

Technical Information

HPS Virtualization Specification



EP03-700-100

February 2021, 1.34

Revision History

Revision	Date	Description
1.0	January 2010	Release Publication
1.1	September 2010	Updated with DVM, Experion HS and Experion LS details.
1.2	Aug 2011	Updated with new Advanced Applications.
1.3	Oct 2011	Updated for Experion process controller support.
1.4	Oct 2012	Updated for Experion R410 and 12 th Generation Dell hardware
1.5	Oct 2012	Minor update to Hardware CPU and Memory Specifications
1.6	November 2013	Updated with new Honeywell Premium Platform details, Virtualization Software component details, Virtual hardware and others
1.7	November 2014	Updated with 24 drive Blade Chassis, new Honeywell Thin Client solution, QCS Virtualization details, latest Advance applications and others
1.8	March 2015	Updated with PlantCruise by Experion, Experion LX and Experion PMD Virtualization
1.9	April 2015	Updated for Experion 431, ESX 5.5 support, Virtual hardware 10 and others
1.10	August 2015	Updated with PBM/BMA, Profit Suite Virtualization details
1.11	May 2016	Essentials Platform refresh, current version for vSphere, EBR, QCS and DVM details
1.12	December 2016	Next Generation Premium Platform, vSphere support, and Switch details.
1.13	April 2017	Updated for Experion R500, vSphere 6, and others
1.14	July 2017	Updated for TP-THNPP2 Thin Client Ethernet Adapter
1.15	August 2017	Updates for product versions, NX430 NAS, Switch Update
1.16	February 2018	Updated for Virtualization Networks, EBR R501, VMware Workstation, Experion R501
1.17	April 2018	Experion R50x Specification, Application update, Essentials hosts, vUOC, PMD, DynAMo
1.18	August 2018	Experion R510 Specification; Premium Platform Updates; vSphere 6.5; BMA/PBM, VCSA
1.19	November 2018	Updated with Thin Client refresh; VMware Workstation 15
1.20	December 2018	Updated vSphere 6.5 support for Essentials Platform
1.21	April 2019	Updated with the Premium Platform HD, ELCN Nodes
1.22	June 2019	Experion R511, Premium Platform 110V Support, and others
1.23	September 2019	Premium Platform, NX440 NAS, Microsoft Server 2019 Datacenter Edition, and Application Updates (EBR, PHD, Business Flex, FDM, DynAMo)
1.24	September 2019	Premium Platform model number changes
1.25	November 2019	Updated Premium Platform FC640 description

1.26	December 2019	Experion PKS Highly Integrated Virtual Environment (HIVE) – Experion PKS IT HIVE; ELCN Updates
1.27	February 2020	Updates to Experion R50x ES-C memory; Performance Profile Server CPU MHz; Premium Platform Top of Rack support; Experion PKS IT HIVE appliance specifications
1.28	May 2020	Premium Platform model number and specification updates; Essentials Platform model number updates; Refreshed links to the current Premium Platform documentation; Updated references to the Experion PKS HMI Specification
1.29	July 2020	Premium Storage Platform; minor updates for Premium Platform, NSX
1.30	August 2020	Updated vSphere model numbers
1.31	November 2020	Universal Thin Client operating system
1.32	December 2020	Updated Cisco L2.5 switch model numbers; DVM R700 application updates
1.33	January 2021	PMD R910, general updates
1.34	February 2021	Digi USB updates; Resource updates for EBR & MOVE; Agentless AV & FT usage

Additional Documents

Document Name	Description	Link
Experion Virtualization Solutions PIN	Provides an introduction to Virtualization	https://www.honeywellprocess.com/library/marketing/notes/PIN-Experion-Virtualization-Solutions.pdf
Experion MX Virtualization Installation and Configuration User Manual ^{Note 1}	Provides detailed information on QCS Virtualization	https://www.honeywellprocess.com/library/support/Documents/P3/6510020600.pdf
Experion PMD Virtualization User's Guide ^{Note 1}	Provides detailed information on Experion PMD Virtualization	https://www.honeywellprocess.com/library/support/Documents/Custom/Virtualization_Users_Guide_PMDOC-X303-en-831.pdf https://www.honeywellprocess.com/library/support/Public/Documents/Virtualization_Users_Guide_PMDOC-X303-en-900.pdf
HPS Virtualization Technical Assistance Policy	Describes the HPS support policy around Virtualization	Contact your Honeywell account manager.
Virtualization with BladeCenter S ^{Note 1}	Guide targeted to users of the BladeCenter S Premium Platform for Experion Virtualization Solutions.	https://www.honeywellprocess.com/library/support/Documents/Experion/Virtualization_with_BladeCenter_S_Guide_EPDOC-X241-en.pdf
Virtualization with Premium Platform ^{Note 1}	Guide targeted to users of the Next Generation Premium Platform for Experion Virtualization Solutions.	https://www.honeywellprocess.com/library/support/Documents/Experion/Virtualization-with-the-Premium-Platform-EPDOC-X455-en-F.PDF
Virtualization with Premium Platform ^{Note 1}	SCN targeted to users of the Next Generation Premium Platform for Experion Virtualization Solutions.	https://www.honeywellprocess.com/library/support/Documents/Experion/Virtualization-with-the-Premium-Platform-Software-Change-Notice-EPDOC-X468-en-E.PDF
Virtualization Planning and Implementation Guide ^{Note 1}	Defines Honeywell best practices for virtualization planning and implementation.	https://www.honeywellprocess.com/library/support/Documents/Experion/Virtualization-Planning-and-Implementation-Guide-EPDOC-X147-en-D.PDF
VMware vCenter Compatibility Matrix	vCenter Server OS Compatibility. Search on Host OS in the compatibility matrix.	http://www.vmware.com/resources/compatibility/search.php http://www.vmware.com/resources/compatibility/wizard/request.php
VMware Hardware Compatibility Matrix	ESXi hardware compatibility. Search on Systems/Servers in the compatibility matrix.	http://www.vmware.com/resources/compatibility/search.php http://www.vmware.com/resources/compatibility/wizard/request.php
Experion Network Best Practices	Provides best practices advice for planning the installation of Experion FTE networks	https://www.honeywellprocess.com/library/support/Documents/Custom/Experion_Network_Best_Practices.pdf

Essentials Platform Dell 14G Tech Note	Provides provisioning guidance for the Essentials Platform based on Dell R640XL, R740, and R740XL.	https://www.honeywellprocess.com/library/support/Documents/Experion/Essentials-Platform-14G-Provisioning-Guidance.pdf
Experion LCN Overview and Implementation Guide	Provides guidance for implementing Experion LCN and the associated virtual appliances.	https://www.honeywellprocess.com/library/support/Documents/Experion/Experion-LCN-Overview-and-Implementation-Guide-EPDOC-X478-en-511A.pdf
Note 1: Requires reader to be logged into the Honeywell Support site in order to access.		

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1. Introduction

Organizations face immense pressures in both constructing new plants in the shortest time and for the lowest cost possible, and operationally to reduce rising lifecycle maintenance costs while maintaining or improving reliability. Additionally, the significant skills shortages being experienced today require companies to do more with less, now more than ever.

Intelligently leveraged, virtualization is a game-changing technology in the way it is able to tackle key challenges that our industry faces. Honeywell Process Solutions has taken a unique approach to delivering the benefits of virtualization to our customers by providing a **complete** experience from installation to support that is **comprehensive**, allowing you to run more of your system virtualized and reap greater benefits.

Honeywell has adopted virtualization throughout its products and solutions. This document will detail,

- The products and solutions HPS supports virtualized
- The types of virtualization supported for these products and solutions
- The qualified virtualization products and versions

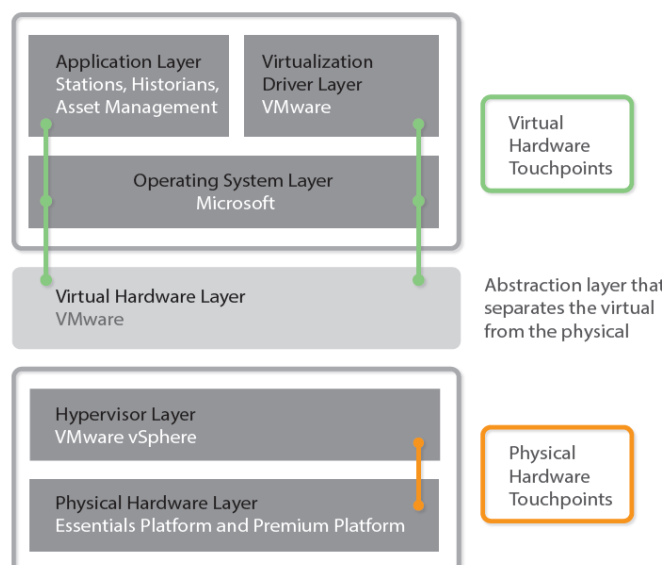
For those that are new to virtualization, the Experion Virtualization Solutions Product Information Note may be useful in explaining Honeywell's offering. See the link at the front of this document.

This document is designed to be read by both Honeywell customers and employees

2. Virtual Hardware

Virtual hardware is a software-emulated hardware layer that sits between the hypervisor and the operating systems used to run the applications. It emulates a motherboard with particular graphics, USB, sound and other capabilities. Honeywell's hypervisor supplier, VMware provides separate release and support cycles for the virtual hardware. This is important as the virtual hardware touches the operating system and applications inside the virtual machine. Extended stability in this layer brings about simplified qualification of Honeywell's operating system/application solutions, reduced retesting and improved lifecycle.

Honeywell tests and qualifies Experion against a given version of Virtual Hardware. The benefit of this is that if the hypervisor layer changes it doesn't invalidate the testing that Honeywell did against a particular version of the Virtual Hardware.



Because Honeywell testing is with the Virtual Hardware, it's very important to understand the mapping between virtual hardware versions and the Hypervisor Layer

Virtual Hardware to vSphere Mappings

Hypervisor Version ⁹	Supported versions of Virtual Hardware
VMware vSphere 4.0 ⁶	Version 7 (Default) and 4
VMware vSphere 4.1 ⁶	Version 7 (Default) and 4
VMware vSphere 5.0 ⁶	Version 8 (Default), 7 and 4
VMware vSphere 5.1 ⁶	Version 9 (Default), 8, 7 and 4
VMware vSphere 5.5 ^{6,8}	Version 10 (Default), 9, 8, 7 and 4
VMware vSphere 6.0 ^{1,2}	Version 11 (Default), 10, 9, 8, 7, and 4
VMware vSphere 6.5 ³	Version 13 (Default), 11, 10, 9, 8, 7, and 4

Note 1: VMware vSphere version 6.0 is currently supported with the BladeCenter S Premium Platform

Note 2: VMware vSphere version 6.0 is currently supported with the FC630-based Next Generation Premium Platform and the Honeywell Essentials Platform

Note 3: VMware vSphere version 6.5 is currently supported with the FC640-based Next Generation Premium Platform, Premium Platform HD and the Honeywell Essentials Platform

Note 4: Honeywell supports all cumulative updates and monthly updates for the current Hypervisor version and the previous versions as outlined in the [Experion Update Matrix](#)

Note 5: Virtual Hardware allows for technical compatibility with VMware releases other than what is being shipped or documented (Current Version). This provides the flexibility to use Honeywell applications in IT environments that may not be the same as our current version. While there may be technical compatibility, Honeywell has limited ability to directly support versions outside of the “Current Version” identified. See “HPS Virtualization Technical Assistance Policy”

Note 6: VMware vSphere version 4.x, 5.0, 5.1, and 5.5 have reached the end of general support phase as per VMware lifecycle support [policy](#) and therefore has limited Honeywell support available.

Note 7: Not all Honeywell applications support each version of virtual hardware. See section 3 for the versions of virtual hardware that are supported by each application.

Note 8: Experion R5xx requires vSphere 5.5U3 or later.

Note 9: The VMware vCenter Server 6.7 appliance (VCSA) has been released for introduction with Honeywell supported vSphere ESXi versions. Refer to the Software Change Notice (SCN) for compatibility and details. This support is for the VMware vCenter Server only - VMware vSphere ESXi 6.7 is not supported for installation on Honeywell virtualization host servers.

Virtual Hardware to VMware Workstation Mappings

Virtual machines installed in VMware Workstation should utilize the latest virtual hardware version that is defined in Section 3 of this document (Compatibility Matrix).

Examples of Virtual Hardware, Hypervisor Versions and Experion Release Mappings

1. Experion 410 which was qualified on VMware Virtual Hardware version 8 and version 7 would be able to run on either vSphere 4.x, 5.x or 6.x releases.
2. Experion R431 supports virtual hardware version 10, version 9, version 8 and version 7. What this means is that Experion R431 is able to run on version 6.x, 5.x and 4.x of vSphere.
3. Experion R511 supports virtual hardware version 13, version 11 and version 10. What this means is that Experion R510 is able to run on version 6.x and 5.5U3 of vSphere.

3. Compatibility Matrix

This compatibility matrix is designed to show all of the current HPS Applications that support Virtualization. Each application has a certified or approved status. This is to depict the type of testing that has been conducted with the main difference being whether in depth performance modeling has been conducted. More information can be found in the HPS Virtualization Technical Assistance Policy. The definitions can also be found in section 7 of this guide.

