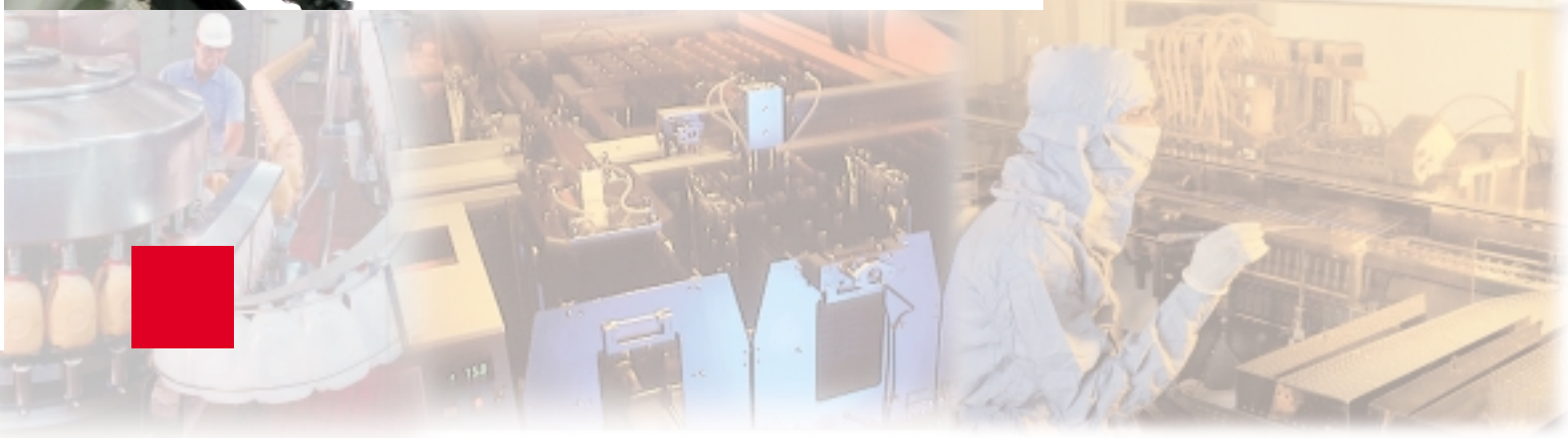
Serial Network Solutions

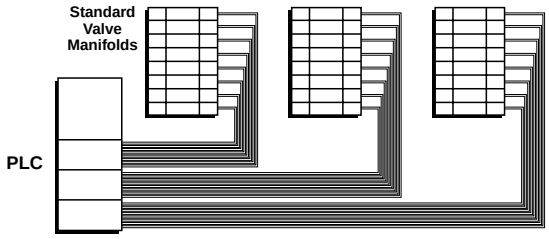
Solenoid Valve Manifolds and Discrete I/O for Serial Networks



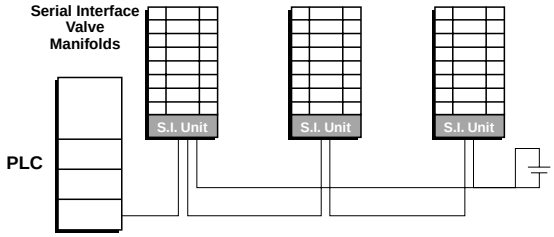

HAVE YOU
SIMPLIFIED
YOUR DESIGN
WITH
SERIAL
NETWORKING?
WHAT IS
SERIAL

What Is SERIAL NETWORKING Technology?

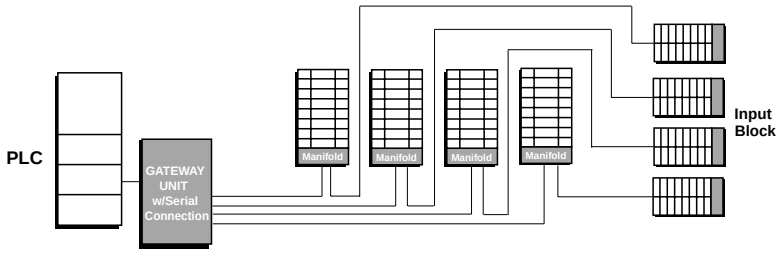
HARD-WIRED **Control System**



SERIAL INTERFACE **Control System**



GATEWAY SERIAL TRANSMISSION **Control System**



Serial Networking technology is fast becoming an integral part of many factory automation applications. Many are realizing the incredible benefits Serial Networks bring to their production efficiency, product quality, and ultimately, their bottom line.

