

Spiro Edge Intelligence

Spiro MPC is a versatile and efficient APC solution that can be deployed directly on PLC backplanes or industrial Edge Devices. This architecture enables low-latency execution and high reliability, without depending on traditional server-based infrastructure. Suitable for both downstream facilities and remote upstream operations, Spiro MPC supports secure, remote deployment and full lifecycle management. Centralised application management is enabled via TLS-encrypted communication through Edge Gateways, with administration platforms deployable either in the cloud or on-premises.

In the oil and gas industry, operational efficiency, responsiveness, and emissions reduction are critical. Advanced Process Control (APC) has been a key enabler in achieving these objectives, delivering significant cumulative value over the past decades. While the rise of artificial intelligence (AI) has not replaced APC, it has extended its capabilities, particularly in inferential sensing, surrogate modelling of complex processes, and enhanced operator decision support.

Despite its widespread use in downstream operations, the adoption of APC in upstream and midstream remains limited. This is in part due to the reliance on PLC and SCADA systems, as well as the remote and distributed nature of operations, which contrasts with the centralised DCS-based infrastructure common in refineries and petrochemical plants.

Spiro MPC addresses this gap by supporting deployment on both DCS and PLC networks. PLCs are widely used in remote production assets and packaged units such as compressors, heaters, and dryers. Deploying APC directly on the PLC or within the L2 control network offers a more integrated, reliable, and cost-effective alternative to traditional L3 server or cloud-based installations.

