# Steps to Improving Your System Health Score

**This document provides information and advice on measuring and maximizing the general health of a control system using the Guardian System Health Benchmark score and its associated risk prioritization and corrective action management capabilities, available for systems enrolled in Guardian Support Service.**
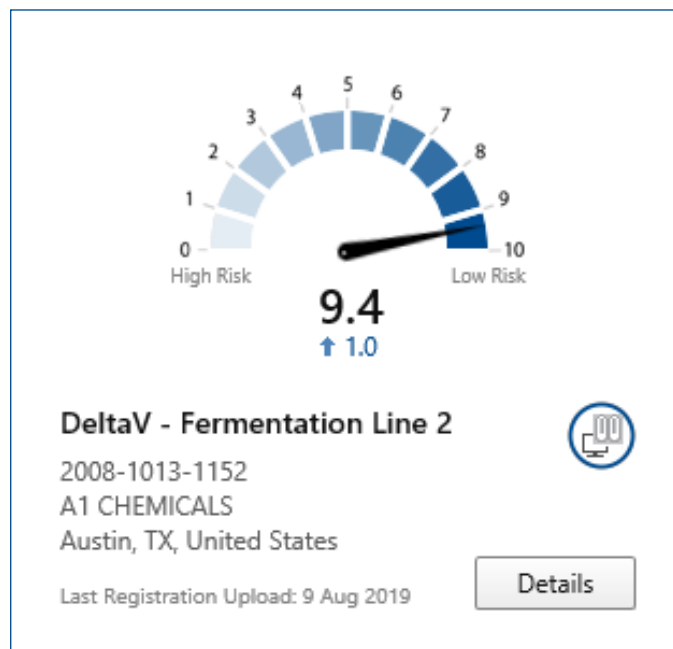


*The Guardian system health score indicates how well risks to system availability and security are being managed relative to all other production systems enrolled in Guardian Support.*

**EMERSON**

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## Introduction

System health management, defined here as the systematic elimination of risks to system reliability, security and performance, is an ongoing process. Each month, new security updates are issued by Microsoft and tested for compatibility by Emerson. Each month, service calls received from system users worldwide are evaluated by Emerson, leading to new or revised Knowledge Base Articles (KBA), and in some cases new hot fixes. Over longer periods of time, advances in technology lead to new operating systems, PCs and DeltaV hardware and software offerings, which make their way into existing systems through expansions, migrations and modernization projects. Change is constant, and so the need for an effective sustained and measurable program of system health management. This whitepaper provides suggestions on how to make best use of Guardian's system health score and its associated risk prioritization and corrective action management capabilities, to monitor and maximize system health.

## Overview

Guardian Support service equips you to manage system health. It identifies risks to the reliability, security and performance of your system, and recommends corrective actions. To do this, your system's content – hardware, software, licenses, applied software updates and version levels – is matched to relevant hot fixes, security updates, Knowledge Base Articles, product lifecycle status and other risk indicators.

The Guardian Support website provides the primary interface for managing system health management tasks, supported by optional automated email notifications and periodic System Analysis Reports (SAR)[1]. The most common tasks are to act on Knowledge Base Articles and apply software updates. Knowledge Base Articles and software updates that match your system content are organized under these four categories:

- Product Safety Notice – Issues with the potential to affect system safety

- Security – Issue affecting security

- Process – Issues known to have disrupted process control

- As Needed – Other issues that may affect the system, such as configuration or migration
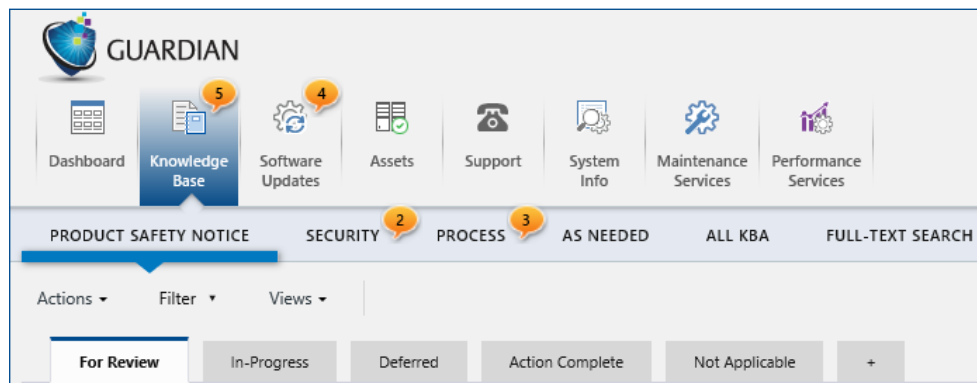


*Significant risks to safety, security and control processes are distinguished from as-needed items.*

To manage the disposition of Knowledge Base Articles and software updates, a simple efficient five-state tracking scheme is provided, to distinguish items to be reviewed, items in progress, items to be deferred to a later time, items that you complete and items that are not applicable to the system's particular hardware or software configuration/application.

