SIEMENS

Smart Infrastructure

Building Products

Modbus 250, Modbus 500, and Modbus 1000 Drivers Product Update

Development Status

Siemens Industry, Inc. recently created two new variants of the Modbus Driver: Modbus 500 and Modbus 1000. In addition to the Modbus 250 Driver, the Modbus 500 and Modbus 1000 are lower-cost Modbus solutions with a limited Modbus point count for smaller integration projects.

The Modbus 250/500/1000 Driver is based on the existing Modbus Driver functionality, which has been completed for some time with many successful installations, but it has a reduced Modbus point capacity. Custom applications should be created with only the required points because points that are not specifically needed in standard applications might exhaust the reduced Modbus point capacity of 250, 500, or 1000.

The Modbus 250/500/1000 Driver uses Integrated Systems Binary (ISB) files for support of Modbus RTU Master and Modbus TCP Client functions. An ISB file is required to provide a complete solution. The ISB file provides the application point map between the Siemens Automation System and the third-party device or system. The ISB file is generated by the Application Builder tool.

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NOTE:
Custom applications are required; the labor cost should be included in the estimate.
For more information on creating your own custom applications with Application Builder Tool, see the *Application Builder Product Announcement* (625T).

The recent change to this driver includes the following new enhancements:

- Firmware Revision 3.5.1 was updated to accommodate a new Ethernet chip in the TC Compacts.

- The Modbus 250/500/1000 Driver can be loaded onto the TC Modular or TC-36.

- With Firmware Revision 3.5 and later, the Modbus 250 and 500 Drivers can be loaded onto the TC-24 and TC-16 with FLN hardware platforms.

- With Firmware Revision 3.4 and later, the Modbus 250/500/1000 Driver is fully compatible with the BACnet Field Panel Web Server (FPWeb). You can now incorporate the benefits of the FPWeb user interface and Launch Pad™ in combination with popular Integration Drivers. This driver is also compatible with FIN Builder and FINlite-based graphics, which are licensed options. Integrated points are fully available in FIN Builder graphics, plus the controller database is supported by the FPWeb configuration tools.

- Desigo CC Revision 2.1 and later Editors are fully compatible with the Modbus 250/500/1000 Driver License Revision 3.4 and later.

⚠	**⚠ CAUTION**
	Older model TC Compacts with 16 MB RAM may be damaged if an attempt is made to flash them with Modbus 250/500 Driver firmware on TC Compact 16/24. It is possible to recover a damaged field panel, by using the Recover Failed Firmware Load option in TALON Commissioner's Firmware Loading Tool (FLT). Left-click in the upper left corner of the FLT window to access the menu.

FLN Device Support

- If the job site has devices of various models or manufacturers that must be integrated on the same FLN port, it is crucial that all these are compatible with each other. Compatibility across the FLN must be valid for the communication parameters and for how the data is presented.

- If the job site has devices of various models or manufacturers that can be integrated on multiple FLN ports, then integration to multiple devices with different communication parameters can be implemented. In this case, the Modbus 250/500/1000 allows the following support:
    - Up to the three FLNs on a TC Modular to be configured independently for standard baud rates between 300 and 115200 baud; even, odd, and no parity; and 1 or 2 stop bits.
    - With Firmware 3.4 and later, up to the two FLNs on a TC-36 to be configured independently for standard baud rates between 300 and 115200 baud; even, odd, and no parity; and 1 or 2 stop bits.

Platform Type

- Modbus 250 and 500 Drivers: TC Modular, TC-36, and BACnet/IP TC-24 or TC-16 with FLN.
- Modbus 1000 Driver: TC Modular or TC-36.

Configuration

The Modbus 250/500/1000 Driver is a licensable feature on TC Modular and TC-36 hardware.

With Firmware Revision 3.5 and later, the Modbus 250 and 500 Drivers are also licensable features on BACnet/IP TC-24 and TC-16 with FLN hardware.

The Modbus 250/500/1000 Driver provides communication between the TALON Automation Level Network (ALN) and the vendor device. The configuration consists of the vendor's Modbus system and the TALON Automation System, linked by the Modbus 250/500/1000 Driver and any necessary interface device.