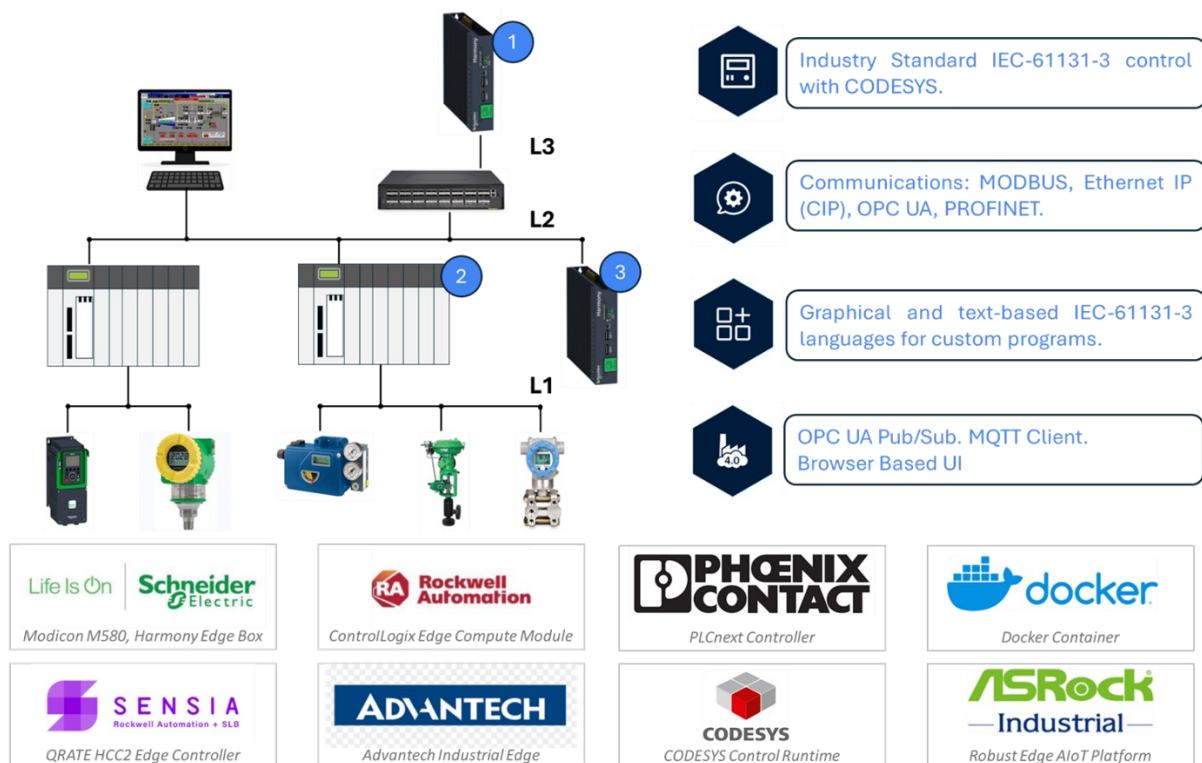


Figure 1 – Spiro MPC supports three deployment modes: (1) on a conventional L3 network, (2) directly on a PLC backplane, or (3) on the L2 network via an Edge Device.

Industry 4.0 Support

Spiro MPC uses the industrially proven CODESYS infrastructure to enable both local application management and secure, centralised administration of geographically distributed applications. Remote deployment, configuration, and monitoring are supported across diverse field applications, including offshore platforms and remote compressor stations, as well as larger facilities like NGL trains and refinery units.

Industrial edge devices enable local processing and control, minimising latency and network overhead. Spiro MPC supports a broad range of industrial edge devices. The MPC runtime can be installed directly on the host OS or as a virtual device inside a managed container.

Edge Gateways provide secure, TLS-encrypted communication with field applications. The gateway can be hosted on dedicated hardware or deployed directly on the Edge Device, acting as the interface layer for remote access without compromising network isolation.

The Automation Server is a centralised, Industry 4.0 platform for managing, monitoring, and maintaining remote applications. It supports the entire application lifecycle, including application commissioning, model and configuration file updates, data analysis and diagnostics. Automation Server can be deployed either on-premises or in the cloud using AWS infrastructure, offering extensive remote access capabilities to connected applications.

Security is a core priority in remote access and control. When deployed in the cloud, Automation Server uses the AWS secure infrastructure, providing advanced encryption, real-time threat detection, vulnerability and patch management, and compliance with global standards.

Industrial IoT support is provided from the Spiro MPC runtime through standard industrial communication protocols such as MQTT, OPC-UA, and HTTPS. It also includes built-in tools for encoding/decoding structured data using JSON and XML, and supports direct AWS cloud connectivity, enabling reliable and secure data exchange across distributed control systems.