But what is Serial Networking technology?

Serial Network systems use serial transmission to enable controllers (a PC or PLC) to control remotely located process equipment. Programmed commands are generated by the controller and are sent through a two-wire (twisted pair cable) connection to a remote input/output (remote I/O) block. These inputs and outputs are then connected to devices such as pneumatic solenoid valves, sensors, or instrumentation of some type.

So why does Serial Networking have such an impact on your profitability? To truly appreciate Serial Interface technology, you should understand the difference between a serial and a conventional control system.

In a conventional control system, I/O cards are located inside the PLC chassis. All wire connections from actuators, limit switches, proximity switches, regulators, etc. have to be fed back to the PLC. Big deal? Well, depending upon the complexity of the system, the number of wires can easily be in the thousands. Try troubleshooting that system with any speed or efficiency.

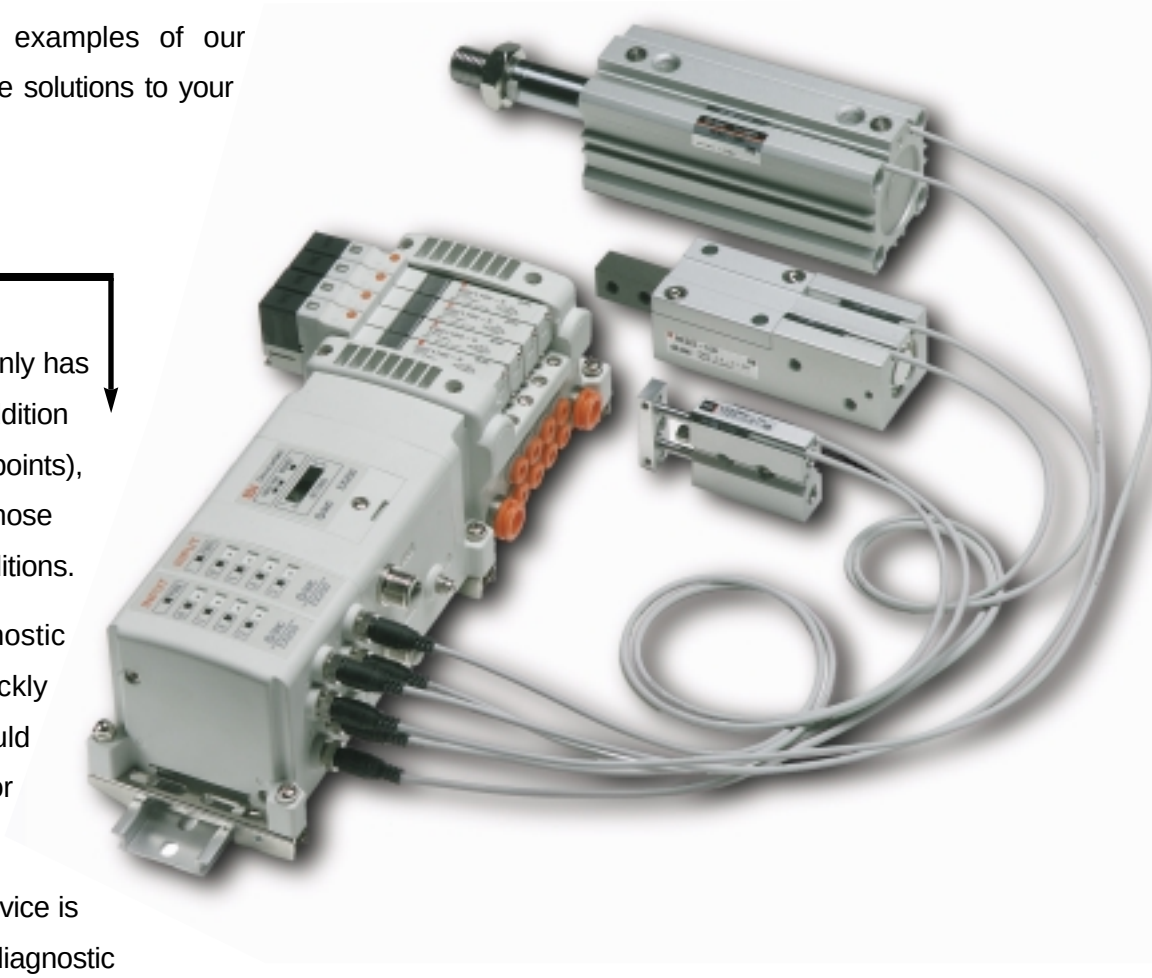
In a Serial Network system, all the I/O cards and the enormous bundle of wires are replaced with a few cables, a scanner, a Serial Interface unit, and input device. Troubleshooting is quick because of the diagnostic capabilities that are inherent to Serial Network systems.