- See the Ordering Information [➜ 5] section for part numbers.
- See the one of the following documents for system architecture diagrams:
    - *Modbus 250 Driver on the TC Series Platform Technical Specification Sheet* (127-1650T)
    - *Modbus 500 Driver on the TC Series Platform Technical Specification Sheet* (127-1774T)
    - *Modbus 1000 Driver on the TC Series Platform Technical Specification Sheet* (127-1775T) for system architecture diagrams

The Modbus 250/500/1000 Driver supports the following:
- FLN 1, FLN 2, and FLN 3 on TC Modular hardware are available for serial communication.
- FLN 1 on TC-36 hardware is available for serial communication. Depending on the ALN chosen, FLN 2 may also be available for serial communication.
- FLN 1 on BACnet/IP TC-16 and TC-24 hardware are available for serial communication (Modbus 250/500 only).
- FLN 6 to FLN 100 are available as virtual FLNs for Modbus TCP or Modbus RTU over Ethernet addressing.

Up to 95 virtual FLNs (6 through 100) for mapping devices accessed through an Ethernet TCP/IP network.

Up to 95 virtual FLNs (6 through 100) for mapping devices accessed through Modbus RTU over Ethernet.

- Up to 247 drops per FLN.
- Up to 8000 TALON points (including virtual points and physical IO points).
- Up to 250, 500, or 1,000 Modbus points per driver are supported (I/O, addressing, and diagnostic points do not apply to the 250, 500, or 1000 limit).
- Up to 100 different applications per driver.
- TX-I/O Modules.

Consult the Number of Drivers Required per Job [→ 7] section to find your actual point count and/or number of drivers required for your application.

Functionality

Desigo CC System

The Modbus 250/500/1000 Driver with Modbus firmware only allows data from Modbus systems to be mapped into Desigo CC points.

Desigo CC Revision 2.1 and later Editors are fully compatible with the Modbus 250/500/1000 Driver License Revision 3.4 and later.

For system architecture examples, see the following documents:

- *Modbus 250 Driver on the TC Series Platform Technical Specification Sheet* (127-1650T)
- *Modbus 500 Driver on the TC Series Platform Technical Specification Sheet* (127-1774T)
- *Modbus 1000 Driver on the TC Series Platform Technical Specification Sheet* (127-1775T)

TALON Automation System

The driver acts as a node on the ALN network. All programming functions—PPCL, TX-I/O modules, and point definition—remain intact.

The Modbus 250/500/1000 Driver can be used in combination with the FPWeb database editors and graphics. This includes support for FIN Builder-based graphics when used in combination with the LSM-FPWEBPLHST.T or LSM-FPWEBPL.T license.

Desigo CC Revision 2.1 and later Editors are fully compatible with the Modbus 250/500/1000 Driver License Revision 3.4 and later.

- The driver performs basic monitoring and control functions.
- Standard system functions are supported including PPCL, alarming, trending, scheduling, and runtime accumulation.

Smoke Control

Can be connected to a smoke control network, but cannot perform any smoke control functions.

Important Considerations

The Modbus 250/500/1000 Driver does not support Modbus RTU Slave or Modbus TCP Server functionality. If those functions are needed, use the Modbus Driver instead.

The Modbus 250/500/1000 Driver has been developed to allow communications with third-party Modbus devices. Although the Modbus protocol is publicly available, manufacturers are free to implement the protocol in a manner that fits their particular product or architecture. As a result, products and systems may support the Modbus RTU or Modbus TCP protocol.

The Modbus 250/500/1000 Driver can support the RTU and TCP protocols at the same time when using an Ethernet-capable field panel. Each FLN port and the Ethernet ALN port can be configured independently.

⚠	⚠ CAUTION
	Older model TC Compacts with 16 MB RAM may be damaged if an attempt is made to flash them with Modbus 250/500 Driver firmware on TC Compact 16/24. It is possible to recover a damaged field panel, by using the Recover Failed Firmware Load option in TALON Commissioner's Firmware Loading Tool (FLT). Left-click in the upper left corner of the FLT window to access the menu.

Modbus RTU Master Mode

- Three physical FLNs (1 through 3) on TC Modular hardware can be used for connecting and addressing Modbus RTU devices on RS-485 FLNs.
- Up to two physical FLNs (1 through 2) on TC-36 hardware, depending on the ALN chosen, can be used for connecting and addressing Modbus RTU devices on RS-485 FLNs.
- With Firmware 3.5 and later, one physical FLN (1) on the BACnet/IP TC-24 and TC-16 hardware can be used for connecting and addressing either Modbus RTU devices on RS-485 FLNs.
- Each FLN port can be configured independently for standard baud rates between 300 and 115200; even, odd, no parity; and 1 or 2 stop bits.

Modbus TCP Client and Modbus RTU over Ethernet Mode

- For Modbus TCP Client and Modbus RTU over Ethernet, the Ethernet port must be used.
- FLN 6 to FLN 100 are virtual FLNs used for Modbus TCP or Modbus RTU addressing.

