DELTAV™

DeltaV PK Controller
Frequently Asked Questions

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This document answers questions about the DeltaV PK Controller as a Standalone and Integrated DeltaV Solution.

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Introduction

Terminology

This document answers questions about the DeltaV PK Controller as a Standalone and Integrated DeltaV Solution. The following terminology is used.

Standalone DeltaV PK Controller: The Standalone DeltaV PK Controller provides a control solution for smaller-scale applications such as skid units or small unit operations. It is designed to operate in a standalone fashion, meaning that it runs without requiring a connection to a server, panel HMI, or other typical DCS system elements.

PK Controller Engineering Station: The PK Controller Engineering Station provides all the configuration and management capabilities a Standalone DeltaV PK Controller requires when in standalone deployment. In most cases, this will be laptop computer, but it can also be a workstation PC. The PK Controller Engineering Station provides a temporary connection to the standalone PK Controller. The PK Controller Engineering Station can only be used for standalone PK Controllers.

PK Controller Engineering Software: The tools you use to configure the Standalone DeltaV PK Controller that are loaded onto the PK Controller Engineering Station. The software applications make it easy to establish communications with a Standalone DeltaV PK Controller and to manage project files associated with different standalone controllers. The tools are the same as the traditional DeltaV engineering tools. PK Controller engineering software cannot be used to configure controllers other than standalone DeltaV PK Controllers.

Project: For standalone PK Controller deployment, the PK Controller's project contains everything associated with that controller, its attached devices, and the local HMI. This includes the logic configuration, graphics files, device configurations, and so on. Each project is limited to 1 PK Controller, 1 SZ Controller, and 1 Operation Station.

Standalone DeltaV Operator Workstation: A DeltaV licensed operator workstation, local to the Standalone DeltaV PK Controller. This workstation can be either a panel PC or a traditional workstation. The standalone operator workstation will be licensed as a Standalone Full Span of Control Operator Workstation.

Merge/merging: This process takes the database from the Standalone DeltaV PK Controller and combines it with the existing database of the larger DeltaV system to create one unified database. The process places the standalone DeltaV PK Controller (and standalone DeltaV Operator Workstation, if present) as native nodes on the DeltaV network. The merge process identifies potential tag name conflicts; verifies there are appropriate licenses available to be consumed and assigns them as appropriate; decommissions the Standalone DeltaV PK Controller and commissions it as a node on the DeltaV network. Because of this step, the Merging process must be conducted while that particular standalone PK Controller is not operating a live plant.

IOP (IO Port): The module onboard the DeltaV PK Controller carrier that houses the Ethernet ports. There are two IOPs on the DeltaV PK Controller: primary (left side) and secondary (right side). The secondary is normally used for redundant networks for your IO communication. The IOP can communicate using native DeltaV, Modbus TCP server, OPC UA server, and either Modbus or Ethernet IP client protocols.

Integrated DeltaV PK Controller: The Integrated DeltaV PK Controller with a PK Controller that is deployed as a traditional node on a DeltaV system. It requires a permanent connection to a ProPlus station and cannot operate in standalone mode, or be managed by a PK Controller Engineering station. These PK controllers were either deployed with a traditional DeltaV system, or merged in from standalone.

Architecture

Do I need a ProPlus to operate the DeltaV PK Controller?

STANDALONE: No, a permanently connected ProPlus cannot be used with a standalone PK Controller. The controller is designed to run with no connections, including the PK Controller Engineering Software, ProPlus, or DeltaV Local Panel HMI. In effect, this is what we would call a 'standalone' controller.

INTEGRATED: If multiple PK controllers (more than 1) are required for one database, then a full DeltaV system with a ProPlus is required for configuration.

What are the node count limitations for Standalone PK Controller?

Users can connect to DeltaV IO nodes on the DeltaV ACN. Standalone system projects are limited to ONE set of (redundant) PK Controllers. The standalone project can be configured with up to a total of 16 CIOCs and WIOCs (combined), ONE SZ Controller, and ONE HMI Node can be configured in the project.

Do the PK controller and DeltaV Operator Workstation count as nodes in my DeltaV system?

When merged into a larger DeltaV system, both the PK Controller and the DeltaV Operator Workstation will count as nodes.

