

Schneider Electric Security Notification

Modicon PAC Controllers

9 August 2022 (13 August 2024)

Overview

Schneider Electric is aware of a vulnerability in its Modicon PAC Controllers.

[Modicon PLCs \(Programmable Logic Controllers\) and PACs \(Programmable Automation Controllers\)](#) control and monitor industrial operations in a sustainable, flexible, efficient, and protected way.

Failure to apply the remediations provided below may risk memory related errors, which could result in Denial of Service of the controller when using Modbus TCP.

August 2024 Update: A remediation is available for the Modicon M580 CPU Safety ([page 2](#)).

Affected Products and Versions

Product	Version
Modicon M340 CPU (part numbers BMXP34*)	V3.40 and prior
Modicon M580 CPU Safety (part numbers BMEP58*S and BMEH58*S)	Versions prior to SV4.21
Modicon M580 CPU (part numbers BMEP* and BMEH*, excluding M580 CPU Safety)	SV3.22 and prior
Legacy Modicon Quantum/Premium	All Versions
Modicon Momentum Unity M1E processor (171CBU*)	SV2.5 and prior
Modicon MC80 (BMKC80)	V1.7 and prior

Vulnerability Details

CVE ID: **CVE-2022-37301**

CVSS v3.1 Base Score 7.5 | High | CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H

CWE-191: Integer Underflow (Wrap or Wraparound) vulnerability exists that could cause a denial of service of the controller due to memory access violations when using the Modbus TCP protocol.

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Remediation

Affected Products	Remediations
Modicon Modicon M340 CPU (part numbers BMXP34*) <i>v3.40 and prior</i>	Firmware v3.50 includes a fix for this vulnerability and is available for download here: https://www.se.com/ww/en/download/document/BMXP34xxxxx_SV_03.50/
Modicon M580 CPU Safety (part numbers BMEP58*S and BMEH58*S) <i>Versions prior to SV4.21</i>	Firmware SV4.21 includes a fix for this vulnerability and is available for download here: https://www.se.com/ww/en/product-range/62098-modicon-m580-pac-controller/#software-and-firmware Important: customer needs to use version of EcoStruxure™ Control Expert v16.0 HF001 minimum to connect with the latest version of M580 CPU Safety. The software is available for download here: https://www.se.com/ww/en/product-range/548-ecostruxure-control-expert-unity-pro/#software-and-firmware
Modicon M580 CPU (part numbers BMEP* and BMEH*, excluding M580 CPU Safety) <i>Versions prior to SV4.10</i>	Firmware SV4.10 includes a fix for this vulnerability and is available for download here: https://www.se.com/ww/en/download/document/BMEx58x0x0_S_V04.10/
Modicon MC80 (BMKC80) <i>v1.7 and prior</i>	Firmware v1.8 includes a fix for this vulnerability and is available for download here: https://www.se.com/ww/en/product-range/62396-modicon-mc80/#software-and-firmware
Modicon MOMENTUM CPU (171CBU*) <i>Versions prior to SV2.6</i>	Firmware SV2.6 includes a fix for this vulnerability and is available for download here: https://www.se.com/ww/en/download/document/Momentum_FW_update/
Legacy Modicon Quantum/Premium <i>All Versions</i>	Schneider Electric's Modicon Premium and Quantum controllers have reached their end of life and are no longer commercially available. They have been replaced by the Modicon M580 ePAC controller, our current product offer. Customers should strongly consider migrating to the Modicon M580 ePAC. Please contact your local Schneider Electric technical support for more information.

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Customers should use appropriate patching methodologies when applying these patches to their systems. We strongly recommend the use of back-ups and evaluating the impact of these patches in a Test and Development environment or on an offline infrastructure. Contact Schneider Electric's [Customer Care Center](#) if you need assistance removing a patch.

If customers choose not to apply the remediation provided above, they should immediately apply the mitigations provided in the table below.

Affected Product	Mitigations
Modicon Modicon M340 CPU (part numbers BMXP34*) v3.40 and prior	<ul style="list-style-type: none"> • Setup an application password in the project properties. • Setup network segmentation and implement a firewall to block all unauthorized access to port 502/TCP. • Configure the Access Control List following the recommendations of the user manuals: <ul style="list-style-type: none"> ○ "Modicon M580, Hardware, Reference Manual": https://www.se.com/ww/en/download/document/EIO00000001578/ ○ "Modicon M340 for Ethernet Communications Modules and Processors User Manual" in chapter "Messaging Configuration Parameters": https://www.se.com/ww/en/download/document/31007131K01000/ ○ "Momentum for EcoStruxure™ Control Expert - 171 CBU 78090, 171 CBU 98090, 171 CBU 98091 Processors" manual in the chapter "Modbus Messaging and Access Control": https://download.schneider-electric.com/files?p_enDocType=User+guide&p_File_Name=HRB44124.08.pdf&p_Doc_Ref=HRB44124
Modicon M580 CPU (part numbers BMEP* and BMEH*) v3.22 and prior	<ul style="list-style-type: none"> • Setup a secure communication according to the following guideline "Modicon Controllers Platform Cyber Security Reference Manual," in chapter "Setup secured communications": https://www.se.com/ww/en/download/document/EIO00000001999/ • Use a BMENOC module and follow the instructions to configure IPSEC feature as described in the guideline "Modicon M580 - BMENOC03.1 Ethernet Communications Schneider Electric Security Notification Module, Installation and Configuration Guide" in the chapter "Configuring IPSEC communications": https://www.se.com/ww/en/download/document/HRB62665/ • Ensure the M580 CPU is running with the memory protection activated by configuring the input bit to a physical input, for more details refer to the following guideline "Modicon Controllers Platform Cyber Security Reference Manual", "CPU Memory Protection section": https://www.schneider-electric.com/en/download/document/EIO00000001999/