ℹ	NOTE: Slave mode is not supported for the Modbus 250/500/1000 Driver.

Estimating

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NOTE:
Custom applications are required; the labor cost should be included in the estimate.
For more information on creating your own custom applications with Application Builder Tool, see the *Application Builder Product Announcement* (625T).

Integration to the Modbus 250/500/1000 Driver requires an application. The following table lists estimating hours for one driver and one application. If multiple drivers or applications are installed, multiply this time by the number of drivers or applications.

Table 1:

Item	Engineering Hours	Project Manager Hours	Specialist Hours	Remarks
Installation of the driver.	4.0	2.5	4.0	This time is for one driver.
Use of pre-existing or standard applications.	2.0	1.0	2.0	This time covers one application. This time includes acquiring the point map.
Custom applications must be created using the Application Builder tool.	4.0	2.0	4.0	This time covers one application. When a custom application must be created, it is necessary to have object list to create the application file, be sure extra time is added to cover this labor in the estimate.

Ordering Information

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NOTE:
Custom applications are required; the labor cost should be included in the estimate.
For more information on creating your own custom applications with Application Builder Tool, see the *Application Builder Product Announcement* (625T).

TC Series-based Integration Drivers are comprised of standard TC Modular, TC-36 or BACnet/IP TC-24 or TC-16 with FLN hardware loaded with Integration Driver firmware.

- Driver firmware must be loaded onto the TC using the Firmware Loading Tool (FLT).
- The driver is then licensed using TALON Commissioner, Siemens software, or the HyperTerminal HMI port.
- Loading the driver firmware replaces the existing firmware and converts the FLN to a driver-specific protocol.

Ensure that you order all the parts for an Integration Driver on the TC Series platform.

1. Select a hardware option:

   – Order the standard TC Modular hardware and RS-485 Expansion Module (as needed) per *Sales Release* SR-736 or Siemens Price List.
   – Order the standard TC-36 hardware per *Sales Release* SR-735T.

2. Then order the Driver License as listed on the Siemens Price List.

The Integration Driver firmware is available on the Partner Extranet Web site. To enable the firmware for operation, load the driver license into the TC Series-based Integration Driver.

For more information on installing the firmware or loading the driver license, see the *Modbus 250/500/1000 Driver for TC Modular and TC-36 Technical Manual* (140-0779T).

See the *Parts Orderable through the Factory* section for orderable part numbers related to the TC Series.

Parts Orderable through the Factory

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NOTE:
The TC Series hardware is standard hardware and not unique to Integration Drivers. The Integrated Driver solution is comprised of the following hardware loaded with the Modbus 250/500/1000 Driver firmware and license:

• Modbus 250 and 500 Drivers: TC Modular, TC-36 or BACnet/IP TC-24 or TC-16 with FLN.

• Modbus 500 and 1000 Drivers: TC Modular or TC-36

Table 2: Licenses.

Product Description	Product Number
License to enable the Modbus 250 Driver on TC Modular , TC-36 or BACnet/IP TC-24 or TC-16 with FLN hardware.	LSM-INT-MDBS250.T
License to enable the Modbus 500 Driver on TC Modular, TC-36 or BACnet/IP TC-24 or TC-16 with FLN hardware.	LSM-INT-MDBS500.T
License to enable the Modbus 1000 Driver on TC Modular or TC-36 hardware.	LSM-INT-MDBS1000.T
Enables a on TC Modular or TC-36 controllers to host FIN Builder graphics.	LSM-FPWEBPLHST.T
Enables any TC Series controller to supply the host controller with data for FIN Builder graphics.	LSM-FPWEBPL.T

Table 3: TC Modular.

Product Description	Product Number
TC Modular, BACnet/IP or MS/TP ALN, 96 FLN nodes, TX-I/O module support.	TC1000-E96.T with TX-I/O support license
Expansion Module, three RS-485 FLN connections.	PXX-485.3

Table 4: TC-36, TC-24 and TC-16.

Product Description	Product Number
TC Compact, 36 point, BACnet/IP or MS/TP ALN includes TX-I/O and FLN support licenses	TC36-EF.T
TC Compact, 24 point, BACnet/IP ALN or MS/TP FLN	TC24.2-EF32.T
TC Compact, 16 point, BACnet/IP ALN, FLN enabled	TC16.2-EF32.T

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Restricted

127-1515T

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License Manager Web Site

License Manager is a licensing tool that provides a flexible field configuration capability for TALON firmware features. Licensing is now integrated with SAP; you can order and generate licenses within a few hours by using the License Manager Web site. For detailed instructions, see the *TALON License Manager Start-up Procedures* (149-703T).