This may result in some systems that approach the maximum node count of 120 for Controllers and Operator Stations. Zones may be used to help address cases where the node count limit will be exceeded.

Can I use a Third-Party Panel HMI?

For standalone PK Controllers, we recommend using the standalone DeltaV Operator workstation. However, third-party panel HMI can be used and connected using either ModbusTCP/IP or OPC UA protocols. This connection can be made redundant in the case high-availability communications are required. These third-party panel HMI's can continue to function even after the PK Controller is merged into a larger DeltaV system.

Can I connect the PK Controller to my Batch Executive?

STANDALONE: For standalone PK Controllers, the Batch Executive is enabled through an additional add-on license on the DeltaV Operator Workstation. See the licensing section for additional information.

INTEGRATED: For traditional DeltaV systems (or merged standalone controllers), connection with a Batch Executive can be done in the same way as any other DeltaV controller after the PK Controller. The PK Controller has the same "batch capabilities" as any other DeltaV controller, including Phase Logic Modules (PLMs), class-based control, and equipment and unit modules that can be reconciled when merging.

How can Version Control Audit Trail be added?

Version Control Audit Trail is not available for use with the standalone PK Controller Engineering Software. Users needing VCAT must purchase a traditional DeltaV ProPlus and license VCAT separately.

Can I network multiple standalone PK Controllers together?

Yes, multiple standalone PK Controllers can be networked together an administered from a central engineering location for configuration and diagnostics. It is important to understand these networked controllers will remain standalone and have separate databases. Users will be required to switch databases via the Project Administration Tool on PK Controller Administration Application. The networked standalone PK controllers will exist on the DeltaV ACN network but will not be able to communicate natively to one another. To pass points between networked standalone PKs, data will have to be manually mapped into each standalone controller using Modbus TCP.

If users network multiple Standalone DeltaV PK Controllers, IP address conflicts will occur. Therefore, users can modify the IP addresses manually such that all nodes in the network have a different IP address. Users must manually track all the IP addresses you assign so that you avoid any conflicts. This applies to not only the PK Controllers, but to associated operator workstations and CIOC's/WIOC's.

Can standalone PK Controller be integrated with AMS?

AMS Suite installation media is included with the standalone PK Engineering Software media pack. Installation is optional and is performed in the PK Controller Engineering Station in the same way as other DeltaV workstations. Basic and Professional PK Engineering Software installations provides AMS Device Configurator capability. A supplemental license can be purchased to enable the AMS Device Manager features. As in DeltaV there will be a single AMS database for the entire machine, not a separate AMS database per project. A new AMS database is not created at new project creation time. The single AMS database on the PK Controller Engineering Station is not part of any project backup.

At switch active project time the existing AMS database must be effectively emptied, so no cross-project devices can interfere with the new active project. The AMS database can become populated while a project remains active, but the contents do not persist after the project is no longer active. This should have no impact on the usability of AMS Device Configurator. However, emptying the AMS database at switch active time will result in a loss of device history, which can impact the usability of AMS Device Manager.

How does a standalone PK Controller handle time synchronization?

The Standalone PK controller is by default the NTP Master for its respective project SKID. All associated DeltaV nodes (operator workstation, CIOC's/WIOC's) will sync with the standalone PK controller automatically. The PK Controller Engineering Station does not have NTP running. Users can set the PK controller time in the Project Administration application to prevent any drift that may happen. To use a satellite time server for your project, connect it to the DeltaV ACN network and the nodes will automatically synchronize with it, no configuration required.

Does PK Controller support OPC UA?

Yes, PK Controllers can be configured as an OPC UA Server.

What are the Local Device Network Options for PK Controller?

1. The Modbus TCP interface on the DeltaV PK Controller's local device network allows communication to/from Modbus TCP data sources such as drives, motor control centers, analyzers and similar devices. A Modbus client can read and write data from/ to Modbus servers (slave devices). Modbus server devices can be direct Modbus TCP devices or Modbus serial devices under a Modbus TCP gateway. Only the Modbus TCP standard protocol is supported. The RTU via TCP and RTU via UDP supported by the VIM are not supported in the Standalone DeltaV PK Controller.