NETWORKING?
TECHNOLOGY

System integrators and engineers have the freedom needed to design world-class control systems thanks to the SMC family of Serial Network (otherwise known as Serial Interface) products.

SMC's modular approach to solving system control problems provides for maximum flexibility. And with SMC's unequalled reputation for high quality manifolds and valves, you know the entire system will optimize the integrity of your design.

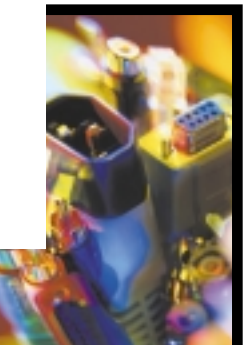
Series EX250 and EX500 Serial Network components are just two examples of our commitment to provide these solutions to your control system problems…



EX250

This advanced system not only has 32 sensor input points (in addition to 32 solenoid valve output points), but it is also IP67 rated for those applications in adverse conditions.

Series EX250's self-diagnostic functions help you quickly identify problems that could have otherwise caused major downtime.

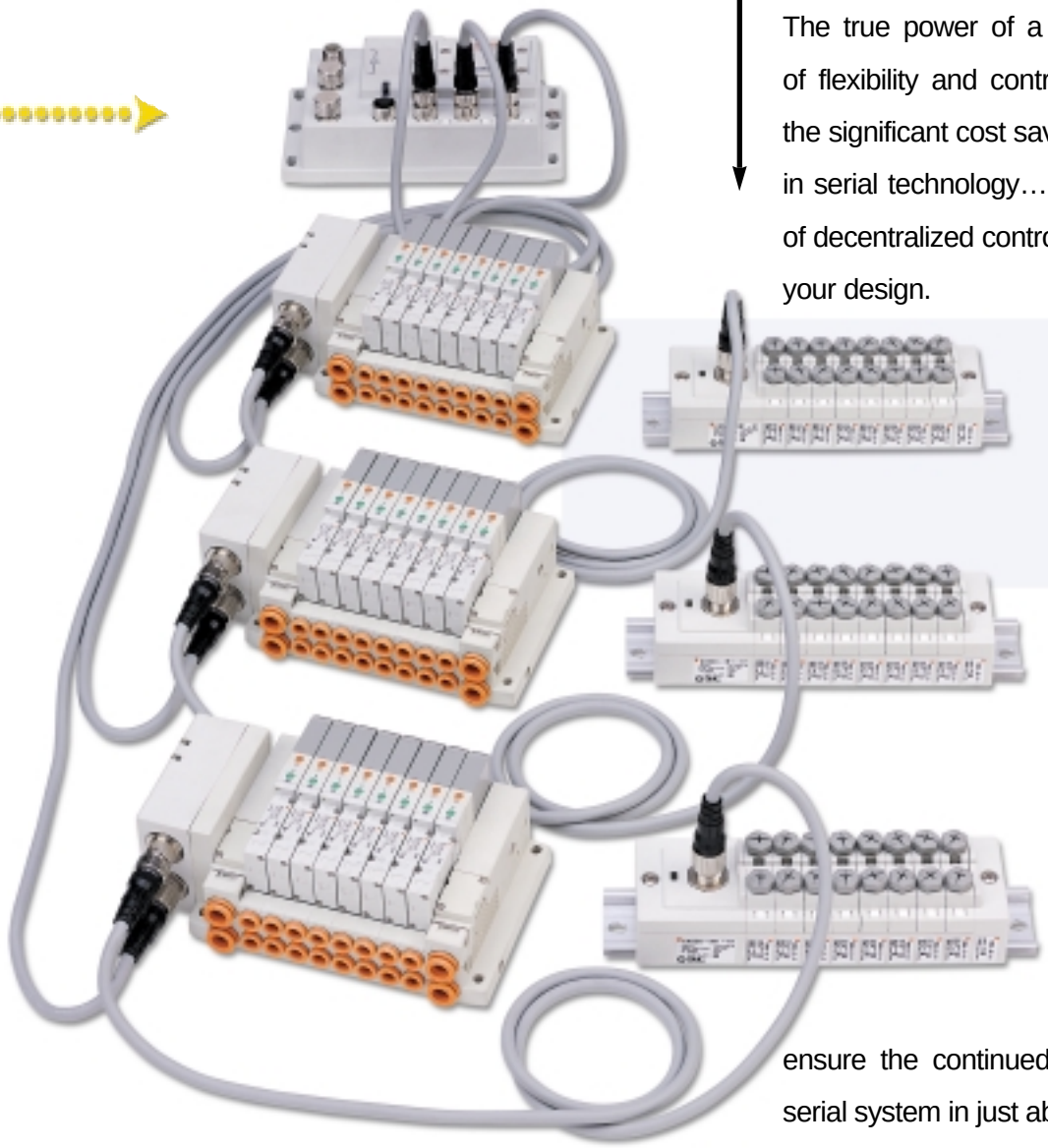


The EX250 device is built with self-diagnostic features to protect the input blocks from over-current and to detect insufficient voltage supply to the valves.

Serial Network Systems

SMC SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS & DISCRETE I/O



EX500 SYSTEM