Product	Releases	Virtual Hardware Versions Tested	Virtualization Support Status	Included Applications	Notes / Exclusions
Advanced Alarm Management (AAM)	R310 and R320	v4, v7	Certified	ACM, AEA, UA	
Asset Manager (AM)	R400, R410 and R430	v4, v7	Approved		
AM A&E (Matrikon Alarm Manager A&E)	4.3.3	v7	Approved		
AM MOC (Matrikon Alarm Manager MOC)	3.0.5	v7	Approved		
Business FLEX	R230, R240, R241 and R242	v4, v7 (R230, R240) v4, v7, v8, v9 (R241, R242)	Certified	- Operating Instructions - Operations Monitoring - Operator Logbook - KPI Manager - Production Balance - Production Scheduler - Blend Management - LIMS - Business Hiway XML - Workcenter	
Business FLEX	R250	v10, v11 (R250)	Approved	- Operating Instructions - Operations Monitoring - Operator Logbook - Production Balance - Blend Management - LIMS - Workcenter	The following are retired from Business FLEX R250 onwards: - KPI Manager - Production Scheduler - Business Hiway XML
Blending and Movement Automation (BMA)	R340.2 and up, R400.x, R401.x, R410.x and R430.x	v4, v7 (R340.2 and up, R400.x, R401.x, R410.x) v7, v9 (R430.x)	Approved	- Blending Instructions - Blend Performance Monitor - Experion Blend Controller - Experion Ratio Controller - Experion Tank Monitor - LIMS Viewer - Inventory Monitor - Movement Automation - OpenBPC	Notes: - Supported for all BMA applications starting with BMA R340.2, except for the C300-based portion of the EBC, ERC and ETM applications.
Profit Blending and Movement (PBM)	R431.x and R50x	v7, v8, v9, v10 and v11	Approved	- Blending Instructions - Blend Performance Monitor - Experion Blend Controller - Experion Tank Monitor - LIMS Viewer - Profit Blend Controller - Profit Blend Optimizer - Profit Inventory Monitor - Profit Movement Management	Notes: - Supported for all PBM applications, except for the C300-based portion of the PBC, EBC and ETM applications. - Starting with PBM R431.1, PBM is the new name for the BMA suite of applications.
Capacity Distribution Planner	R210	v4, v7	Approved		
Collaborative Planning	R102	v4, v7	Approved		
Matrikon Control Performance Monitor (CPM)	5.6.0	v7	Approved		
Matrikon Equipment Condition Monitor (ECM)	5.4.1	v7	Approved		
Domain Controller	n/a	v7, v9, v10, v11	Certified		
DVM	R400.2 SP1, R500, R600, and R700	v7	Approved	- Database Server - Camera Server - Analytics Server	Notes: - Restricted location of DVM nodes. Note 2
DynAMo Alarm Suite	R120, R200	V7, v8, and v9 (R120) V7, v8, v9, v10, v11 (R200)	Approved	- DynAMo D&E (legacy ACM) - DynAMo M&R - DynAMo A&N (legacy UA)	
DynAMo Operations Suite	R120.1 R121.1 R200.1 R210.1 R211.1 R220.1 R230.1 R230.2	v8 (R120.1, R121.1) v9 (R200.1, R210.1) v10 (R211.1) v11 (R220.1, R230.1, R230.2)	Certified	DynAMo® Operations Monitoring DynAMo® Operations Logbook DynAMo® Operation Instruction DynAMo® Operations Tasks Limit Repository	R211.2, R211.4 are point releases and comply v10 version.

Product	Releases	Virtual Hardware Versions Tested	Virtualization Support Status	Included Applications	Notes / Exclusions
EBI & EIS	R400.2 SP1 and R430	v7	Approved		
EBR Manager	R43x	v7, v9, and v10	Approved	Manager Server	
EBR Manager	R50x	v10 and v11	Approved	Manager Server	
Equipment Health Monitoring (EHM)	R200	v4, v7	Approved	Asset Manager	Supported only in latest release AM R400, EHM R200
Experion PKS for SCADA, Cxx & vUOC Controllers	R51x, R50x, R432.x, R431.x, R430.x, R41x.x and R40x.x	v7 (R31x, 40x) v7 and v8 (R41x) v7, v8 and v9 (R430) v7, v8, v9 and v10 (R431) v7, v8, v9, v10 and v11 (R432) v10 and v11 (R50x) v10, v11, and v13 (R51x)	Certified	- Experion Server - Flex Station - ACE Simulation - ACE - eServer - Console Station - Cx00 Simulation - vUOC	Exclusions: - ControlNet - PCIe/PCIx/PCI Interface Cards Notes: - Serial Interfaces Note 1 - VMware features supported Note 3 - Further Information. Note 4 -vUOC supported only on EPKS R505.x, R51x.x
Experion PKS for TPS nodes	R432.x and R431.x	v7, v8, v9 and v10 (R431) v7, v8, v9, v10 and v11 (R432)	Certified	- ESVT - ES-T - ACE-T - EAPP	ETN Node Only
Experion PKS for TPS nodes	R501.x and R510.2	v10 and v11 (R501.x) v10, v11, and v13 (R510.2)	Certified	- ESVT - ES-T - ACE-T - EAPP - HM	- ELCN - ETN Node (excluding HM)
Experion PKS for TPS nodes	R501.4 R511.1 R511.2	v10 and v11 (R501.4) v10, v11, and v13 (R511.1, R511.2)	Certified	- ESVT - ES-T - ACE-T - EAPP - HM - Virtual AMR, ENIM, EHB	- ELCN - ETN Node (excluding HM) - Virtual AMR, ENIM, EHB via ELCN UVA ⁵
Experion PKS for TPS nodes	R501.6	v10 and v11 (R501.6)	Certified	- ESVT - ES-T - ACE-T - EAPP - HM - Virtual AMR, ENIM, EHB, NG	- ELCN - ETN Node (excluding HM) - Virtual AMR, ENIM, EHB, NG via ELCN UVA ⁵
PlantCruise by Experion and Experion LX for SCADA and S8 Cxx controllers	R12x.x	v7 (R31x, 40x) v7 and v8 (R41x) v7, v8 and v9 (R43x) v10, v11 (R50x)	Certified	- Engineering Station - Flex Station - eServer - Direct Station - Simulation node (SCE)	Notes: - VMware features supported. Note 3 - Further Information. Note 4
Experion HS	R430.x, R41x.x, R40x.x and R31x.x	v7 for R43x.x, R41x.x, R40x.x and R31x.x v10, v11 (R50x)	Certified	- Experion Server - Flex Stations	Notes: - Serial Interfaces. Note 1
Experion LS	R41x.x, R40x.x, and R31x.x	v7 for R40x.x and R31x.x	Certified	- Experion Server - eServer - Flex Stations - ACE - ACE Simulation - Cx00 Simulation Control Environment	Notes: - Serial Interfaces. Note 1
FDM	R410, R430, R440, R450, R500, R501.1, R501.2, R501.3	v4, v7 (R410, R430, R440, R450) v10 (R500) v11 (R501.1, R501.2) v13 (R501.3)	Certified	- FDM Server - FDM Client and RCI - FDM Gateway	
Field Advisor	R110, R120 and R201	v4, v7	Approved		Notes: - Approved virtual topologies are documented in Field Advisor™ Hardware and Software Environment Guide
Intuition Executive	R1.6	v7, v8	Certified		
Intuition Product Core (IPC)	R101, R200 and R201	v4, v7	Approved		
KPI Manager built on Intuition platform (KPI)	R100	v8	Certified		
Honeywell Mine to Port (MTP)	R100.5.x	v8	Approved		
Matrikon Operational Insight (OI)	3.5.1	v7	Approved		

Product	Releases	Virtual Hardware Versions Tested	Virtualization Support Status	Included Applications	Notes / Exclusions
Da Vinci QCS MXProLine QCS	RAE 5 Update 6	v10	Certified	Operator Station Application Server	VMware Workstation based virtualization of legacy versions of Da Vinci and MXProLine platform on current OS and PC Hardware Exclusions: - AllianceView - ProcessView - Quality Server - Quality Optimizer (for QCS) and - TMMS
Da Vinci QCS MXProLine QCS	RAE 5 Update 6	V10, v9	Certified	Operator Station Experion MX Server MXProLine Server AllianceView	ESXi based Virtualization of legacy versions of Da Vinci and MXProLine platform on current OS and PC Hardware
Experion MX QCS MXProLine QCS	R603, R610, R611, R612, R614 and R615	v10, v9 and v8 (all R603 and R61x releases)	Certified	Experion MX server MXProLine server Operator Station AllianceView	Supported installation scenarios: - QCS only - Integrated QCS with EPKS Server - Operator Station, AllianceView
Experion MX QCS MXProLine QCS	R700.x	v11, V10	Certified	Experion MX server MXProLine server Operator Station AllianceView	Supported installation scenarios: - QCS only - Integrated QCS with EPKS Server - Operator Station, AllianceView
OptiVision	R530	v4	Approved	- OptiVision - Quality Optimizer - RMM - Actual Costing	
OneWireless vWDM	R320.2	v13	Certified	-Virtual Wireless Device Manager (vWDM)	Refer to the vWDM documentation for deployment considerations.
Experion PMD including PMD and FCE controllers	R910.x R900.x R830.x and R831.x	v11 and v10 (R910.x) v11 and v10 (R900.x) v10 and v9 (all R83x releases)	Certified	- Experion PMD server - Experion PMD HMI - Experion PMD HMI with Console Station - Experion PMD Remote HMI server (RHS) - Experion PMD Design Module	
Uniformance® Process Data Historian (PHD)	R310 R320 R321 R340 and R400	v9(R310 and R320) v10(All) v11(R340 and R400)	Approved	-PHD Server - OPC Server -Application Servers - PCT	Contact Honeywell for details on recommended settings for PHD
Uniformance® Process Studio (UPS)	R310 R320 R321 R322	v10 (all) v11(R321 and R322)	Approved	UPS, Excel Companion	
Uniformance® Insight	R101 R102 R110 R200 R210	v10, v11(for all releases)	Approved		
Procedure Analyst	R6.1, R400, R410, and R430	v7	Approved		
Profit Suite	R400, R411, R412 and R430	v4,v7	Certified		
Matrikon Tai-Ji PID (TJ PID)	3.0.1	v7	Approved		
UniSim Design (USD)	R390, R400 and R410	v4, v7	Approved		
UniSim Operator (USO)	R330, R400 and R410	v4, v7	Certified		Notes: - Supplementary performance specification available. - ULM licensing only supported as hardware based network license or Ethernet connected USB hub with USB network license dongle. UniSim is off-process

Note 1: Must be provided through the use of Terminal Servers

Note 2: DVM systems that fit the Performance profile require the virtual DVM applications to be running on a separate host from virtual on-process Experion Server applications. The performance DVM System's profile is defined in the DVM compatibility matrix (includes systems with more than 1000 recordings per hour for redundant systems, or more than 2000 recordings per hour for non-redundant systems)

Note 3: Honeywell has tested and supports the base functionalities provided as part of Honeywell supplied VMware Essentials Plus and vSphere Standard including vMotion and HA. If you have any different edition of vSphere that is not supplied through Honeywell standard channel, Honeywell support is restricted to only these set of tested functionalities.

Note 4: For further information, please see the Experion *Virtualization Planning and Implementation Guide* in the additional documents section.

Note 5: Refer to the *Experion LCN Overview and Implementation Guide* for deployment guidance.

4. Performance Matrix

The performance matrix is designed to show the amount of resources that are required by each VM. This helps a user to be able to figure out the amount of VMs that they can fit into a given virtualization host (the physical machine running the VMs). The bigger and more powerful the host, the more VMs it is able to run. The resources required by a given VM is related to a performance profile. The performance profile describes how that VM was loaded for it to require those performance resources, and descriptions of the performance profiles are noted in section 5. Note that VMs may require additional memory due to the installation of other applications, and a VM's memory should be increased as necessary to ensure the workload performs at the optimal performance.

Whether a product and node appears in this list is generally a factor of the support status noted in the previous table. Honeywell's aim is to add more applications into this table over time.

Note: Resources for Experion R5xx virtual machines are listed separately from previous Experion releases and will include the identifier (R5xx) in the Node description.

Product	Node	Performance Profile	Virtual Machine CPU Allocation (MHz)	Virtual Machine CPU Quantity	Virtual Machine Memory (GB) <small>Note-7</small>	Virtual Machine Disk Avg (IOPs)	Virtual Machine Disk Max (IOPs)	Virtual Machine Network (Mbps)	Disk Size GB	Data Rate of Change <small>Note 1</small>
Experion Common Nodes	Experion eServer	Profile 1	1050	1	2	10	50	1	80	--
	Experion eServer	Profile 2	3000	2	2	10	70	1	80	--
	Experion eServer	Profile 3	3300	2	2	20	100	1	80	--
	Experion eServer	Profile 4	3700	2	2	20	200	1	80	--
	Experion eServer (R50x)	Profile 4	3700	4	12	20	200	1	100	--
	Experion eServer (R51x)	Profile 4	3700	4	16 ^{Note-8}	20	200	1	160	--
	Experion Server (EMDB only)	Standard	6600	4	4	70	700	10	80	--
	Experion Server (EMDB only) (R50x)	Standard	6600	4	12	70	700	10	100	--
	Experion Server (EMDB only) (R51x)	Standard	6600	4	16 ^{Note-8}	70	700	10	160	--
	EAS (R4xx)	Standard	3100	2	4	10	60	5	80	--
	EAS (R50x)	Standard	3100	3	4	10	60	5	100	--
	EAS (R51x)	Standard	3100	3	8	10	60	5	160	--
	EAS (R4xx)	Performance	3100	2	4	80	850	5	80	--
	EAS (R50x)	Performance	3100	3	4	80	850	5	100	--
	EAS (R51x)	Performance	3100	3	8	80	850	5	160	--
	Experion Station – Flex (R4xx)	Standard	2000	2	2	5	140	5	40	60
	Experion Station – Flex (R50x)	Standard	2000	3	4	5	140	5	100	60
	Experion Station – Flex (R51x)	Standard	2000	3	8	5	140	5	100	60
	Experion Station – Flex (R4xx)	Performance	2500	2	2	10	140	5	80	60
	Experion Station – Flex (R50x)	Performance	2500	4	4	10	140	5	100	60
	Experion Station – Flex (R51x)	Performance	2500	4	8	10	140	5	100	60
	Experion Station - Flex (Engr) (R4xx)	Performance	3000	2	3	80	300	10	80	60
	Experion Station - Flex (Engr) (R50x)	Performance	3000	4	4	80	300	10	100	60
	Experion Station - Flex (Engr) (R51x)	Performance	3000	4	8	80	300	10	100	60
	RESS* (R4xx)	Standard	6600	4	4	70	700	10	80	--
	RESS* (R50x)	Standard	6600	4	4	70	700	10	100	--