2. The EtherNet/IP (EIP) interface on the DeltaV PK Controller allows communication to/from EIP data sources such as PLCs, variable-speed drives, motor control centers (MCCs), analyzers, sub-sea devices, and similar devices communicating EIP. The EIP interface is an EIP I/O scanner reading and writing data from/to EIP I/O adapters and other scanners. Typical ring, star, and linear topologies are supported with the EIP interface network.

What revisions of DeltaV can i use PK Controller with?

Integrated PK Controllers will be available with DeltaV Version 14 systems and beyond. PK Controllers will not be backward compatible with earlier revisions.

Standalone PK Controllers running Version 14 can communicate with earlier revisions of DeltaV using Modbus TCP.

Hardware

DeltaV PK Hardware Layout

Redundant 24V Power Inputs

Redundant 24V Power Inputs

Download Locking for Cybersecurity Protection

Redundant Controllers

Redundant 3-Port Ethernet Switches

Connection to Local I/O Carriers

What do the power modules do?

The Power Modules convert 24V input power provided to the PK Controller Carrier into 12V power for traditional M-Series and S-Series I/O cards connected locally. Power Modules are not required if no local I/O is installed (e.g. if CHARMs are used exclusively). In addition, Power Modules are redundant and are hot-swappable in the event one needs to be replaced.

What is the purpose of the key switch on the PK Controller Carrier?

The PK controller carrier has a physical key switch, the other DeltaV controllers do not have a key switch.

When locked, the PK controller has the following behaviors:

- Downloads are prevented
- Decommission requests are rejected
- Attempts to upgrade the firmware using the Controller Upgrade Utility are rejected
- Attempts to do a project backup from the PK Controller Administration application are rejected.
- Note: Commissioning requests, authentication with the PK controller, and retrievals are allowed while the controller is locked

The Auto Lock feature can be used to prevent the PK controller from remaining unlocked too long. When the auto-lock feature is enabled, the PK controller can remain in the Unlocked state no longer than the configurable time period before automatically returning to the Locked state.

The Unlocked Alert feature can be enabled such that an alert is generated if the length of time a PK controller has been continuously unlocked exceeds a configured time.

Are the Ethernet ports isolated from each other?

While the Ethernet ports are electrically connected to each other, port forwarding is limited between them such that the appropriate network traffic appears on the appropriate port. Ports can be electrically disabled individually.

Can I disable unused Ethernet ports on the controller?

Yes. Ethernet ports are not electrically enabled until they have been configured for use.

Port 1 and Port 4 are enabled by default as these are the Primary and Secondary top ports. Port 2/3 and Port 5/6 are disabled by default. Port 1 is the only port that cannot be disabled (top left port). The other 5 ports can be electrically disabled.

Are there any active electronics on the controller carrier?

The only active electronics on the PK Controller carrier are included in the Ethernet ports, which are redundant and hot swappable in the event of a failure.

What are the details on the SD-Card?

STANDALONE: The SD-Card is recommended in standalone PK Controller applications. In redundant standalone PK Controller applications, an SD-Card is recommended to be installed in each PK Controller.

It is a full-size SD-Card, available in 2gb and 8gb sizes and meets all the same industrial specifications as the PK Controller. SD-Cards are ordered separately from controllers.

INTEGRATED: For traditional DeltaV systems (or merged standalone controllers) where there is a DeltaV ProPlus, the SD-Card is not required or utilized by the system.

What does the SD-Card hold?

The SD-Card on the PK Controller is used only when a PK Controller is implemented in a standalone configuration. In this case, it contains the following project files: controller logic configuration, graphics files, etc. It also contains the last known previously saved project file in the event of a failed backup to the SD-Card.

Based on the DST capacity of the PK Controller and configuration implemented, a 2gb SD-Card may not be sufficient, and the 8gb card is recommended. In general, for most applications 750 DSTs and below, the 2gb card should be sufficient.

It is recommended all standalone PK controllers use SD-Card for local backups.

Can the SD card be replaced online (bumpless) with a backup SD card in case the SD card is corrupted?

If the active standalone PK Controller SD card is corrupted, you can switch over to the redundant controller and then replace the "now" standby SD card. Users cannot replace SD cards online when operating Simplex Standalone PK Controllers.