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[1] *For DeltaV systems only.*

*Progress towards resolution of items can be easily tracked.*

## System Health Score – A Benchmark for System Health Management

The system health score measures how well risks to your system's safety, security and process are being managed. The fewer the number of open or unaddressed risks to your system, the better the score. Risks are counted and weighted by type as explained on the next page.

The gauge is calibrated so that a center scale score (5.0) is achieved when the unaddressed risks to the system are at the midpoint of all system health scores for all registered production systems[2] participating in Guardian Support worldwide. The score is especially useful when managing multiple systems, where a broad-based prioritization aid is desired. But regardless of any system's health score, each risk identified through the Guardian dashboard should be taken seriously and reviewed at the earliest opportunity, then acted on accordingly, taking the process and other local factors into consideration.
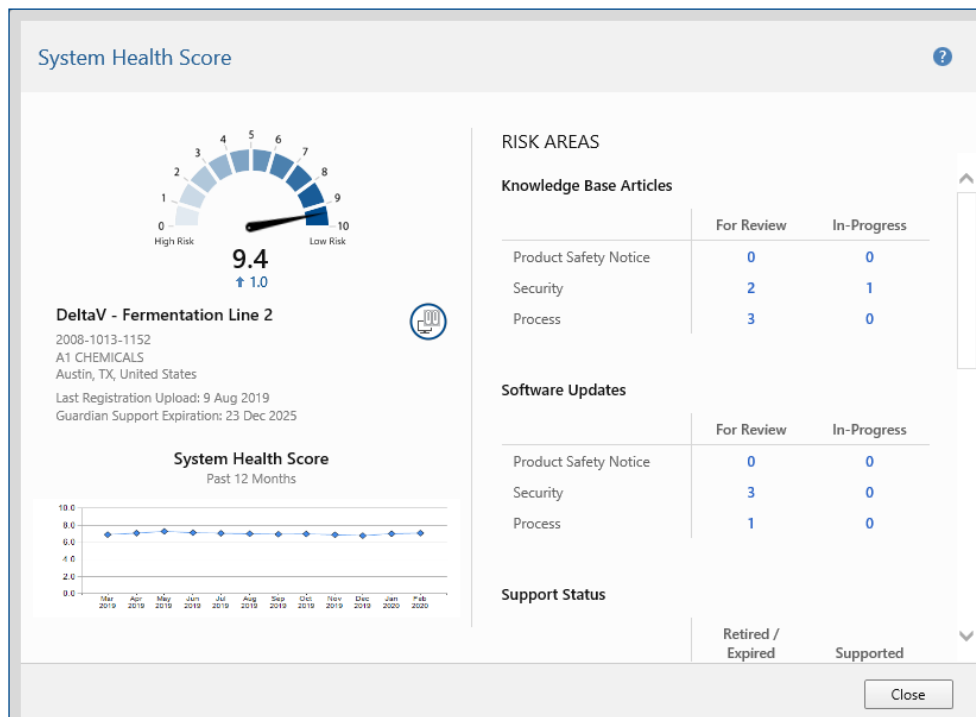


*The System Health Score is based on the most significant risks, and provides direct links to relevant details.*

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[2] *Attention Emerson Service Personnel: Production systems are indicated by the True System attribute in the Service Management System.*

To achieve a fixed zero to ten scale, a logarithmic distribution is applied to the risk factors, made necessary because there is no maximum to the potential number of unaddressed risks. As a result, a very good health score (approaching 10) can be achieved without complete elimination of all risks. Likewise, a very poor score (approaching 0) is not significantly improved by addressing just one risk when a multitude remain open.