Product	Node	Performance Profile	Virtual Machine CPU Allocation (MHz)	Virtual Machine CPU Quantity	Virtual Machine Memory (GB) <small>Note-7</small>	Virtual Machine Disk Avg (IOPs)	Virtual Machine Disk Max (IOPs)	Virtual Machine Network (Mbps)	Disk Size GB	Data Rate of Change <small>Note 1</small>	
	RESS* (R51x)	Standard	6600	4	8	70	700	10	100	--	
Experion DCS or LS or PlantCruise by Experion or Experion LX	Experion Server, ESVT note-4 (R4xx)	Standalone	2500	2	2	40	450	10	80	550	
	Experion Server, ESVT note-4 (R4xx)	Minimum	3200	2	2	70	400	10	80	550	
	Experion Server, ESVT note-4 (R4xx)	Standard	5600	3	4	80	500	10	100	550	
	Experion Server, ESVT note-4 (R50x)	Standard	5600	3	12	80	500	10	160	550	
	Experion Server, ESVT note-4 (R51x)	Standard	5600	3	16 ^{Note-8}	80	500	10	160	550	
	Experion Server, ESVT note-4	Performance	8000	4	8	85	600	25	160	550	
	Experion Server, ESVT note-4 (R50x)	Performance	8000	6	12	85	600	25	160	550	
	Experion Server, ESVT note-4 (R51x)	Performance	8000	6	20 ^{Note-8}	85	600	25	160	550	
	SCE (R4xx)	Standard	2000	2	2	5	50	3	80	--	
	SCE (R50x)	Standard	2000	2	2	5	50	3	100	--	
	SCE (R51x)	Standard	2000	2	8	5	50	3	100	--	
	SCE (R4xx)	Performance	3700	2	2	10	350	5	80	--	
	SCE (R50x)	Performance	3700	4	4	10	350	5	100	--	
	SCE (R51x)	Performance	3700	4	8	10	350	5	100	--	
	ACE, ACE (TPS), EAPP (TPS) note-4 (R4xx)	ACE, ACE (TPS), EAPP (TPS) note-4 (R4xx)	Standard	2000	2	2	5	50	3	80	--
		ACE, ACE (TPS), EAPP (TPS) note-4 (R4xx)	Performance	3700	2	2	10	350	5	80	--
ACE, ACE (TPS), EAPP (TPS) note-4 (R50x)		Standard	2000	2	2	5	50	3	100	--	
ACE, ACE (TPS), EAPP (TPS) note-4 (R51x)		Standard	2000	2	8	5	50	3	100	--	
ACE, ACE (TPS), EAPP (TPS), HM (TPS) note-4 (R50x)		Performance	3700	4	4	10	350	5	100	--	
ELCN History Module (R50x)		Performance	3700	2	4	10	350	5	100	--	
ACE, ACE (TPS), EAPP (TPS), HM (TPS) note-4 (R51x)		Performance	3700	4	8	10	350	5	100	--	
ELCN History Module (R51x)		Performance	3700	2	8	10	350	5	100	--	
Experion PKS ELCN & ENIM Virtual Appliance (UVA ⁹)		Experion PKS ELCN & ENIM Virtual Appliance	Embedded Virtual Appliance (UVA ⁹)	2000	2	0.5	20	80	10	1	--
		Experion PKS IT HIVE Tunnel Appliance	Standard	2000	2	1	5	5	250	1	--
Experion DCS or LS or PlantCruise by Experion or Experion LX	Experion Station – Console (R4xx)	Standard	4500	2	3	30	260	5	80	250	
	Experion Station – Console (R50x)	Standard	4500	4	8	30	260	5	100	250	
	Experion Station – Console (R51x)	Standard	4500	4	8	30	260	5	100	250	
	Experion Station – Console (R4xx)	Performance	5500	4	4	50	280	30	80	250	

Product	Node	Performance Profile	Virtual Machine CPU Allocation (MHz)	Virtual Machine CPU Quantity	Virtual Machine Memory (GB) <small>Note-7</small>	Virtual Machine Disk Avg (IOPs)	Virtual Machine Disk Max (IOPs)	Virtual Machine Network (Mbps)	Disk Size GB	Data Rate of Change <small>Note 1</small>
	Experion Station – Console (R50x)	Performance	5500	4	8	50	280	30	100	250
	Experion Station – Console (R51x)	Performance	5500	4	8	50	280	30	100	250
	Experion Station – ES-T (R501)	Performance	5500	4	8	50	280	30	100	250
	Experion Station – ES-T (R51x)	Performance	5500	4	8	50	280	30	100	250
	Experion Station - Console Extn (R4xx)	Standard	2000	2	2	5	140	5	40	60
	Experion Station - Cons Extn (R50x)	Standard	2000	3	4	5	140	5	100	60
	Experion Station - Cons Extn (R51x)	Standard	2000	3	8	5	140	5	100	60
	Experion Station - Cons Extn (R4xx)	Performance	2500	2	2	10	140	5	80	60
	Experion Station - Cons Extn (R50x)	Performance	2500	4	4	10	140	5	100	60
	Experion Station - Cons Extn (R51x)	Performance	2500	4	8	10	140	5	100	60
Experion PKS vUOC	Virtual UOC	Standard	2000	2	0.5	5	20	3	1	--
Experion SCADA or HS	Experion Server (R4xx)	Standard	3600	3	3	70	600	10	100	550
	Experion Server (R50x)	Standard	3600	3	12	70	600	10	160	550
	Experion Server (R51x)	Standard	3600	3	16 ^{Note-8}	70	600	10	160	550
	Experion Server (R4xx)	Performance	8600	4	4	90	800	10	160	550
	Experion Server (R50x)	Performance	8600	4	12	90	800	10	160	550
	Experion Server (R51x)	Performance	8600	4	20 ^{Note-8}	90	800	10	160	550
AAM	AEA	Standard	3100	2	4	70	600	5	80	--
	AEA	Performance	3100	2	4	180	1000	5	80	--
	AEA Client	Standard	2100	1	2	5	80	3	30	--
	UA-EAS	Standard	3100	2	4	10	60	5	80	--
	UA-EAS	Performance	3100	2	4	80	850	5	80	--
	UA Client	Standard	2700	1	2	5	30	2	30	--
	ACM - Manager Server	Standard	2200	2	4	5	140	5	80	--
	ACM - Manager Server	Performance	2800	2	4	20	400	5	80	--
	ACM - Enforcer Server/ EAS	Standard	1400	2	4	10	30	2	80	--
	ACM - Enforcer Server/ EAS	Performance	2800	2	4	20	250	5	80	--
	ACM Client	Standard	2300	1	2	5	70	1	30	--
	ACM Client	Performance	2300	2	2	5	170	3	30	--
FDM	FDM Server	Standard	4500	2	3	100	500	10	60	--
	FDM Server	Performance	5500	4	8	170	800	10	80	--
	FDM Client/RCI	Standard	1600	1	2	5	50	5	40	--
	FDM Gateway	Standard	1200	1	1	5	50	2	80	--
BMA/PBM	MA/PMM Control Server	Standard	5600	3	16	80	500	10	100	--
	MA/PMM Control Server	Performance	10000	8	20	145	600	25	200	--
	MA Utility/LIMS Viewer Server	Standard	5600	3	12	80	500	10	80	--
	MA Utility/LIMS Viewer Server	Performance	5600	3	12	80	500	10	100	--
	OpenBPC/PBO Server	Standard	5600	3	12	30	500	10	100	--
DVM	Database Server Note 2,3	Standard	--	4	8	--	--	--	80	--
	Camera Server Note 2,3	Standard	--	4	4	--	--	--	40	--

Product	Node	Performance Profile	Virtual Machine CPU Allocation (MHz)	Virtual Machine CPU Quantity	Virtual Machine Memory (GB) <small>Note-7</small>	Virtual Machine Disk Avg (IOPs)	Virtual Machine Disk Max (IOPs)	Virtual Machine Network (Mbps)	Disk Size GB	Data Rate of Change <small>Note 1</small>
	Analytics Server Note 2,3	Standard	--	4	4	--	--	--	80	--
ProfitSuite	Profit Suite Note 3	Standard	2000	2	2	5	50	3	80	--
	Profit Suite Note 3	Performance	3700	2	2	10	350	5	80	--
PHD	PHD Server Note 3	Small	2000	2	4	--	--	--	100	--
	PHD Server Note 3	Medium	4000	4	8	--	--	--	250	--
	PHD Server Note 3	Large	8000	8	16	--	--	--	500	--
	PHD Server Note 3	X Large	16000	16	24	--	--	--	500	--
UniSim	Design Note 3	Standard	2000	2	2	5	50	3	80	--
	Design Note 3	Performance	3700	2	2	10	350	5	80	--
	Operations Note 3	Standard	2000	2	2	5	50	3	80	--
	Operations Note 3	Performance	3700	2	2	10	350	5	80	--
QCS	QCS server (Standard Experion MX)	Standard	17600	8	8	35	283	9	100	--
	QCS Server (Large- QCS only and integrated)	Performance	17600	8	16	31	350	12	100	--
	QCS server (Standard MXProLine)	Standard	4915	2	4	35	257	9	100	--
	QCS server (Large MXProLine)	Performance	9830	4	8	35	283	9	100	--
	QCS OP Station	Standard	3998	2	4	2	77	6	100	--
	QCS Alliance View Server	Standard	7996	4	8	5	587	7	100	--
	QCS Server (Minimum Experion MX R700.x)	Minimum	10396	4	12	20	441	8	150	--
	QCS server (Standard Experion MX R700.x)	Standard	14400	6	16	37	289	9	150	--
	QCS Server (Large Experion MX R700.x)	Performance	14400	6	24	34	361	12	150	--
	QCS server (Standard MXProLine R700.x)	Standard	5600	4	8	37	262	9	150	--
	QCS server (Large MXProLine R700.x)	Performance	9830	6	16	37	289	9	150	--
	QCS OP Station (R700.x)	Standard	4200	4	8	4	81	6	150	--
	QCS Alliance View Server 8 Thin Client (R700.x)	Standard	7996	4	16	7	596	7	150	--
	QCS Alliance View Server, 4 Thin Client (R700.x)	Standard	7996	4	12	7	596	7	150	--
OneWireless	Virtual Wireless Device Manager (vWDM)	Standard	6600	8	11	3	20	5	100	--
Experion PMD	PMD Server	Minimum	4500	3	4	73	450	10	80	--
	PMD Server (R900)	Minimum	5200	4	5	73	450	10	160	--
	PMD Server (R910)	Minimum	5200	4	16	73	450	10	160	--
	PMD Server	Standard	5600	4	5	85	546	10	80	--
	PMD Server (R900)	Standard	6500	5	6	85	546	10	160	--
	PMD Server (R910)	Standard	6500	5	16	85	546	10	160	--
	PMD Server	Performance	12000	8	8	180	750	30	160	--
	PMD Server (R900)	Performance	12600	9	9	180	750	30	160	--

Product	Node	Performance Profile	Virtual Machine CPU Allocation (MHz)	Virtual Machine CPU Quantity	Virtual Machine Memory (GB) <small>Note-7</small>	Virtual Machine Disk Avg (IOPs)	Virtual Machine Disk Max (IOPs)	Virtual Machine Network (Mbps)	Disk Size GB	Data Rate of Change <small>Note 1</small>
	PMD Server (R910)	Performance	12600	8	22	180	750	30	160	--
	PMD Design Module (R910)	Minimum	3900	3	3	10	680	4	80	--
	PMD Design Module	Performance	4500	4	3	12	750	5	40	--
	PMD Design Module (R900)	Standard	3900	3	3	10	680	4	40	--
	PMD Design Module (R910)	Standard	3900	3	3	10	680	4	80	--
	PMD Design Module (R900)	Performance	4500	4	3	12	750	5	40	--
	PMD Design Module (R910)	Performance	4500	4	4	12	750	5	80	--
	PMD HMI	Performance	4000	4	3	10	689	5	80	--
	PMD HMI (R900)	Minimum	2600	2	3	9	540	4	100	--
	PMD HMI (R910)	Minimum	2600	3	8	9	540	4	100	--
	PMD HMI (R900)	Standard	3200	3	3	10	580	4	100	--
	PMD HMI (R910)	Standard	3200	4	8	10	585	4	100	--
	PMD HMI (R900)	Performance	4200	4	4	10	689	5	100	--
	PMD HMI (R910)	Performance	4200	4	10	13	683	5	100	--
	Integrated PMD HMI with QCS Operator Station	Standard	7800	6	10	14	664	5	150	
	PMD HMI on Console Station	Performance	5500	4	4	10	703	25	80	--
	PMD HMI on Console Station (R900)	Performance	5200	4	5	60	703	25	100	--
	PMD RHS (R910)	Minimum	5200	4	8	10	760	7	100	--
	PMD RHS	Standard	5600	4	4	10	760	7	80	--
	PMD RHS (R900)	Standard	5200	4	5	10	760	7	100	--
	PMD RHS (R910)	Standard	5600	4	8	11	765	8	100	--
	PMD RHS	Performance	7000	4	6	16	780	8	80	--
	PMD RHS (R900)	Performance	7800	6	8	16	835	8	100	--
	PMD RHS (R910)	Performance	7800	6	8	16	790	8	100	--
	Experion PMD HMI - Console Station (R910.x)	Minimum	4500	4	8	30	260	6	100	--
	Experion PMD HMI - Console Station (R910.x)	Standard	4500	4	8	30	260	6	100	--
	Experion PMD HMI - Console Station (R910.x)	Performance	6500	5	10	50	280	30	100	--
Microsoft	Domain Controller	Standard	220	2	2	5	50	1	40	--
	WSUS Note 3	Standard	3300	2	2	50	200	10	160	--
VMware	vCenter Server 6.x	Standard	2500	4	8	20	200	5	120	--
	vCenter Server Appliance (VCSA 6.5)	Standard	2500	4	16	20	200	5	290	
	vCenter Server Appliance (VCSA 7.0)	Standard	2500	4	19	20	200	5	480	
	Site Recovery Manager (SRM)	Standard	800	2	2	10	100	1	30	--
	vSphere Client	Standard	800	1	2	10	50	1	30	--
Misc	Service Node	Standard	2000	4	8	50	250	25	150	--
	ePO	Standard	2670	4	8	50	250	25	80	--
	NSX Manager	Standard	2000	4	16	50	250	25	60	--
	SVM Appliance	Standard	800	2	4	10	100	10	8	--

Product	Node	Performance Profile	Virtual Machine CPU Allocation (MHz)	Virtual Machine CPU Quantity	Virtual Machine Memory (GB) <small>Note-7</small>	Virtual Machine Disk Avg (IOPs)	Virtual Machine Disk Max (IOPs)	Virtual Machine Network (Mbps)	Disk Size GB	Data Rate of Change <small>Note 1</small>
	Guest Introspection	Standard	800	2	6	10	100	10	2	--
	Relay Server	Standard	1500	2	4	10	100	25	80	--
	OPC Server	Standard	300	2	2	5	20	1	30	--
	OPC Server	Performance	2000	2	2	10	50	5	30	--
	EDS	Standard	3100	2	4	10	60	5	80	--
	EDS	Performance	3100	2	4	80	850	5	80	--
	EBR Server (w/o de-duplication feature) Note 5	Standard (EBR R431)	3300	2	4	90	220	10	40	--
	EBR Server (w/ de-duplication feature) Note 5,6	Standard (EBR R431)	3300	2	16	90	220	10	40	--
	EBR Virtual Agent	Standard (EBR R431)	3300	2	1	10	10	10	5+1	
	EBR Server R500	Standard (EBR R500)	2000	3	4	50	250	1	40	--
	EBR Server (w/o de-duplication feature) Note 5	Standard (EBR R501)	3300	3	4	50	250	10	60	--
	EBR Server (w/ de-duplication feature) Note 5,6	Standard (EBR R501)	3300	3	16	50	250	10	60	--
	EBR Virtual Agent	Standard (EBR R500, R501)	3300	2	8	10	10	10	5+1	--
	EBR All-in-One Appliance	Standard (EBR R501)	3300	2	6	50	250	10	40	--

Note 1: Represents the amount of data (MB) changing on the disk over a period of 1 hour.
 Note 2: Only partial performance data only available at this time.
 Note 3: Approximation only at this time.
 Note 4: Virtualization of TPS nodes (ESVT, ES-T, ACE and EAPP) is supported only from Experion R431 onwards. See Section 3 for details.
 Note 5: Doesn't include any space for backup storage.
 Note 6: Data De-duplication is an optional feature for improving data storage utilization.
 Note 7: Recommended memory requirements are for guidelines only which may vary based on customer project specific configuration. Experion platforms may require additional memory due to the installation of other supported Experion and 3rd party advanced applications, and a Experion platform memory should be increased as necessary to ensure that Experion applications performs at the optimal performance.
 Note 8: Experion R51x server nodes must maintain 20% minimum available memory. Refer to the Experion R51x HMI Specification for details.
 Note 9: Refer to the *Experion LCN Overview and Implementation Guide* for deployment guidance.