How long will the PK Controller retain its configuration without power being applied?

The PK Controller can successfully perform a cold restart after up to 18 months without external power being applied to it. The configuration files are retained in non-volatile memory of an SD-Card onboard the controller.

In this case of a power disconnection for more than 24 hours, while the PK Controller will start up and run correctly, the internal clock will likely have reset, as its onboard capacitor only lasts for approximately 24 hours. While the PK Controller will run correctly, any alarm/event or historized data will have incorrect timestamps. For users where this is undesirable, an external battery or power connection may be connected to the PK Controller carrier to maintain the internal clock while main power is disconnected from the PK Controller.

Is the PK Controller faster than an MQ or MX controller?

Yes. It is estimated that the PK Controller will have 3-4 times the CPU power as compared to existing controllers. From a module execution rate perspective, the PK Controller will execute modules as fast as 25ms, whereas existing M-and S-Series Controllers execute modules as fast as 100ms.

Can I replace my M-Series controller with a PK Controller?

Yes. Depending on the installation, existing controllers can be replaced by a PK Controller. The PK Controller can execute all the same logic that an M-Series controller might be executing today. However, the width of the PK Controller Carrier is approximately 1" wider than two 2-wide M-Series controller carriers, so some additional cabinet space may be required in certain installations. The existing extender cables can be used to install the PK Controller Carrier on the side of a cabinet and then use the cable to connect to M-Series Traditional I/O.

Is PK controller redundancy handled the same way as the M and S Series?

Yes, PK controller redundancy used the same model as the M and S Series controllers.

What I/O does PK Controller support?

The DeltaV PK Controller supports the following IO:

- M-Series

  - Direct connection to existing 8-wide carriers
  - Up to 8 carriers (any combination of 4 or 8-wide carriers)
  - I/O cards currently available: bussed, analog, discrete, etc.
  - M-Series IS IO Cards are not supported
- S-Series

  - Up to 8 carriers
  - All I/O cards currently available: bussed, analog, discrete, etc.
  - Adapter available in v14.3.1 timeframe
- CHARMS I/O

  - Connect up to 16 CIOCs
  - Networked via DeltaV ACN – redundant or simplex
- Wireless I/O

  - Connect up to 16 Wireless I/O Cards
  - Networked via DeltaV ACN – redundant or simplex

NOTE: *For CHARM I/O and Wireless I/O, connect up to 16 of each if integrated, but up to 16 total when in standalone.*

Software

Is the standalone PK Controller Engineering Software different than "regular" DeltaV software tools?

The tools are the same as the traditional DeltaV engineering tools. PK Controller engineering software can only configure one PK Controller, one SZ Controller, and one operator workstation per database/project.

Additional capabilities have been added to the standalone PK Controller Engineering Software via the DeltaV PK Controller Administration Utility. The DeltaV PK Controller Administration application assists users with connecting to and authenticating with the standalone DeltaV PK Controller, creating, backing up, comparing and retrieving projects; as well as, managing the controller's password.

Does the standalone PK Controller Engineering Software need to have the correct project loaded on it before connecting and editing a standalone PK Controller?

No. The standalone PK Controller Engineering Software has the ability to retrieve the project configuration files from the standalone PK Controller on-board SD card. This enables users to connect and edit it using a PK Controller Engineering Station that had no project files previously loaded on it.

How can I lock the configuration to protect my Intellectual Property?

Within DeltaV, composite modules can be locked in order to hide the logic within that module. The password is known only to the person who set it, and that password persists through the process of merging a standalone PK Controller into a larger DeltaV system, meaning that Intellectual Property is protected throughout the lifecycle of the PK Controller. The ability to lock composites is included in the Professional version of the engineering software

What format is the standalone PK Controller Engineering Software available in?

Standalone PK Controller Engineering software is available in two formats, as a Regular Media Installation or Virtual Machine.

What type of machines can the standalone PK Controller Engineering Software be installed on?

Standalone PK Controller Engineering software can be installed two ways:

1. Regular Media Installation of a tested/supported, dedicated Dell Machine: PK Controller Engineering software can be installed on the new DeltaV rugged laptop or any DeltaV workstation in the DeltaV Workstation and Server Hardware Product Data Sheet as long as they have 16 GM of RAM.

