SoftPLC Smart Controllers

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Overview

A Smart SoftPLC CPU is an unmatched value - it does the basics like storing and running application logic - but it also provides a lot more! Its 512MB of memory, (5) Ethernet ports *(4 which are configured as a managed switch),* up to (6) COM/USB ports, and flexible I/O interfaces are only the beginning.
By combining these rich hardware features with advanced software functions, a Smart SoftPLC can often reduce the number of hardware components required for a complete control system.

Every Smart SoftPLC includes the functions and features of all SoftPLC controllers, including:

- Deterministic, high speed program execution

- "Unlimited" user logic and data table memory

- Ladder logic and data table addressing similar to Allen-Bradley PLC-5/SLC-500

- Fully documented applications, all documentation resides in the controller

- Supports user functions written in C++

- Compatible with all HMI/SCADA products

Specifications

Processor	64-bit, 480MHz quad-core ARM processor
User Memory	512 MB RAM, 8GB on-board eMMC flash
Removable Memory	MicroSD slot *(no SD card included)*
Temperature	Operating: 0 to 60°C *(-20~70°C extended temperature option Cat No SPO-EXTEMP)*
	Storage: -40 ~ 85°C
Humidity	0-95%, non-condensing
Input Voltage Range	6~72 VDC, terminal block connector
Power Requirement	2-5W based on options selected
Time	NTP client, update via internet or NTP server on local LAN
Ethernet Ports	4-port managed GB Ethernet switch (10/100/1000BaseT), RJ45 ports + *(w/ multiple unique host interfaces/MAC-ID's for routing functions)*
	(1) GB Ethernet port, stand-alone, RJ45 port
Serial/USB Ports	(1) RS-485 2-wire (non-isolated), 3-wire terminal block (2) USB 2.0 Host ports (1) MicroUSB interface for serial console access *(for troubleshooting only)*
Option Ports	(3) Must be factory installed, 3-wire terminal blocks
	Allen-Bradley "Blue Hose" *(Cat No SPO-BH)* Remote I/O Master, Remote I/O Adapter or Data Highway Plus *(software selectable)*
	RS-485, 2-wire, isolated *(Cat No SPO-485)*
	Other *(, eg: RS-232, CAN)*
Wireless	WiFi 802.11 b/g/h *(requires optional SPO-WIFIMOD)*
Protocols	Serial - Modbus Master/Slave, DF1, ASCII Ethernet - ModbusTCP/UDP, Ethernet/IP, DF1 Ethernet (PCCC), MQTT
Dimensions (HxWxD)	Without modules - 5.75 x 6 x 1.5 in. (146.1 x 152.4 x 38.1 mm) With modules - 5.75 x 6 x 5.625 in. (146.1 x 152.4 x 142.88 mm)
Packaging	Fanless/Diskless system, DIN-rail Mount, metal enclosure Optional Panel Mount Bracket *(SM-VBKT)*
Local I/O Interfaces (one/system)	Backplane3 - supports any (3) Tealware modules LocalPorts - Tealware rack bus *(4 connectors, each supports up to 3 racks)*
Remote I/O	Serial, USB and Ethernet ports, A-B RIO via SPO-BH option
Security	SSH server for encrypted data transfer

Ports

Communication Ports

The base Smart SoftPLC CPU has **nine** (9) communication ports!

- 4-port GB managed Ethernet switch, with multiple Ethernet interfaces (MAC ID's) to support routing capability and to allow separation of communications and ethernet I/O traffic
- (1) stand-alone GB Ethernet port
- (1) RS-485 communications port
- (2) USB 2.0 Host ports that can be used for RS-232 or RS-485 (eg: DF1, Modbus, ASCII)
- (1) Micro-USB serial console interface for low-level troubleshooting or system setup

Plus, for very low cost, up to 3 factory installed communication port options can be added in any mix:

- RS-485 ports
- Allen-Bradley "Blue Hose" ports, supporting A-B Remote I/O Master or Slave, or Data Highway Plus (DH+)
- Other serial interfaces *(eg: CAN, RS-232, etc.)* [*]

And, for very low cost, internal support can be enabled for WiFi or Bluetooth communication.

Functions

Use SoftPLC communication ports for:

- SoftPLC Programming, Configuration, Monitoring & Troubleshooting *(Ethernet only)*
- Remote I/O to Tealware or other vendor I/O systems via a long list of supported protocols *(eg: ModbusTCP, Ethernet/IP, Modbus, A-B RIO)*
- Communication to SCADA/HMI's or other equipment *(eg: drives)*
- Peer-to-Peer communications (SoftPLC to SoftPLC or A-B PLC's, or SoftPLC to Modbus/ModbusTCP enabled devices)
- Connection to modems or wireless networks for remote access
- Connection to cellular networks for remote management applications via TagWell

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[*] *Other interfaces can be quickly developed, but are not currently available.*

I/O Capabilities

With a Smart SoftPLC, you have a **LOT** of I/O options! Smart SoftPLC supports a variety of I/O interfaces and can support virtually unlimited I/O points.