5. Performance Profiles

These are the descriptions of the performance profiles that are used in section 4. The performance profile describes how that VM was loaded for it to require those performance resources.

Product	Node	Performance Profile	Profile Description	
Experion Common Nodes	eServer	Profile 1	Refer to the release specific Experion PKS HMI Specification for performance profile descriptions and parameter specifications.	
	eServer	Profile 2		
	eServer	Profile 3		
	eServer	Profile 4		
	Station	Economy or Standard		
	Station	Performance		
	Experion HS/LS/SCADA/LX or DCS or PlantCruise by Experion	Server		Standalone
		Server		Minimum
		Server		Standard
		Server		Performance
ACE		Standard		
QCS	QCS Server	Standard	Max 4 Scanners, 4 Thin Clients, Std or MDMV, Std CD	
	QCS Server	Performance	All which exceeds requirements of Standard configuration	
	MXProLine Server	Standard	Without any thin client	
	MXProLine Server	Performance	Max 4 Scanners, 4 Thin Clients	
	QCS Op Station	Standard	--	
	QCS Alliance View Server	Standard	Max 8 thin client	
	QCS server (Standard MXProLine R700.x)	Standard	Max 2 Scanners Max 2 Sensors with MXProLine Base Software, Without Thin clients	
	QCS server (Large MXProLine R700.x)	Performance	Max 4 Scanners, Max 4 Sensors 4 Thin Clients	
	QCS Server (Experion MX R700.x)	Minimum	Max 2 Scanner, Max 5 Sensor across 2 scanners. No Thin Clients, Traditional MD, No CD Control	
	QCS server (Standard Experion MX R700.x)	Standard	Max 4 Scanner, Max 10 Sensor across 4 scanners. 4 Thin Clients, Traditional MD, Traditional CD	
	QCS Server (Large- QCS only and Integrated)(R700.x)	Performance	Max 6 Scanner, Max 16 Sensor across 4 scanners. 4 Thin Clients, MDMV, CDMV, Max up to 634 actuator	
	QCS OP Station (R700.x)	Standard		
QCS Alliance View Server 8 Thin Client (R700.x)	Standard	Max 8 thin client		

	QCS Alliance View Server, 4 Thin Client (R700.x)	Standard	Max 4 thin client
PMD	Experion PMD Server	Minimum	Systems with up to: <ul style="list-style-type: none"> • 5000 Process Points (Combination of Licensed and Non-licensed points in PMD) • 5 Flex Stations • 1 DM Node • 1 RHS Server with Multi Departments access and Office level access (Standard) • 5 PMD+FCE controllers combined • Redundancy • Console Station: (Optional- EPKS Guideline has to be followed)
	Experion PMD Server	Standard	Systems with up to: <ul style="list-style-type: none"> • 10000 Process Points (Combination of Licensed and Non-licensed points in PMD) • 20 Flex Stations • 1 DM Node • 1 RHS Server with Multi Departments access and Office level access (Performance) • 10 PMD+FCE controllers combined • Redundancy • Console Station: (Optional- EPKS Guideline has to be followed)
	Experion PMD Server	Performance	Systems with maximums specified in the Server Spec <ul style="list-style-type: none"> • PHD Connected • 45000 Points (Combination of Licensed and Non-licensed points in PMD) • 10 DM nodes • 40 Flex Stations (Combination of Flex, Console and RHS Clients) • 30 PMD+FCE controllers combined (including Redundancy- 15 redundant Pairs) • Redundancy
	Experion PMD RHS Server	Standard	PMD Remote HMI Server with 5 HMI Clients
	Experion PMD RHS Server	Performance	PMD Remote HMI Server with 10 HMI Clients
	Experion PMD Station - Flex	Standard	Performance - Flex Stations with any one of: <ul style="list-style-type: none"> • 301 to 700 dynamic parameters per display • 600 to 1500 dynamic parameters per Station computer
	Experion PMD Station - Flex	Minimum	Performance - Flex Stations with any one of: <ul style="list-style-type: none"> • 301 to 500 dynamic parameters per display • 600 to 1100 dynamic parameters per Station computer • Single Screen
	Experion PMD Station - DM (Engr)	Standard	Systems with up to: <ul style="list-style-type: none"> • 10000 Process Points
	PMD Server (R900 & R910.2)	Minimum	Systems with up to: <ul style="list-style-type: none"> • 5000 Process Points (Combination of Licensed and Non-licensed points in PMD) • 5 Flex Stations • 1 DM Node • 1 RHS Server with Multi Departments access and Office level access (Standard) • 5 PMD+FCE controllers combined • Redundancy • Console Station: (Optional- EPKS Guideline has to be followed)
	PMD Server (R900 & R910.2)	Standard	Systems with up to: <ul style="list-style-type: none"> • 10000 Process Points (Combination of Licensed and Non-licensed points in PMD) • 20 Flex Stations • 4 DM Node • 1 RHS Server with Multi Departments access and Office level access (Performance) • 10 PMD+FCE controllers combined • Redundancy • Console Station: (Optional- EPKS Guideline has to be followed)
	PMD Server (R900 * R910.2)	Performance	Systems with maximums specified in the Server Spec <ul style="list-style-type: none"> • PHD Connected • 40000 Points (Combination of Licensed and Non-licensed points in PMD) • 10 DM nodes • 40 Flex Stations (Combination of Flex, Console and RHS Clients) • 30 PMD+FCE controllers combined (including Redundancy- 15 redundant Pairs) • Redundancy
	PMD Design Module (R900 & R910.2)	Standard	Experion PMD DM (Engr) - Standard
	PMD Design Module (R900 & R910.2)	Performance	Experion PMD DM (Engr) - Performance
	PMD HMI (R900 & R910.2)	Minimum	Performance - Flex Stations with any one of: <ul style="list-style-type: none"> • 301 to 500 dynamic parameters per display • 600 to 1100 dynamic parameters per Station computer • Single Screen
	PMD HMI (R900 & R910.2)	Standard	Performance - Flex Stations with any one of: <ul style="list-style-type: none"> • 301 to 700 dynamic parameters per display • 600 to 1500 dynamic parameters per Station computer • Dual Screen
	PMD HMI (R900 & R910.2)	Performance	Performance - Flex Stations with any one of: <ul style="list-style-type: none"> • 301 to 700 dynamic parameters per display • 600 to 1500 dynamic parameters per Station computer • Quad Screen
	Integrated PMD HMI with QCS Operator Station	Standard	PMD Performance - Flex Stations with any one of: <ul style="list-style-type: none"> • 301 to 700 dynamic parameters per display • 600 to 1500 dynamic parameters per Station computer • Dual screen QCS MDMV & CD

	PMD RHS (R900 & R910.2)	Standard	PMD Remote HMI Server with 5 HMI Clients
	PMD RHS (R900 & R910.2)	Performance	PMD Remote HMI Server with 10 HMI Clients
BMA/PBM	MA/PMM Control Server	Standard	Database with up to 5000 elements
	MA/PMM Control Server	Performance	Database with up to 14000 elements
	MA Utility/LIMS Viewer Server	Standard	Database with up to 400 sample points each with 35 properties
	MA Utility/LIMS Viewer Server	Performance	Database with up to 800 sample points each with 75 properties
	OpenBPC/PBO Server	Standard	Database with up to 6 blenders
Uniformance PHD	PHD	Small	Up to 10,000 tags 4 RDIs 6-10 client connections
	PHD	Medium	10,000 – 25,000 tags 8-10 RDIs up to 10 client connections
	PHD	Large	25,000 – 50,000 tags 15 RDIs Up to 20 client connections
	PHD	X Large	50,000 – 75,000 tags 20 RDIs 50 clients
	PHD	XX Large	>75,000 tags Not currently supported on VMware

6. Experion PKS Highly Integrated Virtual Environment (HIVE)

Honeywell Experion PKS Highly Integrated Virtual Environment (HIVE) incorporates three elements – IT, IO and Control– which can be used individually or collectively, in tandem with customers’ existing systems and infrastructure.

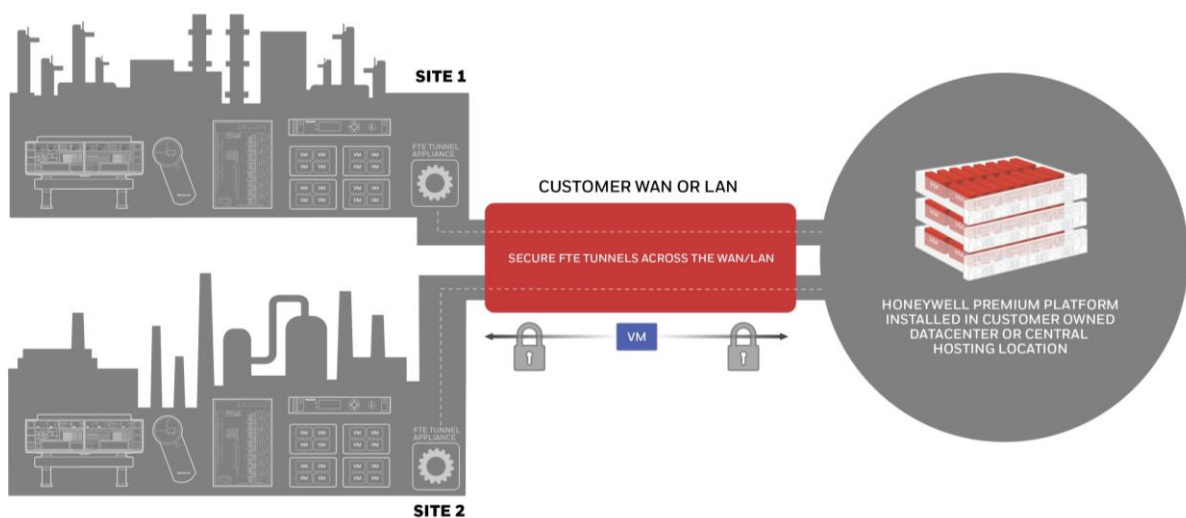
Experion PKS IT HIVE decouples production workloads from having to run at a local process facility, providing the flexibility to host these workloads locally or at a central location.

With traditional hardware deployments, IT workloads are maintained in silos that require separate management planes. Administrators must use separate panes of glass for maintenance and troubleshooting, and excess system capacity is wasted as unused computing resources. If a site incident were to occur, these traditional deployment models must have spare resources available to facilitate recovery of the workload.

Experion PKS IT HIVE solves these problems by providing a secure extension of resources in a central datacenter location. Using Honeywell-supplied Premium Platform hardware installed at the customer’s datacenter, Experion PKS IT HIVE extends multiple remote site FTE networks into a central location to provide for:

- Simpler administration and maintenance
- Centralized view of all Experion systems running at the remote sites
- The choice to run all workloads remotely, all workloads in the datacenter, or any combination in between
- The choice to connect to workloads from the datacenter to facilitate central control room operations
- Disaster recovery space in the event of an incident at a local site
- Maximization of system resources by consolidating multiple remote systems into a highly-available, centralized Premium Platform cluster located in the datacenter

EXPERION® PKS IT HIVE



Experion PKS IT HIVE is enabled using Honeywell-supplied Premium Platform infrastructure at the central datacenter location, Honeywell-supplied virtualization infrastructure at the remote sites, and a secure FTE tunnel that traverses the existing customer WAN or LAN. Using a VMware NSX Data Center tunneling appliance, Experion PKS IT HIVE creates a secure extension of the networks that links the site locations to enable connectivity. Multiple remote sites can be safely and securely hosted in the central datacenter, with all remote site network traffic isolated through the VMware NSX Data Center network virtualization layer.

Replication technology allows users to securely copy the state of a virtual machine between the central datacenter and the remote site. In the event of a double WAN/LAN failure, the replicated virtual machine can be quickly recovered without the need to restore from a system backup, allowing for a rapid restoration of the virtual machine to operation.

7. Honeywell Virtualization Hardware and Software Components

The previously mentioned Honeywell products that support virtualization can run on any server platform that:

- Has sufficient free capacity to meet the minimum guest requirements
- Is on the hardware compatibility lists for the virtualization software qualified. See additional documents section.
- Is installed with the Honeywell-qualified version of virtualization software

However, considering the total lifecycle cost of COTS components -- from ordering through commissioning, operation, troubleshooting, revisions, and maintenance – the Honeywell supplied Virtualization Hardware and Software solution is the best value. This design is an outcome of considerable research, investments and combines best knowledge from Hardware platform OEMs, VMware, Microsoft and Honeywell to build architecture that is optimized for process control.