2. Virtual Machine (running on Oracle VirtualBox) installed on any PC which meets minimum requirements:

   a. WIN10 (Recommended)

   b. 16 GB RAM

   c. 64-Bit Processor

   d. 100 GB hard drive free space

   e. 1 physical NIC adapter with RJ45 jack (use of wireless network adapters is not supported)

   f. 1 USB2 port

Can I use the standalone PK Controller Engineering Software on Integrated PK Controllers?

No, the standalone PK Controller Engineering Software can only be used with standalone PK Controllers.

What is the difference in the Basic and Professional version of the standalone PK Controller Engineering Software?

Standalone PK Controller Engineering Software is available in two tiers: Basic and Professional.   The software package is enabled by BM (basic) or PM (professional) dongle. Users cannot upgrade from Basic to Professional, as the y are independent of one another

Software Capability Enabled by Dongle	Basic	Professional
Support for all configuration languages in DeltaV Control Studio	X	X
Control Studio Online	X	X
Process History View	X	X
Diagnostics (Hardware, software, and configuration)	X	X
AMS Device Configurator	X	X
Recording & saving history from Process History View		X
Loop Tuning (DeltaV InSight Basic)		X
Configuration comparison		X
Control simulation (Simulate Pro, etc.)		X
Locking & viewing locked configurations (locked composites)		X
Advanced Unit Management		X
Smart Commissioning		X
SIS Configuration (SLS1508 and CSLS)		X
DeltaV Live Premium Workstation Software		X

Licensing

How does licensing work? What licenses are required?

DeltaV PK Controller can be configured and deployed in two ways: Standalone or Integrated into a larger DeltaV system.

INTEGRATED: Licensing Scheme for PK Controller deployed in traditional DeltaV systems will remain the same as usual.

STANDALONE: For standalone DeltaV PK Controller deployments, the ordering/licensing flows follows:

1. Standalone PK Controller Engineering Software: User purchases Standalone PK Controller Engineering Software. It can be purchased separately from the Standalone DeltaV PK Controller. The Standalone PK Controller Engineering Software can be used to configure and manage multiple Standalone DeltaV PK Controller projects.

2. Standalone PK Controller Assembly Hardware: User purchases only DeltaV hardware required for (PK Controller Carrier Assembly, I/O, etc. as applicable).

   - **NOTE:** *For Standalone PK Controllers, there is no DST or controller redundancy licensing. DSTs are still counted, and a configuration that exceeds the DST limit of the controller will not be allowed to be downloaded. In effect, DST limits on the controller are enforced, but users do not purchase DST licenses themselves.*

3. Standalone DeltaV Operator Workstation: DeltaV Operator Workstations will be available for Standalone DeltaV PK Controller applications. Users will purchase the hardware (either Panel PC or traditional workstations) and the associated licensing. The standalone operator workstation will be licensed as a Standalone Full Span of Control Operator Workstation. By default, DeltaV Operate will be the operator interface. This license also includes a 250 parameter DeltaV Continuous Historian. This license 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 allows DeltaV Live displays to be used on the standalone operator workstation

- 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.

MERGE: When a Standalone DeltaV PK Controller is merged into a larger DeltaV system, users must purchase licenses appropriate to cover the following items:

- DSTs – consumed in the same manner they would be on any other controller on a DeltaV system.

- Redundant node – If the PK Controller is redundant, a redundant node license must be made available.

- Standalone Operator Station Merge License, if applicable

- Standalone DeltaV Live Operations Merge, if applicable

- Standalone Advanced Batch Merge, if applicable

- Standalone DeltaV Continuous Historian Scale-Ups Merge, if applicable

Note: *When a DeltaV Operator Workstation is merged into a larger DeltaV system, that DeltaV Operator Workstation reverts to a traditional Full Span of Control DeltaV Operator Workstation with a 250 parameter Continuous Historian. Expanded historian and batch capabilities are no longer possible.*

What is the price point of the standalone PK Controller?

The standalone DeltaV PK Controller is price competitive with large / advanced PLCs that are available on the market.