The true power of a serial system is the amount of flexibility and control it gives you in addition to the significant cost savings. SMC's latest innovation in serial technology…EX500…gives you the power of decentralized control and the flexibility needed for your design.

Series EX500 consists of a gateway unit that gives decentralized control of 4 branches of 16 inputs and 16 outputs per branch (a total of 128 I/O points!). Series EX500 also harnesses the power of our latest valve manifolds — the Series SV and the VQC valve.

The IP65 rating of all EX500 components will ensure the continued error-free operation of your serial system in just about any environment in which your automation applications are located.

SMC'S TOTAL SOLUTION

It is our goal to provide you with not just one single innovative, high-quality product, but rather a large complement of products that provide a **TOTAL SOLUTION** for your automation application needs.

SMC offers a **huge array of pneumatic and electronic products** that can be integrated into your Serial Network system with ease and reducing your cost of ownership.

SERIAL NETWORKS

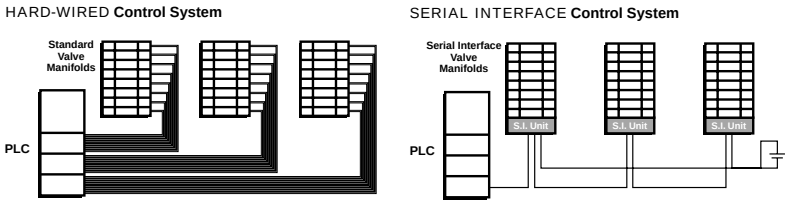
Why Use A Serial Network? Is It Right For You?

SOLENOID VALVE MANIFOLDS & DISCRETE I/O

FASTER WIRING

Serial Networks typically communicate through just a few cable connections. Imagine communicating with hundreds of inputs and outputs without having to hard-wire each one back to the PLC or controller.