Below are key characteristics of Honeywell supplied Virtualization Hardware and Software solution:

- Standardized and Performance tested configuration
- Globally available throughout Honeywell
- Supported through Honeywell TAC
- Planning and configuration guidance

7.1. Honeywell Virtualization Hardware Components

7.1.1. Overview - Honeywell Next Generation Premium Platform and Premium Platform HD

Honeywell's Next Generation Premium Platform and Premium Platform HD leverage modular server technology to deliver advanced virtualization capabilities including Virtual SAN, Fault Tolerance, automatic host recovery, and upgrades with zero operational disruption. In addition, the platform has a longer lifecycle, reduced facility footprint, and remote management capabilities in a package that is pre-configured to save time during deployment. The Premium Platform and Premium Platform HD are engineered from the Dell FX2 platform and provide a design that Honeywell has optimized for process control.

VMware's vSAN provides a shared datastore and does not require external storage devices or complicated shared storage protocols. Virtual SAN is built into the hypervisor, and the combination of solid-state cache and traditional storage drives provide a fast, simple, and reliable storage system. VMware High Availability is used to provide automatic virtual machine restart capabilities in the event of a host failure within the system, and the Next Generation Premium Platform and Premium Platform HD also leverage technologies such as VMware vMotion and Distributed Resource Scheduler to provide for non-disruptive hardware upgrades, maintenance, and expansions.

For workloads without native software redundancy, VMware Fault Tolerance technology provides hardware failure protection by creating and maintaining a secondary VM that is identical to, and continuously available to replace, the primary VM in the event of a failover situation. This provides protection for critical, non-redundant virtual machines such as ACE, Profit Controller, Experion Console Station and Experion Flex Station. The use of VMware Fault Tolerance will incur a small performance impact to the virtual machines, and the use of VMware Fault Tolerance should be limited to deployment scenarios where no other form of availability protection is available (such as through the use of multiple Experion Stations or through workload distribution across hosts). When using VMware Fault Tolerance, in guest antivirus agents must be used due to the incompatibility between the VMware Guest Introspection and Fault Tolerance.

The Next Generation Premium Platform and Premium Platform HD are integrated solutions that are only available from Honeywell and all VMware licenses and hardware components must be purchased from the Honeywell pricebook. All components are tested together to ensure compatibility and the best lifecycle support experience. Design or configuration variations are not supported with the Premium Platform, and the base configuration cannot be modified from either a hardware or software perspective (e.g. VMware vSphere version, unsupported PCIe cards, or unqualified storage drive configurations). Honeywell does not support Dell FX2 hardware configurations that are purchased from other suppliers and cannot provide configuration or support guidance for third-party hardware.

7.1.2. Next Generation Premium Platform

A Next Generation Premium Platform cluster contains between two and six chassis that are interconnected to form the storage system. Each 2U chassis contains two Dell FC640 Compute Sleds, two Storage Sleds, and networking components. Windows Datacenter OS is supported to allow for unlimited virtual machines to be licensed per compute node. The system delivers the capability to grow and scale out storage performance and capacity. In addition to the default vSAN and Fault Tolerance ring topology provided by the standard ethernet-based IO Aggregators, the Premium Platform can support either fiber-optic based IO Aggregators or single-rack Top or Rack (ToR) networking to provide the flexibility to meet a variety of installation scenarios.

The Next Generation Premium Platform is available in two choices for the Dell FC640 Compute Sled. Each Compute Sled in chassis model number MZ-PCVPP3 contains a single Intel 6248 processor and is optimized to provide premium performance while providing the best balance for high consolidations of virtual machines. For workloads that can benefit from higher CPU clock speeds (such as Unisim and other modeling applications), chassis model number MZ-PCVPP4 contains dual Intel 6244 processors in each Compute Sled and operates at a higher CPU clock speed. Honeywell fully supports intermixing any Next Generation Premium Platform chassis within a cluster, thus allowing the Next Generation Premium Platform environment to be configured to meet the specific workload requirements that are presented by the system.

7.1.3. Premium Platform HD

For systems that do not require scale out capabilities, the Premium Platform HD offers a complete vSAN cluster in a single 2U chassis. Each Premium Platform HD chassis contains four Dell FC430 Compute Sleds, two Storage Sleds, and networking components. Each Storage Sled is configured in split-mode to provide for connectivity to two Compute Sleds, and all Fault Tolerance and vSAN networking is internal to the chassis.

The Premium Platform HD is ideal for systems which require infrastructure to be placed in separate mounting locations or where multiple clusters are desired for system redundancy. All cluster connectivity for VMware vSAN and Fault Tolerance is performed within the chassis itself, thus providing a self-contained vSAN cluster without any inter-chassis connections required for vSAN or Fault Tolerance networks. Please refer to the User Guide documentation for detailed guidance and considerations for cluster designs.

7.1.4. Honeywell Essentials Platform for Virtualization

The Essentials Platform is a great way to get started with virtualization and provides excellent lifecycle benefits such as an improvement in both the frequency and impact of hardware refreshes, facility and utility savings (space, power, cooling and weight) and simplified system management.

This platform is based on Dell rack servers which are specifically optimized for virtualization. The platforms leverage local storage only and hence don't support advanced virtualization features that require shared storage. The Portfolio consists of Production host servers and Management host servers.

Production Host Servers

In the Essentials Platform line, Honeywell offers three Production Host Server configurations based on Dell R640XL, R740, and R740XL series platforms. Each configuration has been optimized with various memory, CPU, and storage configurations to meet the unique requirements that a system configuration may present. The choice of the server platform is dependent on the number of virtual machines and the application type being consolidated on each hardware platform.

Management Host Servers

This platform is based on the Dell R640XL machine and is offered as a dedicated host on the management network for centralized administration of the virtual environment. This management host is not required when using either the Next Generation Premium Platform or Premium Platform HD solutions.

7.1.5. Comparing Honeywell Virtualization Platforms

The following table lists the common benefits shared between Honeywell Virtualization Platforms and the additional advantages that are realized when utilizing the Premium Platform:

BENEFITS	ESSENTIALS PLATFORM	PREMIUM PLATFORMS
Avoid reinstalls for a hardware refresh	✓	✓
Upgrade and patch rapid fallback	✓	✓
Computer Infrastructure reduction	✓	✓
Facility savings (space, power, cooling, weight)	✓	✓
Add new ICSS nodes without requiring additional hardware	✓	✓
Fault tolerance		✓
Simple shared storage		✓
Full remote maintenance of hardware		✓
Extended life hardware platform		✓
Automatic recovery from failed nodes		✓
Replace computer hardware transparently		✓

7.1.6. Other Hardware Accessories for Virtualization

Thin Client

Thin client hardware provides an interface for the operator to access the virtual machine. Using the robust Remote Desktop Protocol (RDP), the thin clients provide connections for monitors, select peripheral devices, and support for Honeywell console furniture.

Honeywell offers two choices of operating systems for thin client hardware:

- Honeywell's Universal Thin Client operating system is based on a customized Linux image that has been specifically developed for process automation. This solution currently provides:
 - Honeywell-customized and security-hardened Linux image
 - Connection to up to four Full HD displays
 - Comprehensive central management capabilities
 - Select peripheral device support (Honeywell IKB, OEP)
 - Support for Honeywell Classic, Z/EZ, and ICON Consoles

Note: Fault Tolerant Ethernet (FTE) and Orion Console support are not available in the current release of the Universal Thin Client operating system.

- The Microsoft Windows solutions are preloaded with a Honeywell customized, securely locked-down Windows 10 IoT Enterprise operating system and supports:
 - Up to 6 video outputs
 - Use with Experion Orion Console, supporting 4K Ultra High Definition resolution monitor, Operator Touch Panel (OTP) and the Alarm light panel
 - Honeywell Console furniture mounting (Z, EZ, Classic, Icon and Orion)
 - USB redirection for supported peripherals (Honeywell IKB, OEP, smart card readers)
 - Fault Tolerant Ethernet
 - Centralized monitoring with the Wyse Management Suite

Network Attached Storage

Network Attached Storage (NAS) solutions provide a method for storing system backups, archives, and other system data. These platforms are not used for hosting running virtual machine components, and the NAS platforms may also be used to store data from physical platforms.

A choice of two qualified NAS platforms are available to match the capacity and feature needs of the system:

- The Premium Storage Platform is a scalable, highly redundant storage system that features:
 - Redundant Storage Processors and power supplies
 - Scalable architecture which provides the ability to add storage as system needs increase
 - Flexible storage configurations
 - Honeywell-customized Unisphere operating system
- The Dell NX440 platforms are available in two storage tiers and provide:
 - Familiar operation through the Windows Storage Server 2016 operating system
 - A fixed RAID5 storage array

Network Switch

A dedicated management switch is required for Honeywell's virtual solution that is used for vCenter, High Availability, vMotion and backup traffic. Honeywell provides a Cisco 3850 24-port switch for this task. Level 2 FTE switches are common across bare metal and Virtualization infrastructure.

A 24-port Cisco 2960X and Cisco 2960XR gigabit switch are also available for connecting the Level 2 FTE based Experion Virtualization Solution Hosts. While the virtual machines inside the ESXi host still runs at 100Mb, each virtualization host can connect at Gigabit speeds to this physical level 2 switch to provide additional bandwidth for FTE.

VLAN aggregation is supported with Experion Virtualization Solutions on both the Premium and Essentials Platforms. Systems with this configuration utilize a single pair of Yellow and Green FTE VLAN trunk connections to reduce the cabling requirements when multiple Level 2 FTE communities are needed for a virtualization host. VLAN aggregation may also be used with downlink IO connections on the vUOC. Different network levels (e.g. Level 2 and Level 3) cannot be combined on the same VLAN trunk. Refer to the Experion Fault Tolerant Ethernet Overview and Implementation Guide and Experion Network Best Practices document for details.


Honeywell supports single-rack Top of Rack networking with the Next Generation Premium Platform. This configuration utilizes a pair of the Cisco 3850X switch as an aggregation point for networks that support virtualization management, VMware vSAN, and VMware Fault Tolerance networks. The use of this design eliminates the standard ring topology and enables new topologies while providing for simpler expansions. Refer to the Premium Platform User Guide for details.

USB Hosting for Systems Using the Experion Software Protection Key

Virtual machines are mobile and can be moved between virtualization hosts. For virtual machines that require the use of the Experion Software Protection Key, Honeywell recommends the use of a Digi AnywhereUSB device to connect Software Protection Keys to virtual machines. These devices are available in a variety of port and mounting options, and a unique Software Protection Key must be used for each applicable virtual machine. For maximum availability and redundancy, multiple devices may be used to ensure that Software Protection Keys for redundant workloads are placed on different devices. Use of these devices is limited to the Experion Software Protection Key only.

7.2. Detailed Description for Honeywell Virtualization Hardware Components

7.2.1. Honeywell Next Generation Premium Platform for Virtualization

Honeywell Next Generation Premium Platform for Virtualization [Based on Dell FX2 Server Architecture]	
	
Model Number	Description
MZ-PCVPP3	Premium Platform Performance-A Chassis with Compute Sleds, Storage Sleds, Power Supplies
MZ-PCVPP4 ⁴	Premium Platform Performance-B Chassis with Compute Sleds, Storage Sleds, Power Supplies
MZ-PCVC05 ⁵	MZ-PCVPP3 Extension for Dell Pro Support 5-year Hardware Warranty (Total 5-years)
MZ-PCVC06 ⁵	MZ-PCVPP3 Extension for Dell Pro Support 7-year Hardware Warranty (Total 7-years)
MZ-PCVC07 ⁵	MZ-PCVPP4 Extension for Dell Pro Support 5-year Hardware Warranty (Total 5-years)
MZ-PCVC08 ⁵	MZ-PCVPP4 Extension for Dell Pro Support 7-year Hardware Warranty (Total 7-years)
MZ-PCVC12	MZ-PCVPP3 Windows Server 2019 Datacenter COA (for both FC640 Compute Sleds)
MZ-PCVC14	MZ-PCVPP4 Windows Server 2019 Datacenter COA (for both FC640 Compute Sleds)
MZ-PCVC20	Premium Platform FX2 IO Aggregator – FN410T 10GBASE-T
MZ-PCVC21 ¹	Premium Platform FX2 IO Aggregator – FN410S SFP (for supported fiber ring topology)
MZ-PCVC25	2400W Power Supply
MZ-PCVC30 ²	Storage Expansion – Factory Order – New Chassis
MZ-PCVC31 ²	Storage Expansion Kit – Field Upgrade Kit per Chassis
MZ-PCVC42	Network Interface Cards – Qty.4 Intel i350-T4 Quad-Port 1Gbps
MZ-PCVC43	Network Interface Cards – Qty.8 Intel i350-T4 Quad-Port 1Gbps
MZ-PCVC44	Network Interface Cards – Qty.4 Intel x710-T4 Quad-Port 10Gbps
MZ-PCVC45	Network Interface Cards – Qty.8 Intel x710-T4 Quad-Port 10Gbps
MZ-PCVC61	MZ-PCVPP3 Factory Memory Upgrade to 256GB per FC640 compute sled
Usage	The Next Generation Premium Platform is a 2U chassis that is populated with integrated compute, storage, and networking components. Chassis are interconnected to create the VMware vSAN storage cluster. A complete chassis solution must contain the base chassis model number, IO Aggregator selection, and Network Interface Card selection (highlighted below with asterisk). Operating System COA and warranty extensions can be optionally selected.
Detailed Spec	Link
Single Next Gen Compute Sled (Each MZ-PCVPP3 or MZ-PCVPP4 Chassis contains Qty.2 Compute Sleds)*	
Description	Production Host Server with processor, memory and local storage for the hypervisor. Based on Dell PowerEdge FC640.
Form Factor	Half-Width - consumes 1/4 space of the Premium Platform Chassis
Storage (Hypervisor)	Redundant 64GB SD cards used for storing the Hypervisor
Processor	MZ-PCVPP3: Single Intel® Xeon 20-core, 2.40 GHz Processor MZ-PCVPP4: Dual Intel® Xeon 8-core, 3.60 GHz Processors
vCPU	MZ-PCVPP3: 40 vCPUs MZ-PCVPP4: 32 vCPUs
Standard Memory	MZ-PCVPP3: 128GB MZ-PCVPP4: 192GB
Ethernet Ports	Qty.8 dedicated Ethernet ports through PCIe network cards for Production and Management networks, plus Qty.4 shared Ethernet ports which are connected to the network I/O aggregator