Remote I/O

With no added hardware, the Smart's built-in Ethernet, serial and USB ports can be configured to communicate to I/O products from dozens of vendors, over a number of protocols.

Rockwell Automation/Allen-Bradley Remote I/O *(A-B RIO)* is supported with up to 3 optional internal interfaces. A Smart SoftPLC can act as an A-B RIO master and/or slave.

Serial Options

Serial I/O is supported via the included RS-485 port or with added option ports (Cat No SPO-485). You can also use the USB ports for serial protocols. For RS-232, use the SPO-USBSERKIT, and for RS-485 use the SPO-USB485. These kits includes USB to serial converters and firmware configuration.

- Modbus - any compatible devices - I/O, meters, drives, or other process equipment
- COMGENIUS supports ASCII string type protocols
- Other serial I/O drivers (eg: A-series)
- Write your own serial interface with the SoftPLC Programmer's Toolkit

Ethernet Options

Since the Smart SoftPLC has two Ethernet interfaces, one of them can be dedicated to the I/O network for optimum performance, with no interference from HMI/SCADA, programming, or peer-to-peer communications that may exist on the other network interface.

- ModbusTCP/UDP to compatible I/O systems and devices *(including Tealware)* on up to 127 remote slaves
- Ethernet/IP^{TM}
- Write your own ethernet interface with the SoftPLC Programmer's Toolkit

Local I/O

SoftPLC Corporation's Tealware I/O is a modular, high speed I/O system for the Smart SoftPLC. Discrete, analog and specialty modules are available in this robust, proven, and value-priced I/O system. (NOTE: Tealware can also be connected to the Smart SoftPLC as remote I/O on Ethernet via ModbusTCP.)

Simple & Affordable: Smart SoftPLC's equipped with a Tealware Backplane3 interface need no rack or additional power supply and support any mix of up to (3) Tealware modules
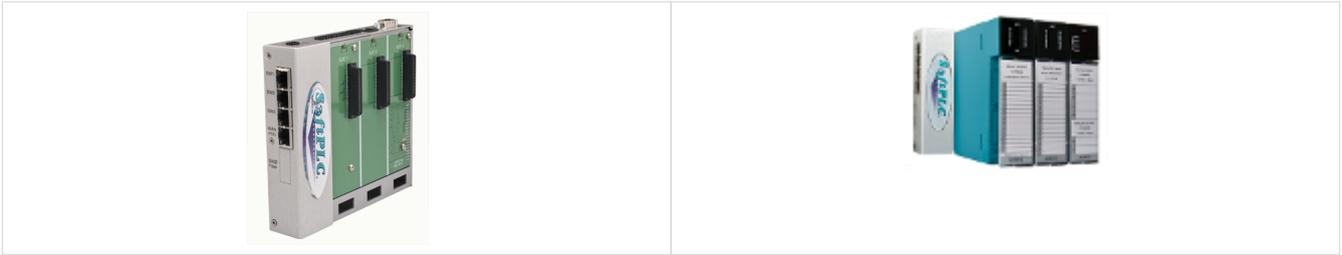
Low Cost: Every Smart SoftPLC equipped with a Tealware LocalPorts interface comes with built-in local expansion capability. Racks connect to the Smart SoftPLC using a Local Rack Expansion Cable, available in lengths of 2 or 4 feet. Cable from each LocalPorts port to the first rack, then daisy chain up to 2 more racks per port using additional cables.

Huge Local I/O Capacity: A Smart SoftPLC can support up to 12 local racks - at 256 points per rack that means up to 3072 points of fast update local I/O!

Other Advantages of Tealware w/ SoftPLC

Remote I/O Expansion: With a Smart Adapter and Tealware I/O, each remote Ethernet drop can include up to 3 racks. Use the Remote Expansion when your I/O count is extremely high, or when the racks must be separated by longer distances.

Auto-Discover I/O Modules: With a Smart SoftPLC CPU and Tealware I/O you don't have to spend time entering your I/O configuration into the system! Just install the modules in your racks (local and/or remote) and connect the cables. SoftPLC will automatically sense which modules you have installed. A configuration file is created that lets you see the mapped modules and addresses in the TOPDOC NexGen programming software, where you can then manually make any changes you desire.

Smart SoftPLC Models / Ordering Information

A Smart SoftPLC consists of a base model (Cat No SMS4-), with an optional Local Tealware Interface daughter board (-y), and a selected Runtime License size (-x). To this assembly, you can add factory installed options, ordered separately by Catalog Number.

Each Smart system is assembled and configured with all your selected options, then undergoes a system-level test prior to shipment.