Note that the risk items counted in the system health score are clearly marked with a special icon for easy identification throughout the Guardian website.
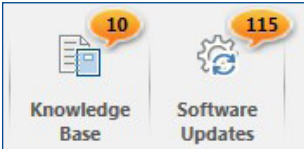


*Significant risks are flagged in the Guardian website.*

Each product line has different risk indicators and corresponding weighting factors. The sample table below is for the DeltaV system. Note that Emerson may adjust these periodically.

| Risk Category | Weight | Comments |
|---|---|---|
| KBA | Safety 10 | ■ KBAs marked For-Review in the Safety, Security and Process category are counted. |
| | Security 1 | ■ As-Needed and Informational KBAs are not counted. |
| | Process 3 | ■ In-Progress KBAs are not counted, based on a presumption that the user is aware of and mitigating the risk.<br><br>■ KBAs count once per system, regardless of the number of system devices affected. |
| Software Updates | Safety 5 | ■ Uninstalled software updates marked For-Review in the Safety, Security and Process category are counted. |
| | Security 0.2 | ■ As-Needed and Informational updates are not counted. |
| | Process 3 | ■ In-Progress updates are not counted, based on a presumption that the user is aware of and mitigating the risk.<br><br>■ Updates count once per system, regardless of the number of workstations (or controllers in the case of firmware) affected. |
| Service Calls | A Calls 10 | ■ Service calls are categorized by their current operational impact.<br><br>● A = Process down, SIS issue, or the process is unavailable or at substantial risk. |
| | B Calls 5 | ● B = Process up but yield, rate, quality or regulatory compliance are impaired or jeopardized.<br><br>● Open category A & B calls count once per system. |

| Risk Category | Weight | Comments |
|---|---|---|
| Support Status | Expired Warranty (Workstation) 8 | ■ Hardware and Software on Retired, Expired Warranty and Supported status are counted. |
| | Retired Software 150 | ■ Current and Active Hardware and Software are not counted. |
| | Supported Software 100 | ■ Retired, Expired Warranty and Supported Hardware and Software marked as Deferred and Acknowledged are still counted, as these still pose risks and need to be upgraded. |
| | Retired Hardware (Non Workstation) 15 | ■ Support Status count once per system, regardless of the number of hardware and software currently installed. |
| | Supported Hardware (Non Workstation) 8 | ■ Retired Software under the Guardian Support Bridge program is not counted. ■ Retired Non Workstation with drop-in replacements are not counted. |
| SHM Actionable Alerts | High Priority 0.3 | ■ The optional on-line System Health Monitoring (SHM) service continuously monitors important health information of system assets such as controllers, DCS servers and workstations, SIS controllers, switches, firewalls, 'DeltaV Virtualization' infrastructure, CIOCs, UPSs, and non-DCS servers and workstations. When a monitored health parameter detects a health condition that could lead to a process disruption or loss of asset availability, an Actionable Alert is created. |
| | Medium Priority 0.2 | |
| | Normal Priority 0.1 | |
| | Low Priority 0.0001 | |
| SSM Findings | Failed Controller 0.007 | ■ The optional Scheduled System Maintenance service provides a certified Emerson Specialist on-site to provide a set of standard preventive maintenance routines in order to help maintain the DeltaV system's operational reliability. The results of the maintenance checklist are uploaded to the Emerson database and consequently displayed in the Guardian website for customer visibility. |
| | Failed DeltaV SIS 0.0056 | |
| | Failed I/O Subsystem 0.0042 | |
| | Failed Network 0.0028 | |
| | Failed Automatic Patch Management 0.0028 | |
| | Failed Cabinet 0.0007 | |
| | Failed System Updated and Hotfix 0.0028 | |
| | Warning 0.0007 | |

*DeltaV System Risks Weight Factors.*

Each risk present in the system is multiplied by a weight factor and then all are summed. Then to achieve a zero-to-ten fixed scale and bell curve distribution, this formula is applied to this System Risk Total:

$$Health\ Score = 10 * e^{(-Risk\ Mean\ Factor * Total\ Risk\ Score)}$$

The factor N centers the gauge to match the worldwide average system risk total. It is updated daily such that new risks defined during the day, like a batch of new approved Microsoft security updates which no one has had an opportunity to install yet, will not cause your system's score to drop.