Single Next Gen Storage Sled ((Each MZ-PCVPP3 or MZ-PCVPP4 Chassis contains Qty.2 Storage Sleds)*)	
Description	Storage sled with Solid State and Hard Disk Drives, used for the vSAN that extends across the Premium Platform cluster. Based on Dell PowerEdge FD332.
Form Factor	Half-Width - consumes 1/4 space of the Premium Platform Chassis
Storage Drives	Qty.6 1.2TB SAS Hard drives, Qty.2 400GB Solid State drives
Next Gen Premium Platform IO Aggregator*	
Description	Integrated Networking Switch for vSAN & Fault Tolerance traffic
Based on	MZ-PCVC20 Qty.2 FN410T 10GBASE-T MZ-PCVC21 ¹ Qty.2 FN410S SFP+
Networking	Qty.8 10Gb shared ports through dual IO Aggregators for inter-chassis connectivity
Next Gen Premium Platform Network Interface Card*	
Description	Network Interface Card for Production and Management Network traffic
Based on	MZ-PCVC42 Qty.4 Intel i350 Quad-Port (Qty.2 per FC640 Compute Sled) MZ-PCVC43 Qty.8 Intel i350 Quad-Port (Qty.2 per FC640 Compute Sled) MZ-PCVC44 Qty.4 Intel x710-T4 Quad-Port (Qty.2 per FC640 Compute Sled) MZ-PCVC45 Qty.8 Intel x710-T4 Quad-Port (Qty.2 per FC640 Compute Sled)
General Specifications	
Form Factor	Rack, 2U (1200mm rack recommended)
Dimension	8.68cm (3.41") x 48.19cm (18.97") x 85.16cm (33.52") [HxWxD]
Power Supply ⁴	Standard Qty.2 hot-swappable and redundant 1600W power supplies (C13 to C14 power cord) <ul style="list-style-type: none"> 200-240VAC: Full PSU redundancy and hot swap capabilities 100-120VAC: Supported – refer to the User Guide for considerations. Optional Qty.2 hot-swappable and redundant 2400W power supplies (C19 to C20 power cord) <ul style="list-style-type: none"> 200-240VAC: Full PSU redundancy and hot swap capabilities 100-120VAC: Supported – refer to the User Guide for considerations.
Operating Power	~1083Watts (MZ-PCVPP3); ~1550Watts (MZ-PCVPP4)
Environmental	
Temperature	Operating +10° to +35° C (50° to 95° F)
Relative Humidity	Operating 10% to 80% (non-condensing)
Vibration	Operating 0.26 Gms at 5 to 350 Hz
Airborne	Meets Class/Severity G1 or lower limits per ANSI/ISA-S71.04-1985(non- contaminant level corrosive, contaminant-free, dust-free)

Premium Platform Cluster Architecture		
Minimum Cluster Size	Qty.2 Premium Platform Chassis	
Maximum Cluster Size	Qty.6 Premium Platform Chassis	
Note: A single chassis is not a valid Next Generation Premium Platform configuration.		
Estimated Premium Platform Storage Capacity ²		
Cluster Size	FTT=1 Storage Capacity	FTT=2 Storage Capacity
Qty.1 Chassis	N/A ³	N/A ³
Qty.2 Chassis	12TB	N/A ³
Qty.3 Chassis	18TB	12TB
Qty.4 Chassis	24TB	16TB
Qty.5 Chassis	30TB	20TB
Qty.6 Chassis	36TB	24TB

Note-1: A minimum of three chassis, each in a distinct location, is required when using the FN410S. Direct-fiber connections (with no top of rack switching) must be utilized.


Note-2: Storage Expansion Kit MZ-PCVC30 or MZ-PCVC31 will double the usable capacity when applied to all chassis.

Note-3: Not a valid Premium Platform configuration.

Note-4: MZ-PCVPP4 requires either high-line input voltage or the 2400W PSU (MZ-PCVC25) for power redundancy.

Note-5: The model numbers for Dell hardware extended warranties are only available and applicable at the time of the original hardware purchase. Please contact your Honeywell account team for after-purchase extension queries.

7.2.2. Premium Platform HD for Virtualization

Premium Platform HD for Virtualization [Based on Dell FX2 Server Architecture]	
	
Model Number	Description
MZ-PCVPP2	Premium Platform HD Chassis with Compute Sleds, Storage Sleds, Power Supplies
MZ-PCVC03 ²	Extension for Dell Pro Support 5-year Hardware Warranty (Total 5-years)
MZ-PCVC04 ²	Extension for Dell Pro Support 7-year Hardware Warranty (Total 7-years)
MZ-PCVC13	Windows Server 2019 Datacenter COA (for four FC430 Compute Sleds)
MZ-PCVC20	Premium Platform FX2 IO Aggregator – FN410T 10GBASE-T
MZ-PCVC25	2400W Power Supply (Optional)
MZ-PCVC30 ¹	vSAN Expansion – Factory Order – New Chassis
MZ-PCVC31 ¹	vSAN Expansion Kit – Field Upgrade Kit per Chassis
MZ-PCVC43	Network Interface Cards – Qty.8 Intel i350-T4 Quad-Port 1Gbps
Usage	The Premium Platform HD is a 2U chassis that is populated with integrated compute, storage, and networking components. Each chassis contains all components necessary to create the VMware vSAN storage cluster. A complete chassis solution must contain the base chassis model number, IO Aggregator selection, and Network Interface Card selection. Operating System COA, 2400W Power Supply and warranty extensions can be optionally selected
Detailed Spec	Link
Single Next Gen Compute Sled (Each MZ-PCVPP2 Chassis contains Qty.4 Compute Sleds) *	
Description	Production Server with processor, memory and local storage for the hypervisor. Based on Dell PowerEdge FC430.
Form Factor	Quarter Width Compute Sled
Storage (Hypervisor)	Redundant 64GB SD cards used for storing the Hypervisor
Processor	Intel® Xeon 14-core, 2.40 GHz Processor
vCPU	28 vCPUs
Memory	128GB
Ethernet Ports	Qty.8 dedicated Ethernet ports through PCIe network cards for Production and Management networks, plus Qty.4 shared Ethernet ports which are connected to the network I/O aggregator
Single Next Gen Storage Sled (Each MZ-PCVPP2 Chassis contains Qty.2 Storage Sleds)*	
Description	Storage sled with Solid State and Hard Disk Drives, used for the vSAN that extends across the Premium Platform cluster. Based on Dell PowerEdge FD332, and each FD332 operates in split-mode to support two Compute Sleds.
Form Factor	Half-Width - consumes 1/4 space of the Premium Platform Chassis
Storage Drives	Qty.6 1.2TB SAS Hard drives, Qty.2 400GB Solid State drives
Premium Platform HD IO Aggregator*	
Description	Integrated Networking Switch for vSAN & Fault Tolerance traffic
Based on	MZ-PCVC20 Qty.2 FN410 10GBASE-T
Networking	Qty.8 10Gb shared ports through dual IO Aggregators to support internal networking for vSAN and Fault Tolerance
Next Gen Premium Platform Network Interface Card*	
Description	Network Interface Card for Production and Management Network traffic
Based on	MZ-PCVC43 Qty.8 Intel i350 Quad-Port (Qty.2 per FC640 Compute Sled)


General Specifications	
Form Factor	Rack, 2U (1200mm rack recommended)
Dimension	8.68cm (3.41") x 48.19cm (18.97") x 85.16cm (33.52") [HxWxD]
Power Supply	Standard Qty.2 hot-swappable and redundant 1600W power supplies (C13 to C14 power cord) <ul style="list-style-type: none"> • 200-240VAC: Full PSU redundancy and hot swap capabilities • 100-120VAC: Supported – refer to the User Guide for considerations. Optional Qty.2 hot-swappable and redundant 2400W power supplies (C19 to C20 power cord) <ul style="list-style-type: none"> • 200-240VAC: Full PSU redundancy and hot swap capabilities • 100-120VAC: Supported – refer to the User Guide for considerations.
Operating Power	~1140 Watts (For Honeywell Configuration)
Heat Dissipation	~ 3889BTU/hr (For Honeywell Configuration)
Storage Capacity ¹	10.8TB usable at VSAN FTT=1
Premium Platform Cluster Architecture	
Each 2U Premium Platform HD contains a complete VMware vSAN storage cluster.	
Environmental	
Temperature	Operating +10° to +35° C (50° to 95° F)
Relative Humidity	Operating 10% to 80% (non-condensing)
Vibration	Operating 0.26 Gms at 5 to 350 Hz
Airborne	Meets Class/Severity G1 or lower limits per ANSI/ISA-S71.04-1985(non- contaminant level corrosive, contaminant-free, dust-free)


Note-1: Storage Expansion Kit MZ-PCVC30 or MZ-PCVC31 will double the usable capacity when applied to all chassis.

Note-2: The model numbers for Dell hardware extended warranties are only available and applicable at the time of the original hardware purchase. Please contact your Honeywell account team for after-purchase extension queries.

7.2.3. Honeywell Essentials Platform for Virtualization

Specifications common across all Essentials Platform	
Environmental	
Air Quality	ISA S71.04 Class G1 (non-corrosive, contaminant-free, dust-free)
Temperature	Operating +10° to +35° C (50° to 95° F), Storage -40° to +65°C (-40° to 149° F)
Relative Humidity	Operating 10% to 80% (non-condensing), Storage 5% to 95% (non-condensing)
Altitude	Operating -15.2 to 3048 m (-50 to 10,000 ft.), Storage -15.2 to 12,000 m (-50 to 39,370 ft.)
Vibration	Operating 0.26 Gms at 5 to 350 Hz, Storage 1.88 Gms at 10 to 500 Hz for 15 minutes
General	
Mounting	Rack Mountable with Sliding Ready Rails with Cable Management Arm
Power Supply	Redundant, hot-pluggable power supplies with each Essentials platform
Operating Systems	No OS shipped with computer platforms; Honeywell Essentials Platform can be used with Honeywell supplied Operating Systems. Details provided in Virtualization Software section.

MZ-PCVM20: Essentials Platform Standard Server [based on Dell R640XL server]		
Usage	Production Host for Standard Consolidation Ratio ¹ (Up to 5:1)	
Form Factor	1U Rack Chassis	
Storage, RAID	4x600GB 10K SAS HDDs in RAID10 +1 Hot Spare	
Storage Space	1072GB	
Disk IOPs	690	
Memory	64GB	
Processor	Single Intel Xeon 5215 2.50GHz 10-Core Processor	
Virtual CPUs	20 vCPU	
Processor MHz	25000 MHz	
Ethernet Ports	8 Ethernet ports	
Power Supply	Redundant, hot-pluggable 495W power supplies	
Detailed Spec	Link	

MZ-PCVM21: Essentials Platform Performance-A Server [based on Dell R740XL server] ²		
Usage	Production Host for High Consolidation Ratio ¹ (from 5:1 to 12:1)	
Form Factor	2U Rack Chassis	
Storage, RAID	8x600GB 15K SAS HDDs in RAID10 array +1 Hot Spare	
Storage Space	2143GB	
Disk IOPs	1500	
Memory	128GB	
Processor	Single Intel Xeon 6248 2.50GHz 20-Core Processor	
Virtual CPUs	40 vCPUs	
Processor MHz	50000 MHz	
Ethernet Ports	8 Ethernet ports	
Power Supply	Redundant, hot-pluggable 495W power supplies	
Detailed Spec	Link²	

MZ-PCVM22: Essentials Platform Performance-B Server [based on Dell R740 server]	
Usage	Production Host for CPU Intensive Workloads ¹ (from 5:1 to 10:1)
Form Factor	2U Rack Chassis
Storage, RAID	8x600GB 15K SAS HDDs in RAID10 array +1 Hot Spare
Storage Space	2143GB
Disk IOPs	1500
Memory	192GB
Processor	Dual Intel Xeon 6244 3.60GHz 8-Core Processor
Virtual CPUs	32 vCPUs
Processor MHz	57600 MHz
Ethernet Ports	8 Ethernet ports
Power Supply	Redundant, hot-pluggable 495W power supplies
Detailed Spec	Link



MZ-PCVMM5: Essentials Platform Management Server [based on Dell R640XL server]	
Usage	Dedicated host on separate Management network for Managing Virtual Infrastructure
Form Factor	1U Rack Chassis for Up to Eight 2.5-inch Hot Swap Hard Drives
Storage, RAID	2x600GB 15K + 2x1.2TB 10K SAS hard drives in a RAID1 array each
Storage Space	548GB (Management datastore) and 1100GB (Staging datastore)
Disk IOPs	300 (Management datastore) and 240 (Staging datastore)
Memory	64GB
Processor	Single Intel Xeon 5215 2.50GHz 10-Core Processor
Processor MHz	25000 MHz
Virtual CPUs	20 vCPUs
Ethernet Ports	4 Ethernet ports
Power Supply	Redundant, hot-pluggable 495W power supplies
Detailed Spec	Link



Note 1- Consolidation Ratio Represents number of Virtual Machines that can be accommodated per Host platforms. Please note the typical consolidation ratio mentioned below for every Host platform is based on general estimate and will vary based on actual project workload.

Note 2- MZ-PCVM21 can only be used with the Microsoft Datacenter model number EP-COADC5. No other operating system COA supplied by Honeywell is supported on MZ-PCVM21.

7.2.4. Other Hardware Accessories for Virtualization

Universal Thin Client Operating System Thin Clients

Honeywell Virtualization Thin Client Kit [based on Dell Wyse 5070 Slim/Extended]	
TP-THNCL4-600 ³	Slim Chassis, Desktop, up to 3 Video outputs
TP-THNCL5-600 ³	Extended Chassis, Desktop, up to 4 Video outputs
TP-THNCL5-700 ³	Extended Chassis, Icon Console, up to 4 Video outputs
TP-THNCL5-800 ³	Extended Chassis, Thin Client, Z, EZ and Classic Console
TP-THNOS1 ⁴	Field Upgrade Kit for Wyse 5070 and Wyse Z90 Thin Clients
Usage	Provides access to virtual machines through the Microsoft Remote Desktop Protocol (RDP)
Form Factor	Slim: Height 184 mm x Width 35.6 mm x Depth 184 mm Extended: Height 184 mm x Width 66 mm x Depth 184 mm Note: The Wyse 5070 Slim Chassis must be mounted in the vertical orientation.
Video Output ^{1,2}	Up to Four Video Outputs (Wyse 5070 Extended)
Supported Native Display Resolution	5:4 Aspect Ratio: 1280x1024, 4:3 Aspect Ratio: 1600x1200 and 16:9 Aspect Ratio: 1920x1080 (all per monitor)
Operating System	Honeywell Linux-based Universal Thin Client operating system
Ethernet Ports ⁵	Dual 10/100/1000 Base-T Gigabit Ethernet Port
Keyboards	Serial IKB, USB IKB, Serial OEP
Temperature	Operating 32°F to 104°F (0°C to 40°C), Storage -40°F to 149°F (-40°C to 65°C)
Relative Humidity	20% to 95% (non-condensing) 20% to 80% (condensing)
Detailed Spec	Link
Note 1- Experiion Station with Win7 Professional Operating systems can only support spanning mode for up to four screen output. For the best user experience when using "spanning mode", Honeywell's Experiion Safeview should be used Note 2- Experiion Station with WS2016, Windows 10 LTSB 2016, WS2008 R2, and Windows 7 Ultimate OS supports true Multi Monitor display mode providing separate screens Note 3- The Wyse 5070 Slim Chassis must be mounted in the vertical orientation. Model numbers for the Wyse 5070 Extended Chassis support mounting in Honeywell Classic, Z/EZ, and Icon Consoles. Note 4- The TP-THNOS1 field upgrade kit may be used to perform a field upgrade of existing thin clients to the Honeywell Universal Thin Client operating system. Note that any Universal Thin Client operating system usage restrictions and feature availability apply to any thin clients converted through this kit. The upgrade kit may only be used on Wyse 5070 and Wyse Z90 hardware purchased through Honeywell, and usage of this upgrade kit is not supported on any unqualified device. Note 5- Fault Tolerant Ethernet is not currently available on the Universal Thin Client operating system.	



