software, Basic version; Virtual Machine (VM); v14.FP2 with Feature Pack 2; English <sup>1,2</sup>        | PK2301PR14FP2L39B-VM |
| DeltaV PK Controller Engineering Software, Professional version; Virtual Machine (VM); v14.FP2 with Feature Pack 2; English <sup>1,2</sup> | PK2301PR14FP2L39P-VM |
| DeltaV PK Controller Engineering Software, Basic version; v14.FP3; English   | PK2301PR14FP3L39B    |
| DeltaV PK Controller Engineering Software, Professional version; v14.FP3; English  | PK2301PR14FP3L39P    |
| DeltaV PK Controller Engineering Software, Basic version; Virtual Machine (VM); v14.FP3 with Feature Pack 3; English <sup>1,2</sup>        | PK2301PR14FP3L39B-VM |
| DeltaV PK Controller Engineering Software, Professional version; Virtual Machine (VM); v14.FP3 with Feature Pack 3; English <sup>1,2</sup> | PK2301PR14FP3L39P-VM |
| 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 |

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

<sup>2</sup>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; v14.LTS; English | PK2104R14LTSL39 |
| Operator Station, Full Span of Control; for use with DeltaV Operator Panel or Workstation on Standalone PK Controller systems only; v14.FP1; English | PK2104R14FP1L39 |
| Operator Station, Full Span of Control; for use with DeltaV Operator Panel or Workstation on Standalone PK Controller systems only; v14.FP2; English | PK2104R14FP2L39 |
| Operator Station, Full Span of Control; for use with DeltaV Operator Panel or Workstation on Standalone PK Controller systems only; v14.FP3; English | PK2104R14FP3L39 |
| 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      |
| DeltaV PredictPro MPC add-on for Standalone PK Controller, 2 MV Outputs <sup>1</sup>   | PK3152S002      |
| DeltaV PredictPro MPC add-on for Standalone PK Controller, 5 MV Outputs <sup>1</sup>   | PK3152S005      |
| DeltaV PredictPro MPC add-on for Standalone PK Controller, 10 MV Outputs <sup>1</sup>  | PK3152S010      |
| DeltaV PredictPro MPC add-on for Standalone PK Controller, 20 MV Outputs <sup>1</sup>  | PK3152S020      |
| Quad-Monitor Workstation License; for use with DeltaV Operator Panel or Workstation on Standalone PK Controller systems only                         | PK2104K01       |

<sup>1</sup>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.

## 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).

## 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

- DeltaV Workstation and Server Hardware
- DeltaV M-Series Traditional I/O
- 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 v14.3 or later DeltaV software.
- For PROFINET functionality, DeltaV v15.FP1 or later is required.

©2023, Emerson. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. The DeltaV logo is a mark of one of the Emerson family of companies. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while diligent efforts were made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

### Contact Us

 [www.emerson.com/contactus](http://www.emerson.com/contactus)