QUICK INSTALLATION



Installing your machine either as a stand-alone application or part of an entire line is a much quicker process through the use of a Serial Network. The modular components can make your installation as easy as “plug and play”.

SIMPLER MAINTENANCE

Have a problem? Save precious time by merely checking the LED display on the serial unit, which will tell you if the device in question is working or not. It sure beats checking every wire and I/O point.

CAN I BENEFIT FROM USING SERIAL NETWORK PRODUCTS?

Ask yourself these questions. The more questions you answer YES to, the more you should consider using serial network products from SMC.

Do you have multiple solenoid valve manifolds on your machine?	YES
Would you benefit from spending less time wiring your machines?	YES
Are you looking for ways to reduce your machine's footprint?	YES
Do you want to be able to modify your machine's design more efficiently?	YES
Are your customers looking for the latest technology in your design?	YES
Would you like to simplify troubleshooting and maintenance?	YES
Do you want better communication and control capabilities for your system?	YES

Benefits of Serial Network Systems

SMC SERIAL NETWORKS

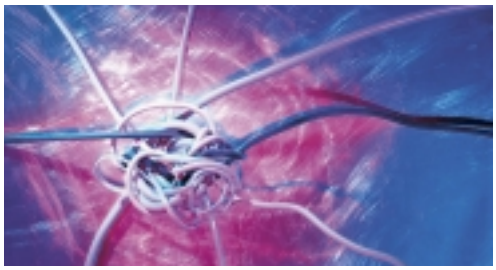
SOLENOID VALVE MANIFOLDS & DISCRETE I/O

FLEXIBLE INSTALLATION

Adding or moving devices can be a tedious and time-consuming task when they're hard-wired, but with a Serial Network, expansion and modification can be as simple as unplugging a phone in the den and reconnecting it in the kitchen!

SMALLER SIZE

Reducing the number of wires from hundreds (or even thousands) to a few will make a huge difference in your footprint space. An additional benefit is not having as many I/O cards to deal with.



LOWER COST OF OWNERSHIP

Imagine having fewer wires to number, route, and terminate…fewer I/O cards for your PLC…faster and more effective maintenance. A Serial Network system can achieve all of the above and more.
It all adds up to greater added value.

READ ON TO LEARN MORE ABOUT OUR SERIAL NETWORK PRODUCTS

DeviceNet™ **is a low-cost and simple network solution that connects a wide range of intelligent devices. With DeviceNet™ the cost and time to wire and install devices is dramatically reduced.** ***DeviceNet™*** **is an open communication network. Visit the** ***DeviceNet™*** **website at www.odva.org.**

Serial Unit	Inputs	Outputs	Features	IP65
	64	64	EX500-GDN1 Gateway (GW) unit EX500-S001 for SV valve EX500-Q001, EX500-Q101 for VQC valve • Modular system controls up to four 16-solenoid valve manifolds and four 16-input units. • Decentralized control of solenoid valve manifolds with SI and input units • Separate modular NPN & PNP input blocks allow you to add or remove inputs (2 per block) without rewiring or re-addressing. • IP65 protection rating • Use with Series VQC1000/2000/4000 and SV1000/2000/3000/4000 valves.	**GW unit IP65** **SI unit with SV valves : IP65** **SI unit with VQC valves: IP67**
	32	**32 on Series SV valves** **24 on Series VQC valves**	EX250-SDNI (SI unit) EX250-IE1/-IE2/-IE3 (Input block) • Controls up to 32 solenoid valves and receives up to 32 inputs depending on the number of input blocks installed • Input blocks can be added or removed at the point of use without rewiring or re-addressing. • Both M8 and M12 input connectors are available, and can be mixed on one manifold. • Built with two self-diagnostic features: 1. Over-current protection of input blocks (mechanical fuse) 2. Detects insufficient voltage supply to the valves and cuts-off network communication With a special option (available with model EX250-SDN1-X102), the network communication can still be maintained, sending voltage status to the master PC/PLC. • IP67 protection rating • Only for negative common valve • Use with Series VQC1000/2000/4000 and SV1000/2000/3000 valves	**IP67**
	0	16	IN313-DN1-B • Controls up to 16 single solenoid valves (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16) • Can be configured locally via the DIP switches or remotely via the DeviceNet network • LED indicator for each output • Use with Series (N)VFR, (N)VFS, (N)VZS, and ISO valves	**N**
	32*	16	EX230-SDN1 • DeviceNet compatible • 16 solenoid outputs and 32 inputs are available on the SI unit Out of 32 inputs • 16 inputs monitor solenoid overcurrent • 1 input monitors valve external power • 5 inputs accessible to the user via 3 numbers , M12 connectors • 2 inputs are reserved for actual application like weld package use • 8 inputs are inaccessible to the user. • LED indicators for each output for overload indication. • IP65 protection • Applicable to Series VSS/VSR ISO plug-in valves	**Y**