We are accomplishing that by our modified licensing scheme:

1. When building a Standalone DeltaV PK Controller, the user is required to pay only for DeltaV hardware (Controller, I/O, DeltaV Operator Panel). Hardware pricing will be competitive with high-end PLCs on the market.

2. DST Licenses are not required when building a Standalone DeltaV system

3. Standalone PK Controller Engineering Software can be purchased separately from the Standalone DeltaV PK Controller. The Standalone PK Controller Engineering Software can be used to configure and manage multiple Standalone DeltaV PK Controller projects.

Why should I pay for the extra DSTs to merge the PK Controller into my Balance of Plant DeltaV system? It is already running standalone.

Users who choose to merge their PK Controller into a DeltaV system are seeking to have the benefits of now operating their plant as one native DCS, and not as multiple standalone parts. When using multiple different types of control systems (e.g. PLCs), this would traditionally be accomplished by using data mapping, and other methods that do not yield a seamless system. The merging process enables that process to be significantly smoother, and results in one native system in the end. We believe that paying for DSTs reflects the value of this benefit.

Ultimately, if the user does not see value in operating it in a seamless, native DeltaV DCS environment (merged), they can always choose to use ModbusTCP or OPC UA to map the PK Controller into a DeltaV EIOC or VIM2 card and still have the ability to merge it at a later date.

Can I upgrade a PKXXX to a larger PK size by a firmware change?

No. Like the existing M- and S-series controllers, upgrading the capacity of the PK Controller must be done by purchasing a separate physical controller. Capacity upgrades cannot be performed by changing the firmware flash.

While changing a PK Controller to have a different capacity does require a separate physical controller, making the change within DeltaV Explorer is as simple as changing the size of the PK Controller node from within the properties menu. No major configuration changes are required. Any configuration work already completed will be retained and can be easily transferred into the new controller.

How Is Ethernet IP IO licensed on PK Controller? Is it counted as devices?

The PK Controller uses the same industrial Ethernet device configuration as the EIOC - there are physical devices and under the physical devices are logical devices. Each logical device (up to 100 signals) counts as a DST.

STANDALONE: For standalone PK Controller, no Device or DST licensing apply.   The DST's are counted toward the total capacity of the PK Controller.

INTEGRATED: For traditional DeltaV systems (or merged standalone controllers), the DST's consumed by the LDT's do count against the overall system size and the number of physical devices count toward the overall system Device license, which is new in v14. The Device licenses are shared with any other PK Controller's or EIOC's in the system, similar to the system wide IO type licenses. The PK Controller model dictates the number of Ethernet devices it can communicate with.

Is DeltaV Live available with Standalone PK Controller?

Users can deploy DeltaV Live with Standalone DeltaV Operator Workstations. Users who wish to use DeltaV Live will be required to purchase the Professional PK Engineering Software (which includes the DeltaV Live Premium Workstation Software). Additionally, customer will require add-on License to the DeltaV Operator Workstation (DeltaV Live Operations Premium Performance Pack add-on).

Merge

How do I know what licenses I need when merging my standalone PK Controller into a larger DeltaV?

On the larger DeltaV ProPLUS system resides the PK Merge Utility. One of the first steps of PK Merge Utility is called "Check Readiness". The Check Readiness step is always required when attempting to load a processed project into a larger DeltaV system. Checking licenses is a key part of the Check Readiness step and is intended to let Users know if supplemental licenses will need to be purchased as a result of merging the standalone PK Controller.

The output of the license check in the PK Merge Utility shows a line for each licensed feature. Users infers the supplemental licenses needed from this output.

Can historical data from standalone PK controller be merged into a larger DeltaV / facility-wide historian?

The PK Controller itself contains no historical data. In Standalone, a DeltaV Operator workstation can be added to provide continuous historical trending via DeltaV Continuous Historian. When merged, the data from the workstation is not integrated into any existing historians. However, historization settings and configuration from modules in the PK controller are retained during the merge process.

Can a standalone PK controller be merged into a full system temporarily?

A standalone PK controller can be Merged into a full DeltaV system but there is no utility to perform a "de-merge". Once a standalone PK controller is merged into a larger system, a customer can remove that configuration/decommission manually.

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