Microsoft Windows Thin Clients




Honeywell Virtualization Thin Client Kit [based on Dell Wyse 5070 Slim/Extended]	
TP-THNCL4-100 ³	Slim Chassis, Desktop, up to 3 Video outputs
TP-THNCL5-100 ³	Extended Chassis, Desktop, up to 6 Video outputs
TP-THNCL5-200 ³	Extended Chassis, Icon Console, up to 4 Video outputs
TP-THNCL5-300 ³	Extended Chassis, Thin Client, Z, EZ and Classic Console
TP-THNCL5-400 ³	Extended Chassis, Orion Console, 4K UHD Resolution Video output and Operator Touch Panel (OTP)
Usage	Provides access to virtual machines through the Microsoft Remote Desktop Protocol (RDP)
Form Factor	Slim: Height 184 mm x Width 35.6 mm x Depth 184 mm Extended: Height 184 mm x Width 66 mm x Depth 184 mm Note: The Wyse 5070 Slim Chassis must be mounted in the vertical orientation.
Video Output ^{1,2}	Up to Six Video Outputs (Wyse 5070 Extended)
Supported Native Display Resolution	5:4 Aspect Ratio: 1280x1024, 4:3 Aspect Ratio: 1600x1200 and 16:9 Aspect Ratio: 1920x1080 (all per monitor) Orion Console UHD (TP-THNCL5-400 only)
Operating System	Honeywell securely locked-down Windows 10 IoT Enterprise
Ethernet Ports	Dual 10/100/1000 Base-T Gigabit Ethernet Port
Keyboards	Serial IKB, USB IKB, Serial OEP
Temperature	Operating 32°F to 104°F (0°C to 40°C), Storage -40°F to 149°F (-40°C to 65°C)
Relative Humidity	20% to 95% (non-condensing) 20% to 80% (condensing)
Detailed Spec	Link
Note 1- Experion Station with Win7 Professional Operating systems can only support spanning mode for up to four screen output. For the best user experience when using "spanning mode", Honeywell's Experion Safeview should be used Note 2- Experion Station with WS2016, Windows 10 LTSC 2016, WS2008 R2, and Windows 7 Ultimate OS supports true Multi Monitor display mode providing separate screens Note 3- The Wyse 5070 Slim Chassis must be mounted in the vertical orientation. Model numbers for the Wyse 5070 Extended Chassis support mounting in Honeywell Classic, Z/EZ, Icon, and Orion Consoles. Note 4- The Fabulatech USB Redirection Upgrade Kit may be ordered using model number TP-THNU01.	




Network Attached Storage


The Premium Storage platform provides a high-performance, expandable network storage array that is designed for use with Experion Backup and Restore, digital video, and other big data sets used with Honeywell applications. This solution is engineered to complement the Honeywell Premium Platform and Essential Platform virtualization platforms through NAS protocols, and the Premium Storage platform provides an easy to use, browser based Unisphere interface for management, configuration, and administration within the Operating Environment (OE) operating system. Capacity can be easily added to the system to scale and adapt to growing data requirements.


The Dell NX440 offers a cost effective and reliable option for storing virtual machine backups. This device is based on the 1U Dell PowerVault NX440 rack storage solution and is available in two storage tiers.


Premium Storage Platform [Based on DellEMC Unity XT 380]		
MZ-PCVPS1	Network Storage, 2U Rack	
Usage	Backup Storage, Performance	
Compute	Dual Storage Processors (SP), each with 128GB memory	
Form Factor	Rack: 2U, 8.88 x 44.76 x 61.39 cm [HxWxD]	
Base Storage	Qty.12 1.8TB 10K RPM Hot Swap RAID6 (16TB usable)	
Expansion	2U Expansion Chassis – Contact Honeywell for Details	
Operating System	DellEMC Unity Operating Environment (OE)	
Power Supply	Dual 1100W Hot Plug power supply	
Front-End	Qty.2 10 GbE BaseT per SP	
Back-End	Dual 12 GB SAS ports per SP for expansion connectivity	
Specification	Link	
Virtualization Network Attached Storage (NAS) [Based on Dell NX440]		
MZ-NWSTR4	Network Storage, 1U Rack	
Usage	Backup Storage, Standard	
Memory	8GB	
Form Factor	Rack: 1U, 4.28 x 43.40 x 54.90 cm [HxWxD]	
Storage	Qty.4 x 2TB 7.2K RPM Hot Swap HDDs (6TB usable)	
RAID	Pre-configured to RAID5 level	
Operating System	Windows Storage Server 2016	
Power Supply	Dual 350W Hot Plug power supply	
Temperature	+10°C to +35°C (50° to 95°F) [Operating]	
Humidity	10% to 80% (non-Condensing)	
Specification	Link	
MZ-NWSTR5	Network Storage, 1U Rack	
Usage	Backup Storage, Performance	
Memory	16GB	
Form Factor	Rack: 1U, 4.28 x 43.40 x 54.90 cm [HxWxD]	
Storage	Qty.4 x 8TB 7.2K RPM Hot Swap HDDs (24TB usable)	
RAID	Pre-configured to RAID5 level	
Operating System	Windows Storage Server 2016	
Power Supply	Dual 350W Hot Plug power supply	
Temperature	+10°C to +35°C (50° to 95°F) [Operating]	
Humidity	10% to 80% (non-Condensing)	
Specification	Link	


Network Switches

SI-9200R4: Level 2.5 Network Switch for Virtualization [Based on Cisco Catalyst 9200 - 24 port] SI-9300R4: Level 2.5 Network Switch for Virtualization [Based on Cisco Catalyst 9300 - 24 port]		
Usage	Used for vCenter, HA, vMotion and backup management traffic	
Note 1- The SI-9200R4 and SI-9300R4 models provide different options for qualified expansion modules. Refer to the Honeywell FTE Specification for details.		

NE-SW24G1: Level 2 FTE Gigabit Switch for Virtualization [Based on Cisco Catalyst 2960X – 24 port]		
Usage	For Level 2 FTE connections between Experion Virtualization Solution Hosts ¹ . Also used for 1Gbps VLAN aggregation for Level 2 FTE connections between Experion Virtualization Hosts.	
Note 2- The virtual machines inside the ESXi host will still be running at 100Mb; however, each virtualization host is able to connect at Gigabit speeds to the physical level 2 switch providing additional bandwidth for FTE communications.		

SI-299XN8: Level 2 FTE Gigabit Switch for Virtualization [Based on Cisco Catalyst 2960X – 48 port]		
Usage	For Level 2 FTE connections between Experion Virtualization Solution Hosts ¹ . Also used for 1Gbps VLAN aggregation for Level 2 FTE connections between Experion Virtualization Hosts.	
Note 1- The virtual machines inside the ESXi host will still be running at 100Mb; however, each virtualization host is able to connect at Gigabit speeds to the physical level 2 switch providing additional bandwidth for FTE communications.		

SI-2960R4: Level 2, Level 2.5 Network Switch for FTE and Virtualization - [Based on Cisco Catalyst 2960XR - 24 port]		
Usage	Contains redundant power supplies. Can be utilized for either Level 2.5 or for Level 2 FTE connections between Experion Virtualization Solution Hosts ¹ . Also used for 1Gbps VLAN aggregation for Level 2 FTE connections between Experion Virtualization Hosts.	
Note 1- The virtual machines inside the ESXi host will still be running at 100Mb; however, each virtualization host is able to connect at Gigabit speeds to the physical level 2 switch providing additional bandwidth for FTE communications.		

SI-385XN4: Level 2 Top of Rack Solution - [Based on Cisco Catalyst 3850X - 24 port]		
Usage	10Gbps VLAN aggregation switch for Level 2 FTE connections between Experion Virtualization Solution Hosts ¹ . Also used for Premium Platform Single Rack Top of Rack solution.	
Note 1- The virtual machines inside the ESXi host will still be running at 100Mb; however, each virtualization host is able to connect at 10Gbps speeds to the VLAN aggregation switch. Refer to the Experion Network Best Practices document for details.		

7.3. Honeywell Virtualization Software Components

Honeywell's virtualization solution leverages strategic partnerships with both VMware (Hypervisor) and Microsoft (Operating System) to provide the necessary software components required for the virtual infrastructure.

7.3.1. VMware Hypervisor Software Components

Honeywell offers the industry-leading virtualization hypervisor software for use with our products – VMware's vSphere. For small system sizes Honeywell offers the vSphere Essentials plus package which supports installations up to a total of three Virtualization hosts. The vSphere Standard package is utilized for larger systems requiring more than three hosts with a choice of either Single or Dual processor host types. The Next Generation Premium Platform and Premium Platform HD leverage vSphere Enterprise Plus to support the platform's advanced virtualization features.

Honeywell is currently shipping and supports VMware vSphere 6.5 for the FC640-based Next Generation Premium Platform, the Premium Platform HD, and the Honeywell Essentials Platform. Honeywell's documentation and technical assistance is optimized for the current version of VMware that we are shipping; however, other versions may be technically compatible (see sections 2 and 3).

VMware Workstation licenses are also available to support a limited set of applications (Off-line engineering and a limited set of on-process applications). Honeywell is currently shipping VMware Workstation 15 Pro.

7.3.2. Microsoft Windows Operating System License Components

For the operating systems used inside of the virtual machines, Honeywell supplies Microsoft Windows Server. This operating system is used for all workload types running inside of the virtual environment.

Honeywell offers a choice of either Windows Server Datacenter or Windows Server Standard. Honeywell recommends the use of Windows Server Datacenter for virtual machine licensing as it provides maximum flexibility, enabling

- The running of an unlimited number of Windows Server virtual machines per host
- Support for all versions of Windows Server
- Support for multiple versions of the Windows Server operating system.

For those customers running smaller virtualization installations, Honeywell also supports use of existing Windows Server Standard 2008, 2008 R2, and 2016 licensing.

When connecting to a Windows Server operating system from a Thin Client, a Windows Remote Desktop Services (RDS) CAL is required which is also available from Honeywell.

7.3.3. Experion Backup and Restore Virtual Edition

The Experion Backup and Restore (EBR) solution consists of both the Physical Edition (PE) and Virtual Edition (VE) sub products. It provides an integrated backup and restore environment for Physical and Virtual machines through central management of these machines using the EBR Manager.

Experion Backup and Restore R501 Virtual Edition (VE) is the Honeywell supported Backup and Restore solution for Virtual Platforms. EBR R501 VE supports Experion releases R410.x, R43x.x, and R50x.x and vSphere 5.5U3, 6.0 and 6.5 hypervisor versions.

7.3.4. Honeywell Virtualization Client Access Licenses

Like Honeywell has done over the years for traditional physical hardware, Honeywell provides value add additions to the virtualization layer. Honeywell requires a Client Access License (CAL) for select Honeywell nodes in a virtualized environment. In addition to virtualization rights, CALs provide....

- VMware Certified TAC professionals located in each region around the world
- Extensive certification and approval process for our applications to ensure that they work correctly virtualized
- Testing and guidance for hypervisor patches (done in a similar fashion to what HPS does with Windows patches)
- Development of solutions such as Backup Control Center that solve industry problems with virtualization.
- Implementation and Planning Guidance that provides the best practices for installing and configuring your virtual environment.
- Virtualization aware deployment tools that provide rapid deployment and template support for virtual environments.

7.4. Detailed Description for Honeywell Virtualization Software Components

7.4.1. VMware Hypervisor Software Components

EP-VVCSB7: VMware vCenter 7 Standard
<ul style="list-style-type: none"> At least one vCenter Standard licensing is required for a vSphere Standard deployment
EP-VVSSB7: VMware vSphere 7 Standard Single Socket Host
<ul style="list-style-type: none"> Designed for larger solutions requiring more than 3 hosts Should be used with Essentials platforms
EP-VVSD7: VMware vSphere 7 Standard Dual Socket Host
<ul style="list-style-type: none"> Designed for larger solutions requiring more than 3 hosts Should be used with Essentials platforms
EP-VESPB7: VMware vSphere Essentials Plus 7
<ul style="list-style-type: none"> Typically used with the Essentials hardware platform family Supports up to 3 physical hosts where each host can have a maximum of 2 CPUs or sockets Bundled with VMware vCenter Server for Essentials
EP-VWKB15: VMware Workstation version 15 Base
<ul style="list-style-type: none"> Offered primarily for Off-Process Development applications

EP-VVESB7: VMware vSphere 7 Enterprise Plus Single Socket
<ul style="list-style-type: none"> Designated for the Single Socket Next Generation Premium Platform and Premium Platform HD nodes to license the hypervisor
EP-VSSSB7: VMware Virtual SAN 7 Standard Single Socket
<ul style="list-style-type: none"> Designated for the Single Socket Next Generation Premium Platform and Premium Platform HD nodes to license Virtual SAN
EP-VVEDB7: VMware vSphere 7 Enterprise Plus Dual Socket
<ul style="list-style-type: none"> Designated for the Dual Socket Next Generation Premium Platform nodes to license the hypervisor
EP-VSSDB7: VMware Virtual SAN 7 Standard Dual Socket
<ul style="list-style-type: none"> Designated for the Dual Socket Next Generation Premium Platform nodes to license Virtual SAN

EP-VNESB6: VMware NSX Data Center Enterprise Plus
<ul style="list-style-type: none"> Part of Experion PKS IT HIVE

Note: The VMware NSX Manager does not require licensing if solely used for the purpose of implementing Honeywell's qualified agentless security solution. Refer to the *Anti-Virus Software Guidelines for Virtualization Environment* document for details.