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<p>Modicon M580 CPU Safety (part numbers BM5P58*S and BM5H58*S) <i>Versions prior to SV4.21</i></p>	<ul style="list-style-type: none"> ○ NOTE: The CPU memory protection cannot be configured with Hot Standby CPUs. In such cases, use IPsec encrypted communication • Setup a VPN between the Modicon PLC controllers and the engineering workstation containing EcoStruxure Control Expert or Process Expert. Note: this functionality may be provided by an external IPSEC compatible firewall located close to the controller. <p>To further reduce the attack surface on Modicon M580 CPU Safety:</p> <ul style="list-style-type: none"> • Ensure the CPU is running in Safety mode and maintenance input is configured to maintain this Safety mode during operation – refer to the document Modicon M580 - Safety System Planning Guide - in the chapter “Operating Mode Transitions”: https://www.se.com/ww/en/download/document/QGH60283/ <p>To ensure you are informed of all updates, including details on affected products and remediation plans, subscribe to Schneider Electric's security notification service here: https://www.se.com/en/work/support/cybersecurity/security-notifications.jsp</p>
<p>Modicon MOMENTUM CPU (171CBU*) SV2.5 and prior</p>	

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<p>Legacy Modicon Quantum/ Premium <i>All versions</i></p>	<p>If customers choose not to upgrade, they should immediately apply the following mitigations to reduce the risk of exploit:</p> <ul style="list-style-type: none"> • Setup network segmentation and implement a firewall to block all unauthorized access to port 502/TCP • Configure the Access Control List feature as mentioned in “Quantum using EcoStruxure™ Control Expert - TCP/IP Configuration, User Manual” in chapter “Software Settings for Ethernet Communication / Messaging / Quantum NOE Ethernet Messaging Configuration”: https://www.se.com/ww/en/download/document/33002467K01000/ • Configure the Access Control List following the recommendations of the user manual “Premium and Atrium using EcoStruxure™ Control Expert - Ethernet Network Modules, User Manual” in chapters “Connection configuration parameters / TCP/IP Services Configuration Parameters / Connection Configuration Parameters”: https://www.se.com/ww/en/download/document/35006192K01000/
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To ensure you are informed of all updates, including details on affected products and remediation plans, subscribe to Schneider Electric’s security notification service here:

<https://www.se.com/en/work/support/cybersecurity/security-notifications.jsp>

General Security Recommendations

We strongly recommend the following industry cybersecurity best practices.

- Locate control and safety system networks and remote devices behind firewalls and isolate them from the business network.
- Install physical controls so no unauthorized personnel can access your industrial control and safety systems, components, peripheral equipment, and networks.
- Place all controllers in locked cabinets and never leave them in the “Program” mode.
- Never connect programming software to any network other than the network intended for that device.
- Scan all methods of mobile data exchange with the isolated network such as CDs, USB drives, etc. before use in the terminals or any node connected to these networks.
- Never allow mobile devices that have connected to any other network besides the intended network to connect to the safety or control networks without proper sanitation.
- Minimize network exposure for all control system devices and systems and ensure that they are not accessible from the Internet.
- When remote access is required, use secure methods, such as Virtual Private Networks (VPNs). Recognize that VPNs may have vulnerabilities and should be updated to the most current version available. Also, understand that VPNs are only as secure as the connected devices.

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For more information refer to the Schneider Electric [Recommended Cybersecurity Best Practices](#) document.

Acknowledgements

Schneider Electric recognizes the following researcher for identifying and helping to coordinate a response to this vulnerability:

CVE	Researcher
CVE-2022-37301	Li WEI, BooleanTech

For More Information

This document provides an overview of the identified vulnerability or vulnerabilities and actions required to mitigate. For more details and assistance on how to protect your installation, contact your local Schneider Electric representative or Schneider Electric Industrial Cybersecurity Services: <https://www.se.com/ww/en/work/solutions/cybersecurity/>. These organizations will be fully aware of this situation and can support you through the process.

For further information related to cybersecurity in Schneider Electric's products, visit the company's cybersecurity support portal page:

<https://www.se.com/ww/en/work/support/cybersecurity/overview.jsp>

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About Schneider Electric

Schneider's purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all. We call this Life Is On.

Our mission is to be your digital partner for Sustainability and Efficiency.

We drive digital transformation by integrating world-leading process and energy technologies, end-point to cloud connecting products, controls, software and services, across the entire lifecycle, enabling integrated company management, for homes, buildings, data centers, infrastructure and industries.

We are the most local of global companies. We are advocates of open standards and partnership ecosystems that are passionate about our shared Meaningful Purpose, Inclusive and Empowered values.

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Revision Control:

Version 1.0.0 09 August 2022	Original Release
Version 2.0.0 13 September 2022	A fix is available for Modicon MC80 (BMKC80) controller.
Version 3.0.0 13 December 2022	The Modicon M580 SV4.02 firmware has been retracted for quality issues and is no longer available for download. Additional mitigations have been introduced for Modicon M580 CPU and M580 CPU Safety, and we urge customers to deploy these mitigations to further reduce the risk of potential exploitation of identified vulnerabilities.
Version 4.0.0 14 March 2023	A remediation is available for Modicon Momentum Unity M1E processor and for the Modicon M580 CPU.
Version 5.0.0 13 August 2024	A remediation is available for the Modicon M580 CPU Safety (page 2).