Items to be specified include:

- Local Tealware I/O Interface Option
- SoftPLC Runtime License Size
- Communication Port Options
- Other Options

Local Tealware I/O Interface Options

Cat No Ref (-y)		I/O Interface
		No Tealware interface
B		Backplane3 interface, supports any mix of 3 Tealware Modules
L		LocalPorts, supports up to 12 Tealware racks

Runtime License Size Options

There are (4) available SoftPLC firmware runtime sizes, where runtime size determines the maximum supported number of Ethernet/IP bytes, ModbusTCP servers, logical A-B racks and digital I/O points *(analog I/O is limited only by hardware, not firmware)*. The table below summarizes these choices. Details on these limits are in the communication driver manuals for each protocol.

Specify the size by appending the suffix to the base model Catalog Number. For example, a 1K license would be model SM4S-y-1K.

Cat No Suffix	ModbusTCP Servers	Ethernet/IP Bytes	Logical A-B Racks	Discrete Inputs^	Discrete Outputs^
LT	2	64	1	128	128
1K	16	512	8	1024	1024
2K	32	1024	16	2048	2048
8K	127	4096	64	8192	8192

^ Select the size based on the larger value in either category. For example, a system with 130 inputs and 24 outputs would require a 1K version. An exception is for A-B RIO which is dictated by logical racks per the A-B RIO definition, details can be found in the A-B RIO driver documentation.

Examples

- A LocalPorts SoftPLC with 144 Tealware digital inputs, 32 digital outputs requires a 1K license. Order catalog number SMS4-L-1K

- A Smart SoftPLC Gateway with 100 Ethernet/IP connection bytes (~50 16-bit tags) and 1 logical A-B RIO requires a 1K license. Order catalog numbers SMS4-1K plus SPO-BH

- A Smart SoftPLC that acts as a Gateway between one ModbusTCP HMI to DH+ that addresses 8000 tags, but only I/O addresses in logical rack 0 requires a LT license. Order SMS4-LT plus SPO-BH

Factory Installed Options

Configurable Communication Ports

These optional interfaces must be factory installed. Select up to 3 per Smart SoftPLC, ordering by Catalog Number.

Catalog Number	Protocol	Description
SPO-485	RS-485 (isolated 2-wire)	Software configurable protocols (ie: Modbus, ASCII)
SPO-BH	A-B RIO Master	Allows SoftPLC to act as RIO scanner
	A-B RIO Slave	Allows SoftPLC to act as RIO adapter
	A-B DH+	A-B Data Highway Plus

Other Factory Installed Options

Order the following as separate line item(s) by Catalog Number. SoftPLC Corp. will manufacture the unit to include these options.

Catalog Number	Protocol	Description
		Hardware Options
SPO-WIFIMOD	Wifi Antenna Extension & Case Modification	enables use of WiFi 802.11 b/g/h

Catalog Number	Protocol	Description
SPO-EXTEMP	Extended Temperature Option	extends operating range to -20~70°C
	Software Options	
SPZ-WEB	SoftPLC Embedded Web Server	serves user web pages to attached browser
SPZ-EML	Send Email Message Package	adds ability to send Email/text messages

Accessories

In addition to the factory configured options *(see "Models" section)*, these useful accessories are available:

Cables, Connectors & Accessories

Catalog Number	Description	Image
SM-VBKT	Smart Vertical Panel Mount Bracket Can be used to panel mount the Smart SoftPLC so the Ethernet ports face out, requiring less horizontal panel space. Standard mounting is DIN-rail with Ethernet ports facing left.	
SPO-USBSERKIT	SoftPLC USB to serial support kit (cable/firmware) Supported USB to serial cable, null modem + firmware to support RS-232 DF1/Modbus/ASCII communication	
SPO-USB485	Small Industrial USB to RS-485 Converter to support Modbus/ASCII communication	
SPO-UCONCBL	Smart/NeoPAC Serial Console Access Cable (10') *Used for troubleshooting in the event the Ethernet port is not accessible*	
SPO-CKIT	Spare Connectors Kit for Smart/NeoPAC option ports (1 P/S, 2 serial/bluehose)	

Power Supplies, Power Equipment

Catalog Number	Description	Image
ICO-PSH1524	DIN-rail P/S, Output 24VDC, 15W; Input: 100~240VAC	
ICO-PSH3024	DIN-rail mount P/S, 24VDC output, 30 Watts, 85-264VAC input	

Resources

Data Sheets

[Smart SoftPLC Data Sheet](#)

[SoftPLC Gateway Data Sheet](#)

[Tealware I/O Configurations Data Sheet](#)

Manuals

[Smart Quick Start Guide](#)

[Smart/NeoPAC SoftPLC & TOPDOC NexGen User Guide (version 5)](#)

[Smart Tealware Local I/O Driver User Manual](#)

Local Tealware I/O driver for use with Smart SoftPLC's equipped with a Backplane3 or LocalPorts interface.

Videos/Podcasts

A-B Control System Migrations *(~16 min video)* Download or Watch on YouTube

Allen-Bradley PLC Upgrades *(~5 min video)* Download or Watch on YouTube

What is a SoftPLC? *An overview of SoftPLC® Controllers* Download or Watch on YouTube.

A-B Migrations *(~13 min Podcast)* Listen