EP-VSRMB8: VMware Site Recovery Manager 6 Standard
<ul style="list-style-type: none"> Part of Backup Control Center (BCC) solution Requires a supported vSphere installation at each control room whether primary or backup Single EP-VSRMB8 license allows protecting up to 25 virtual machines for an individual site Multiple copies of EP-VSRMB8 can be purchased up to a total of 3 protecting a total of 75 virtual machines per site One copy of EP-VSRMB8 required for every protected control room

7.4.2. Microsoft Windows Operating System License Components

General information
<ul style="list-style-type: none"> • Honeywell uses Windows Server as the primary operating system used in virtual environments • Experion workstation nodes (ES-F, ES-C) are also supported running on Windows Server operating systems

Windows Datacenter OS COA
<ul style="list-style-type: none"> • Honeywell supplies Windows Server Datacenter 2019 • Downgrade keys are bundled with this COA to provide support for products that are not qualified with Windows Server 2019 Datacenter Edition. Downgrade keys entitle the user to run Windows Server 2016 Datacenter, Windows Server 2016 Standard and Windows Server 2008 R2 Standard. • Allows unlimited number of Windows Server based virtual machines on each host • Optionally bundled with the Next Generation Premium Platform and Premium Platform HD • Optionally available for Honeywell Essentials Platform through separate model number EP-COADC4 and EP-COADC5 <p>Note: Essentials Platform model MZ-PCVM19 can only be used with COA EP-COADC3 or EP-COADC5. No other operating system COA supplied by Honeywell is supported on MZ-PCVM19.</p>

EP-COA2K8: Windows 2008 Server Standard COA
<ul style="list-style-type: none"> • For running server or workstation virtual machines that require Windows Server Standard 2008
EP-COAR28: Windows 2008 Server R2 Standard COA
<ul style="list-style-type: none"> • For running server or workstation virtual machines that require Windows Server Standard 2008 R2
EP-COAS16: Windows 2016 Server Standard COA
<ul style="list-style-type: none"> • For running server or workstation virtual machines that require Windows Server Standard 2016 <p>Note: Microsoft Server Standard COAs are not available on the Premium Platform and Essentials Platform model MZ-PCVM19. Microsoft Datacenter OS COA must be used on these platforms.</p>

EP-T09CAL: Windows Remote Desktop Services (RDS) CAL
<ul style="list-style-type: none"> • Previously known as Windows Server Terminal Service (TS) CAL • Required when connecting a Thin Client into a virtual machine running Windows Server where a permanent connection is required • This single Remote Desktop Services CAL model number is used for both Microsoft Windows Server Standard 2008, 2008 R2, and 2016.
MZ-SQLCL4: Microsoft SQL Client Access License (CAL)
<ul style="list-style-type: none"> • Required for each vCenter Client connected to vCenter Server

7.4.3. Experion Backup and Restore Virtual Edition

General Information
<ul style="list-style-type: none"> • Experion Backup and Restore is the Honeywell supported Backup and Restore solution for Virtual Platforms
EP-BRVE05: Experion Backup and Restore (EBR) R501 Virtual Edition
<ul style="list-style-type: none"> • Based on Acronis Backup Advanced version 12.5 Advanced • Licensed required per ESXi host machine and covers the licensing need for backing up all the virtual machines that are running inside the ESXi host (note: Fault Tolerant virtual machine backup is provided via agents running on the virtual machine) • EBR R501 Virtual Edition (VE) is supported on Experion Release R410.x, R43x.x, R50x.x, and R51x.x along with vSphere version 5.5U3, 6.0, and 6.5. • At least one quantity EBR R501 Media Kit (EP-BRM501-ESD) is also required for a standard Experion cluster • The detailed EBR R501 specification can be found here Link

7.4.4. Experion, FDM, and Experion MX Virtualization CALs

<p>General Information</p> <ul style="list-style-type: none"> • A Client Access License (CAL) is required while using Experion Software in a virtualized environment and must be purchased for each running, on-process Level 2 virtual node listed below • If the FDM Client, FDM RCI and Experion Station are running on the same virtual machine, only one CAL of either type is required • Not required for any off-process or Level 3 nodes
<p>EP-PKSVMS: Experion Virtualization Server CAL</p> <ul style="list-style-type: none"> • An Experion Virtualization Server CAL is required for virtualized L2 Experion Server nodes running on-process • Experion Virtualization Server CAL applies to the following nodes- Experion Server, ACE, SIM-ACE, SIM-Cxx • In the case of a redundant Experion Server, both the primary and backup server must have a Virtualization CAL • Also used to license virtualized Experion MX Server nodes
<p>EP-PKSVMC: Experion Virtualization Client CAL</p> <ul style="list-style-type: none"> • An Experion Virtualization Client CAL is required for virtualized L2 Experion Client nodes running on-process • Experion Virtualization Client CAL applies to the following nodes- Experion Station Flex (ES-F), Experion Station Console (ES-C), Experion Station Console Extension (ES-CE) • Also used to license virtualized Experion MX Client nodes
<p>FDM CALs</p> <p>Following Virtualization CALs are required for Honeywell Field Device Manager (FDM) nodes in a virtualized environment for on-process level 2 use</p> <ul style="list-style-type: none"> • FDM Virtualization Server CAL (HC-FDMVMS) applies to FDM Server and FDM Gateway • FDM Virtualization Client CAL (HC-FDMVMC) applies to FDM Client and FDM RCI
<p>Experion LX CALs</p> <p>Following Virtualization CALs are required for Experion LX nodes in a virtualized environment for on-process level 2 use</p> <ul style="list-style-type: none"> • Experion LX Virtualization Server CAL (LX-EPCVMS) applies to Experion LX Server nodes including Server, SIM-C300 • Experion LX Virtualization Client CAL (LX-EPCVMC) applies to Experion LX Client nodes including Direct Station and Flex Station
<p>PlantCruise by Experion CALs</p> <p>Following Virtualization CALs are required for PlantCruise by Experion nodes in a virtualized environment for on-process level 2 use</p> <ul style="list-style-type: none"> • PlantCruise by Experion Virtualization Server CAL (CV-EPCVMS) applies to PlantCruise Server nodes including Engineering Station, SIM-C300 • PlantCruise by Experion Virtualization Client CAL (CV-EPCVMC) applies to PlantCruise by Experion Client nodes including Direct Station and Flex Station

8. Glossaries

8.1. HPS Glossary

Term or Acronym	Description
AAM	Advanced Alarm Management (AAM), Honeywell's suite of applications that help ensure effective alarm systems thereby improving operator efficiency and assisting in providing safe and reliable processes. The AAM suite includes Alarm Configuration Manager (ACM), Alarm and Event Analysis (AEA) and UserAlert.
ACE	Application Control Environment. Experion controller node hosted on a server computer platform. The ACE node is ideally suited for supervisory control solutions and integration with third party control systems.
Approved	Third party product that has been approved for use with specified HPS Products. Approval has been granted on the basis of observed compatibility and interoperability from HPS's use of this Virtualization Platform and HPS Product combination, internally. It needs to be noted that: <ul style="list-style-type: none"> Dedicated performance testing has not been performed on this Virtualization Platform thus Honeywell cannot warrant the product to meet performance specifications that have been validated on Qualified/certified platforms. No specific guidance around virtual machine configuration or patch levels will be provided. While a customer will be functionally supported in this configuration – commercially reasonable limits may apply when investigating performance issues.
BMA	Blending and Movement Automation (BMA) is the old name of the Profit Blending and Movement (PBM) solution.
C200	A specific type of Honeywell Process Controller
C300	A specific type of Honeywell Process Controller based on the series C form factor
Certified	Third-party Product tested by HPS for interoperability under given test criteria with Standard Products. HPS does not test all the functions claimed for that Product by its supplier, but only those functions required for interoperability. The certification is valid only for the specific releases of the Standard Products and third-party Product tested.
ControlNet	Real-time control-layer network.
DCS	Distributed Control System
DSA	Distributed System Architecture
EBI	Enterprise Building Integrator. Suite of integrated security management applications.
EIS	Experion Industrial Security
EBR Virtual Edition (VE)	Experion Backup and Restore Virtual Edition is the Honeywell supported backup and restore solution for Virtual Platforms based on vSphere 5.1 and onwards.
ES-C	Experion Station – Console
ES-CE	Experion Station – Console Extension
ES-F	Experion Station –Flex
Experion server	The node (optionally redundant) at the heart of Experion. The servers encompass a wide range of subsystems including history collection, SCADA interfaces, alarm/event, etc.
Experion PMD	Experion PKS based DCS which use PMD or FCE Controllers
FCE	A specific type of Honeywell Process Controller, Field Controller Express, for Process, Machines and Drives control
FTE	Fault Tolerant Ethernet, the Experion control network
OPC	Series of standard specification for open connectivity in industrial automation originally based on Microsoft's OLE COM and DCOM technologies.
Off Process	Defines the intended usage of the node that this term is attached to. Off Process means that the node should not be used for an application that is in production, directly influencing or controlling the process. Testing and development only.
On Process	Defines the intended usage of the node that this term is attached to. On process means that the node can be used for an application that is in production, directly influencing or controlling the process.
PBM	The Profit Blending and Movement (PBM) solution consists of a set of applications which schedule, control, monitor and report on product blending, inventory and material movements throughout a manufacturing complex. The applications are supported by the Experion Process Knowledge System (EPKS) architecture for distributed control of the field equipment used in blending and movement operations.

Term or Acronym	Description
PMD	A specific type of Honeywell Process Controller for Process, Machines and Drives control
QCS	Quality Control System - Experion MX and MXProLine for use in Pulp and Paper and Continuous Web Solutions
Qualified	Third-party Product that is sold, maintained, and supported by HPS as a Standard Product, and listed in HPS's price books. HPS may not necessarily support all functions of a Qualified Product, and may require that unnecessary functions be removed, disabled, or avoided. Qualified Products may be standalone or embedded in HPS Standard Products.
SCADA	Supervisory Control and Data Acquisition
SIM-ACE, SIM-C200, SIM-C300	Simulation Application Control Environment. Experion controller node hosted on a server computer platform. Used for simulating control strategies.
TPS	TotalPlant Solution
Uniformance PHD	Flexible environment for the collection, storage and analysis of process data. A Process History Database (PHD) database may be centrally configured and managed, gathering data from many systems including Honeywell Experion PKS and TotalPlant Solution (TPS), OPC Servers, and other third-party sources.

8.2. Virtualization Glossary

Term or Acronym	Description
Allocated Memory	The total amount of memory allocated to a virtual machine. This is the maximum amount of memory the virtual machine can use.
Clone	An identical copy of a Virtual Machine
CPU Reservation	Is a guaranteed lower bound on the amount of CPU capacity that the host reserves for the virtual machine.
ESXi	VMware's next-generation hypervisor which is functionally equivalent to ESX 3 in that it offers the same levels of performance and scalability. However, the footprint is reduced to 32MB of memory. ESXi is designed for distribution in various formats.
Guest OS	Guest Operating System, an operating system that runs inside a virtual machine
ESXi Host	Physical machine that is "hosting" virtual machines. It is where the ESXi Hypervisor operates.
Hypervisor	A hypervisor is a virtualization platform that allows multiple operating systems to run on a host computer at the same time.
Platform Virtualization	Platform virtualization is a term that refers to the abstraction of computer resources. Virtualization hides the physical characteristics of computing resources from their users, be they applications, or end users.
Storage VMotion	VMware technology that allows a virtual disk to be moved from one SAN to another while running. Allows for the online upgrade of SANs or Central Storage Units. See section 3 note 5.
Template	A master image of a virtual machine. This typically includes a specified operating system and a configuration that provides virtual counterparts to hardware components. Optionally, a template can include an installed guest operating system and a set of applications.
Thin Client	Is a client computer or client software in client-server architecture networks which depends primarily on the central server (the virtual machine in this case) for processing activities.
Top of Rack (ToR)	Network architecture which combines a set of network connections from multiple servers installed in a rack. Supported ToR topologies reduce the cabling requirements and facilitate simpler network distribution, a reduction in cabling requirements, and easier expansion.
UOC	Unit Operations Controller - A specific type of Honeywell Process Controller
vUOC	Virtualized instance of a Unit Operations Controller
Virtual Application Services	Set of Virtualization functions targeted at the application layer. VMware examples include, VMotion, High Availability, Storage VMotion, Dynamic Resourcing
Virtual Center Server	A service that acts as a central administrator for VMware servers connected on a network. This service directs actions on the virtual machines and the virtual machine hosts. VirtualCenter Server is the working core of VirtualCenter.
vDR	VMware Data Recovery. Is the VMware's backup and restore solution for virtual machines.
vSphere Client	A user interface that runs locally in a Windows machine and provides access to the virtual machine's display.
Virtual CPU	Virtual CPU. A single-core virtual processor in a virtual machine.
Virtual SAN	Software defined, converged datastore that is built into the vSphere hypervisor. Storage is pooled across ESXi hosts to form a single datastore that is accessible to all hosts in the cluster.
Virtual Machine	A virtualized x86 computer environment in which a guest operating system and associated application software can run. Multiple virtual machines can operate on the same host system concurrently.
Virtual Management Services	Set of Virtualization functions designed to manage the operation of virtual machines. VMware examples include, Virtual Center, Stage Manager, Lab Manager, Lifecycle Manager

Virtualization	Virtualization is the creation of a virtual (rather than actual) version of something, such as an operating system, a server, a storage device or network resources.
Virtualization Manufacturer	Supplier of the Virtualization technology that will be used with Experion
Virtualization Platform	The virtualization product produced by the Virtualization Manufacturer. It is the platform or environment that hosts the Application/s and Operating System/s.
Virtualization Supplier	The company responsible for selling the Virtualization Platform. This could either be the Virtualization Manufacturer, reseller or Honeywell.
Virtualization Solution	Solution supplied and supported by Honeywell consisting of the Virtualization Platform and Honeywell Application Software. It may also include Hardware and/or Operating Systems.
VMotion	VMware technology that allows a Guest workload to be moved while running from one Host to another without any interruption to work processing.

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