Serial Unit	Inputs	Outputs	Features	IP65
	32	32	EX240-SDN2 (SI unit), EX240-IE1 (Input unit) • Controls up to 32 solenoid valves and receives 8, 16, 24 or 32 inputs depending on the number of input units installed. Input units can be added or removed at the point of use without rewiring or re-addressing. • Selectable input polarity (NPN/ PNP) on each input unit • Built with two self-diagnostic features: 1. Over-current protection of input units (electrical fuse) 2. Detects insufficient voltage supply to the valves and cuts-off network communication. With a special DIP switch setting, the network communication can still be maintained, sending voltage status to the master PC/PLC. • As a standard, you can have two inputs on a single M12 connector, or one per connecter. • IP65 protection rating • Use with Series VQ2000/4000 and VQC4000 valves.	Y
	0	16	EX124(U, D)-SDN1 • Same performance as Series EX120 with additional features • For use on the Upside (U) or Downside (D) of the manifold • IP65 protection rating • Use with Series VQ2000/4000/5000 valves.	Y
	0	16	EX120-SDN1, EX121-SDN1, EX122-SDN1 • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • The "X1" option provides internal connections to allow the DeviceNet™ connector to power the SI unit as well as the valves. • Compact, economical serial unit for Series VQ1000/2000, SX3000/5000, SY3000/5000 Plug-in valves, and Series SV1000 2000/3000/4000 valves	N

PROFIBUS® consists of three different buses. They are PROFIBUS® DP, PROFIBUS® PA, and PROFIBUS® FMS. PROFIBUS® is used in more than 200,000 applications to solve a multitude of automation challenges in manufacturing and process control.

Serial Unit	Inputs	Outputs	Features	IP65
	64	64	EX500-GPR1 (GW unit) EX500-S001 for SV valve EX500-Q001, EX500-Q101 for VQC valve • Modular system controls up to four 16-solenoid valve manifolds and four 16-input units. • Decentralized control of solenoid valve manifold with SI unit and input unit. • Separate modular NPN & PNP input blocks allow you to add or remove inputs (2 per block) without rewiring or re-addressing. • IP65 protection rating • Use with Series VQC1000/2000/4000 and SV1000/2000 3000/4000 valves. • DB9 network connector is available as an option. • Maximum baud rate: 12Mb	**GW unit IP65** **SI unit with SV valves: IP65** **SI unit with VQC valves: IP67**
	32	**32 on Series SV valves** **24 on Series VQC valves**	EX250-SPR1 (SI unit) EX250-IE1/-IE2/-IE3 (Input block) • Controls up to 32 solenoid valves and receives up to 32 inputs depending on the number of input blocks installed • Input blocks can be added or removed at the point of use without rewiring or re-addressing. • Both M8 and M12 input connectors are available, and can be mixed on one manifold. • Built-in over-current protection of input blocks • IP67 protection rating • Only for negative common valve • Use with Series VQC1000/2000/4000 and SV1000/2000/3000 valves. • Maximum baud rate : 12Mb	**IP67**
	32	16	IN313-PR1 • Profibus-DP and FMS compatible • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16). • Status LEDs on unit for each output • Use with Series (N)VFR, (N)VFS, (N)VZS, ISO valves. • Maximum baud rate: 1.5 Mb	**N**

∗ Each unit listed above is compatible with the Profibus-DP protocol.