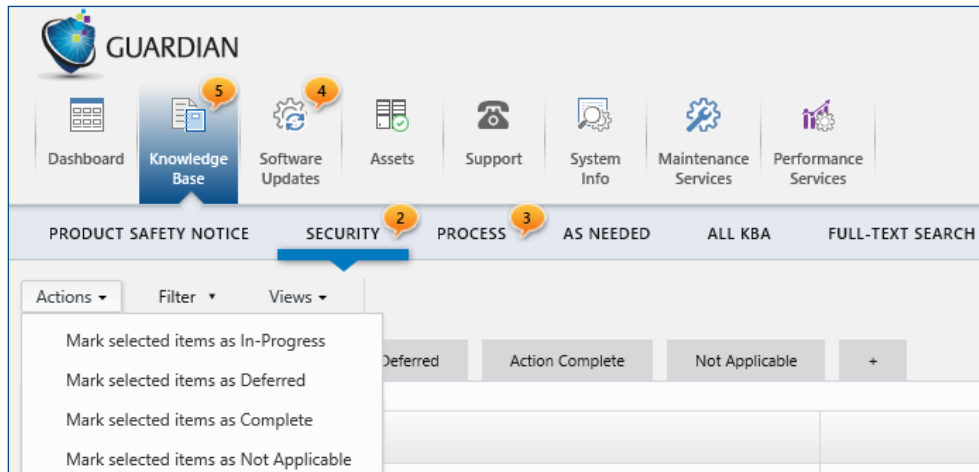## Improving Your System Health Score

Follow these steps to improve your system health score, to help you achieve greater system safety, security and process dependability:

- Upload a new system registration file to Guardian after installing software updates or making other system content changes. Guardian uses this information to identify required (uninstalled) updates. The installation of a hotfix will in most cases also eliminate the related Knowledge Base Article.
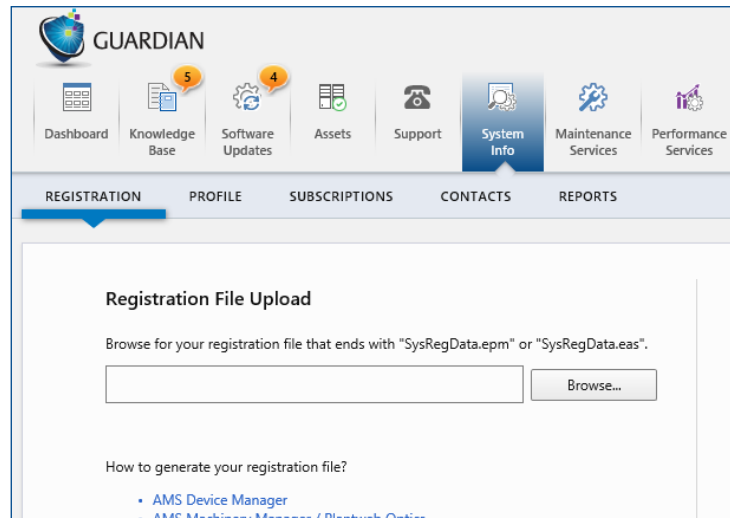


*Keep Guardian information fresh using the DeltaV system registration utility.*

■ Some Knowledge Base Articles require local on-site action to determine if an issue is relevant or confirm that action has been taken. For example, an article may require physical hardware inspection or review of the system's control configuration to determine if the issue's triggering conditions are present. Once accomplished, update the article's status. Items with a status of In-Progress, Complete or Not Applicable are no longer considered a risk in the system health score.



*Moving a Knowledge Base Article or Software Update out of the For-Review state using the Actions menu instantly improves your system health score.*

■ Some security updates for a computer's operating system or applications are only relevant if setup in a certain way, that the registration utility (and therefore Guardian) can not detect. Thus it is sometimes possible that Guardian can show an update is approved to install, where it is not actually installable. Or, there may be certain computers or updates where you've taken other actions to mitigate risk or determined there is no risk.
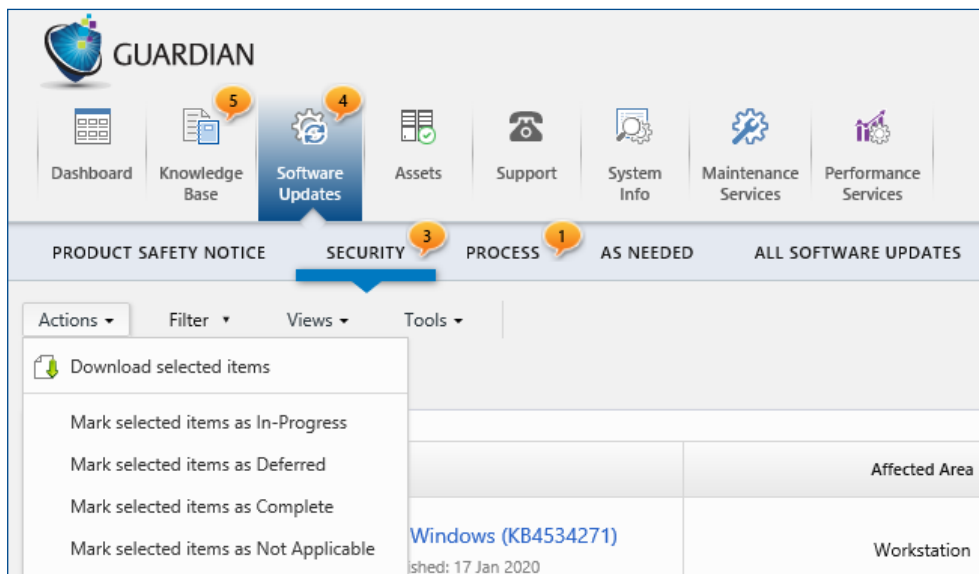
- For 11.3.1 systems, we offer Guardian Support Bridge program that allows systems to still be matched with product hotfixes introduced during the bridge program. Moreover, system's matched MS updates will reflect the most recent approval status. Through this, you will better address the actionable items of your system to increase your system health score.