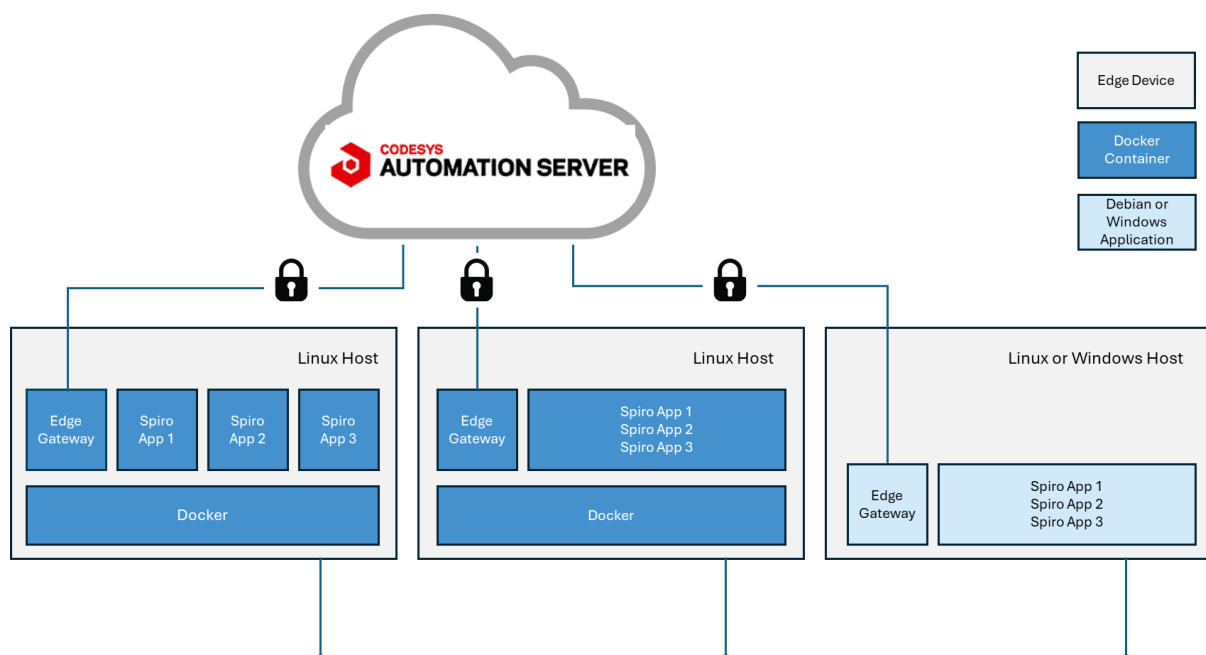


Figure 2 – Secure remote access of Edge Devices is enabled through the Edge Gateway. The CODESYS Automation Server can be deployed either on-premises or in the cloud.

Advantages of Spiro Edge Intelligence

Low Latency and Fast Execution: Spiro MPC applications run directly on PLCs or Edge Devices, enabling sub-second execution and rapid disturbance rejection. This supports time-sensitive applications such as compressors, fired heaters, and upstream choke and lift valve manipulation.

Powerful and Scalable APC Software: Spiro MPC is a scalable, fully featured APC solution suitable for applications ranging from wellheads to complete NGL trains and refinery process units. Its modular design and Industry 4.0 compatibility make it a robust candidate for replacing legacy APC systems with a modern, maintainable, and extensible platform.

Coordinated Multi-Asset Deployment: Applications can be deployed across multiple controllers and centrally managed via the Automation Server, enabling synchronised updates, version control, and streamlined configuration across distributed assets.

Secure Remote Access: TLS-encrypted communication via the Edge Gateway allows engineers to remotely monitor and update applications without requiring VPN access, reducing site visits and operational overhead.

Centralised Lifecycle Management: The Automation Server provides tools for version tracking, rollback, application backups, and change auditing, simplifying governance and long-term maintainability of APC applications.

Standard Protocol Support: Native support for OPC-UA, MQTT, HTTPS, and structured data formats ensures compatibility with Industrial IoT platforms and cloud services such as AWS.

Cost-Efficient Architecture: Spiro MPC can leverage existing hardware and control networks, and low-cost edge devices, avoiding the need for additional servers or firewalls and reducing capital and operational costs.

Field-Maintainable: Using standard CODESYS tools, local technicians can configure, troubleshoot, and maintain Spiro MPC applications without reliance on external specialists.

Scalable and Modular: The platform supports incremental scaling and reuse of application templates, making it well-suited for expanding operations or fleets of similar assets.

Cybersecurity by Design: By avoiding general-purpose OS dependencies and minimising network exposure, Spiro MPC reduces the system's attack surface. Secure boot, update management, and isolated control networks further enhance security.

Real-Time Visibility: The Automation Server provides centralised dashboards, real-time notifications, and update alerts to ensure operational continuity and facilitate timely intervention.

Conclusion

Spiro MPC extends the reach of APC into remote and distributed industrial environments by combining low-latency edge execution with secure, centralised management. Its support for deployment on PLCs and industrial Edge Devices allows for control solutions that are both efficient and field maintainable. The integration of secure remote access via the Edge Gateway and centralised lifecycle management through the Automation Server enables engineers to deploy, monitor, and update control applications across dispersed assets without requiring on-site intervention. With support for standard Industrial IoT protocols and hardened security architecture, Spiro MPC delivers a technically robust platform for scalable, maintainable, and cyber-resilient APC in oil and gas operations.