Number of Drivers Required per Job

The following factors determine driver capacity, and therefore, the number of drivers needed to support a particular job:

- Available RAM in the driver.
- Number of devices the driver can support (see below for maximum limitation for Modbus points).
- Performance of the driver (update time).

Based on each factor, calculate how many drivers may be needed. The calculation that results in the highest number of drivers reflects the most limiting factor and the actual number of drivers required for the job.

The Modbus 250/500/1000 Driver is most often limited by the number of vendor devices or performance.

Available Bytes of RAM

In general, use the following guidelines for RAM sizing:

Available RAM (TC Series Parts).		
Product Description	Product Number	Approx. RAM (MB)
	PXC00-PE96.A	64
TC Modular, BACnet/IP or MS/TP ALN, 96 FLN nodes, TX-I/O module support	PXC00-E96.A	64
	PXC100-PE96.A	64
	PXC100-E96.A	64
		64
TC Compact, 36 point, BACnet/IP or MS/TP ALN	TC36-E.T	64
TC Compact, 24 point, BACnet/IP ALN or MS/TP FLN	TC24.2-EF32.T	32
TC Compact, 16 point, BACnet/IP ALN, FLN enabled	TC16.2-EF32.T	32

Available RAM.		
Product Description	Product Number	Approx. RAM (MB)
TC Modular, BACnet/IP or MS/TP ALN, 96 FLN nodes, TX-I/O module support.	TC1000-E96.T with TX-I/O support license	64
TC Compact, 36 point, BACnet/IP or MS/TP ALN.	TC36-E.T	64
TC Compact, 36 point, BACnet/IP or MS/TP ALN includes TX-I/O and FLN support licenses	TC36-EF.T	64
TC Compact, 24 point, BACnet/IP ALN or MS/TP FLN	TC24.2-EF32.T	32
TC Compact, 16 point, BACnet/IP ALN, FLN enabled	TC16.2-EF32.T	32

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Number of Devices Supported

When configured as a Modbus RTU Master or Modbus TCP Client, the Modbus 250/500/1000 Driver can support a maximum of either 247 device addresses per FLN (three physical FLNs for Modbus RTU Master and 95 virtual FLNs for Modbus TCP Client are available), or 8000 TALON points (including physical IO points and virtual points), whichever comes first.

While having the same features and capabilities as the Modbus Driver, the Modbus 250/500/1000 Driver has the following limitations:

- A maximum of 250, 500, or 1,000 Modbus points per driver (I/O, addressing, and diagnostic points do not apply toward the 250, 500, or 1000 point limit).
- Modbus RTU Slave or Modbus TCP Server modes are not supported.

Performance

Performance requirements in the job specification may limit the number of points or devices that can be added to the Modbus 250/500/1000 Driver.

NOTE:
Virtual and I/O points do not need to be included in this calculation since they do not affect the communication performance to third-party devices.

The Modbus 250/500/1000 Driver polls each device in the vendor system individually. Therefore, the time required for the driver to update all of the points increases as more devices are added to the database.

Typically, the Modbus 250/500/1000 Driver polls approximately three devices per second when connected to the vendor system at 19200 baud.

For additional information about calculating the poll time, see the *Transfer Timing* section in the *Modbus Driver and Modbus 250 Driver for TC Modular and TC-36 Technical Manual* (140-0779T).

Documentation

Sales Documentation

Document	Product Number
BACnet Field Panel Firmware Revision 3.4 with BACnet Field Panel Web Server (FPWeb) and Launch Pad Updates	SR-874T
Modbus 250 Driver TC-Series Technical Specification Sheet	127-1650T
Modbus 500 Driver TC-Series Technical Specification Sheet	127-1774T
Modbus 1000 Driver TC-Series Technical Specification Sheet	127-1775T

Technical Documentation

Document	Product Number
Modbus or Modbus 250/500/1000 Drivers Release/Upgrade Notes	126-984T
Modbus or Modbus 250/500/1000 Drivers for TC Modular and TC-36 Technical Manual	140-0779T
Modbus Driver for TC Modular and TC-36 Installation Instructions	565-411T

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Document	Product Number
TC Modular Series Installation Instructions	553-654
TC Modular Start-up Procedures	588-779
TC Modular Technical Reference Manual	588-780
TC-36 Installation Instructions	553-680
TC Compact Series Start-up Procedures	588-680
TC Compact Series Technical Reference Manual	588-681

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