- Open Category A or B service calls, or Action Alerts if enrolled in the optional on-line system health monitoring service, signify a serious risk. To close these calls or alerts requires the involvement of the Emerson service engineer assigned to the call. Once closed, or downgraded to an operational impact category less than a "B", your score is immediately improved.

- Review the list of retired and supported hardware and software devices. Mark items as Deferred if the action for the hardware/software has been postponed to a later time, say during a plant shutdown. Mark items as Acknowledged if the status of the hardware/software has been acknowledged. Changing the disposition status to Deferred and Acknowledged of a retired hardware will not automatically increase the System Health Score. Retired hardware needs to be replaced and a fresh registration file must be submitted for the health score to increase.

- Sign-up for automated Guardian notification email to ensure you are aware of new system health risks as they are identified.



*Subscribe to Guardian Notifications to ensure awareness of new risks.*

- Review new System Analysis Reports. These reports recap a system's service history, which can provide important service trends and help identify longer term system sustainability risks – the effects of product lifecycle status changes – not considered in the Guardian system health score.

## Aim High

Statistical analysis of the thousands of production systems participating in Guardian Support demonstrate a highly normal (bell curve) distribution of system health scores, where most system's scores are near the median score (5.0) and few systems have a score at either extreme.
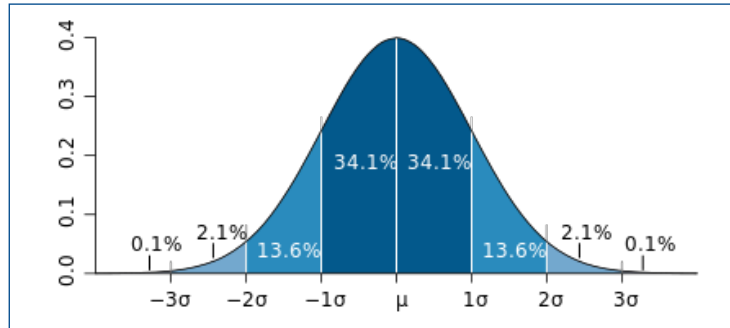


*The health scores for DeltaV production systems participating in Guardian closely follow a normal (bell curve) statistical distribution.*

**Interpreting your system health score[3] (0 – 10 scale)**

- **8.0**     In the top 2% of all systems' health scores, indicative of an aggressive proactive response to Guardian identified system health risks.
- **7.0**     In the top 8%. Emerson's definition of best in class performance is a score of 7 and above.
- **6.0**     In the top 20%. A positive indication that Guardian identified risks are receive some routine attention.
- **5.0**     At the center of the bell curve of all system health scores. Action is advised.
- **4.0**     In the bottom 20%. Urgent action is advised. See the section Improving Your System Health Score.

## Learn More

For more information about Guardian Support contact your local Emerson sales office, or visit our **Lifecycle Services** website to learn more about our various Lifecycle Services offerings.

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[3] *The Guardian system health score considers only what is known to Emerson relative to a limited collection of risk factors (KBAs, uninstalled hotfixes, etc.) with no consideration of the processes under control, the system's application or configuration, or the actual actions taken locally to mitigate the identified risks as such, is imperfect. A high score is recognition of your efforts to mitigate the risks Guardian is capable of identifying, but is by no means an assurance of risk elimination.*

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