Visit the PROFIBUS® website at www.profibus.com for more information.

Serial Unit	Inputs	Outputs	Features	IP65
	32	32	EX240-SPR1 (SI unit), EX240-1E1 (Input unit) • Controls up to 32 solenoid valves and receives 8, 16, 24 or 32 inputs depending on the number of input units installed. • Input units can be added or removed at the point of use without rewiring or re-addressing. • Selectable input polarity (NPN/PNP) on each input unit • Built-in over-current protection of input units • As a standard, you can have two inputs on a single M12 connector, or one per connector. • IP65 protection rating • Only for negative common valve • Use with Series VQ2000/4000 and VQC4000 valves. • DB9 network connector is available as an option. • Maximum baud rate 12Mb	Y
	0	16	EX120-SPR1, EX121-SPR1, EX122-SPR1 • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • Utilizes 9-pin D-sub network communication connector. • Only for negative common valve • Compact, economical serial unit for Series VQ1000/2000, SX3000/5000, SY3000/5000 Plug-in valves, and SV1000/2000/ 3000/4000 valves • Maximum baud rate: 1.5Mb	N

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PROFI PROCESS FIELD BUS BUS

Visit the PROFIBUS® website at www.profibus.com for more information.

SMC SERIAL NETWORKS

Solutions for Allen-Bradley RIO

SOLENOID VALVE MANIFOLDS & DISCRETE I/O

Allen-Bradley is a world leader in programmable logic controllers, control logic components, industrial automation software, motion control and electronic operator interface devices. Visit their website at www.automation.rockwell.com for more information.

Serial Unit	Inputs	Outputs	Features	IP65
	64	64	EX500-GAB1-X1 (GW unit) EX500-S001-X1 for SV valve EX500-Q001-X1, EX500-Q101-X1 for VQC valve • Modular system utilizes a half rack to control up to four 16-solenoid valve manifolds and four 16-input units. • Decentralized control of solenoid valve manifolds with SI and input units. • Separate modular NPN & PNP input blocks allow you to add or remove inputs (2 per block) without rewiring or re-addressing. • IP65 protection rating • Use with Series VQC1000/2000/4000 and SV1000/2000/3000/4000 valves.	**GW unit IP65** **SI unit with SV valves: IP65** **SI unit with VQC valves: IP67**
	0	16	IN313-AB1 • Controls up to 16 single solenoid valves. • Status LEDs on unit for each output • Use with Series (N)VFR, (N)VFS, (N)VZS, ISO valves.	N
	32	32	IN313-AB2 • Controls up to 32 solenoids and 32 auxiliary inputs. Each input module handles 4 inputs (8 modules maximum). • Status LEDs for inputs and outputs • Use with Series (N)VFR, (N)VFS, (N)VZS, ISO valves.	N
	0	16	EX120-SAB1, EX121-SAB1, EX122-SAB1 • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • Terminal strip wiring with status LEDs for output • Compact, economical serial unit for Series VQ1000/2000, SX3000/5000, SY3000/5000 Plug-in valves, and Series SV1000/2000/3000/4000 valves	N
	0	16	EX124(U, D)-SAB1 • Same performance as Series EX120 with additional features • For use on the Upside (U) or Downside (D) of the manifold • IP65 protection rating • Use with Series VQ2000/4000/5000 valves.	Y

ROCKWELL AUTOMATION ENCOMPASS AMERICAS PARTNER

Solutions for Other Protocols

SMC SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS & DISCRETE I/O

SMC supports an extremely wide variety of open and closed network protocols to suit your application. To determine which protocol is right for you, see "Frequently Asked Questions" on page 22.

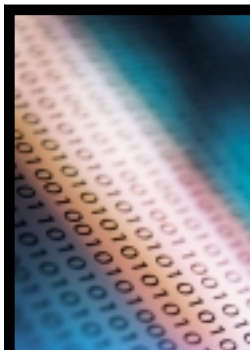
Network	Protocol	Serial Unit	Inputs	Outputs	Valve Series	IP65
OPEN NETWORKS	ASi	EX120/121/122-SAS2/4/5	0	4 to 8	**VQ, SX, SY & SV	N
		EX210-SAS1~6	0 to 2	2 to 8	VQ2000/4000	Y
	Interbus	EX120/121/122-SIB1	0	16	**VQ, SX, SY & SV	N
		EX240-SIB1	32	32	VQ2000/4000	Y
	LonWorks	Special Order	0	16	**VQ, SX, SY & SV	N
	SDS	EX141-SSD1 (with network M12 Connector)	0	16	SQ1000/2000, SZ3000/5000	N
		EX140-SSD1-X16 (with network AMP connector)				
	CC-Link	EX120/121/122-SMJ1	0	16	**VQ, SX, SY & SV	N
		EX124 (U, D)-SMJ1	0	16	VQ2000/4000/5000	Y
		EX140-SMJ1	0	16	SQ1000/2000, SZ3000/5000	N
MITSUBISHI	MelsecNet Mini-S3	EX120/121/122-SMB1	0	16	**VQ, SX, SY & SV	N
		EX123/124(U, D)-SMB1	0	16	VQ2000/4000/5000	Y
		IN313-MB1	0	16	(N)VFR/S, (N)VZS, ISO	N*
NKE	NKE Wire Saving System	EX120/121/122-SUW1	0	16	**VQ, SX, SY & SV	N
		EX123 (U, D)-SUW1	0	16	VQ2000/4000/5000	Y
		EX140-SUW1	0	16	SQ1000/3000, SZ3000/5000	N
		IN313-UW1	0	16	(N)VFR/S, (N)VZS, ISO	N*
	NKE Wire Saving H System	EX120/121/122-SUH1	0	16	**VQ, SX, SY & SV	N
		EX123 (U, D)-SUH1	0	16	VQ2000/4000/5000	Y
		EX140-SUH1	0	16	SQ1000/2000, SZ3000/5000	N
OMRON	CompoBus/S	EX120/121/122-SCS1	0	16	**VQ, SX, SY & SV	N
		EX120/121/122-SCS2	0	8		N
		EX124 (U, D)-SCS1	0	16	VQ2000/4000/5000	Y
		EX124 (U, D)-SCS2	0	8		Y
		EX140-SCS1	0	16	SQ1000/2000, SZ3000/5000	N
		EX140-SCS2	0	8		N
		EX120/121/122-STA1	0	16	**VQ, SX, SY & SV	N
	SYSBUS	EX123(U, D)-STA1	0	16	VQ2000/4000/5000	Y
		IN313-TA1	0	16	(N)VFR/S, (N)VZS, ISO	N*
SUNX	S-Link	EX120/121/122-SSL1	0	16	**VQ, SX, SY & SV	N
		EX120/121/122-SSL2	0	8		N
		EX123 (U, D)-SSL1	0	16	VQ2000/4000/5000	Y
		EX123 (U, D)-SSL2	0	8		Y

* IP53 or NEMA12 comes as optional.

** VQ1000/2000, SX3000/5000, SY3000/5000, SV1000/2000/3000/4000

If your protocol isn't listed here, or for more information about our many Serial Network products, contact your local SMC representative.

Call toll-free 1-800-SMC-SMC1 to reach a branch near you.



SMC
SERIAL NETWORKS

Solutions for the Automotive Industry

SOLENOID VALVE MANIFOLDS

Because of the enormity and complexity of many Automotive Industry applications, Serial Network systems provide the solutions needed to handle such challenges.

Lengthy production lines with hundreds, or even thousands of I/O points from sensors to ISO valves, all running on a single Serial Network can be controlled by a single PC.

Here are a few of SMC's serial product solutions for the Automotive Industry.

Serial Unit	Inputs	Outputs	Features	IP65
	64	64	EX500-GAB1-X1, EX500-GDNI, EX500-GPRI For applicable SI units, refer to pages 8, 10 &12. • Three major protocols are available: Allen-Bradley Remote I/O (RIO) (EX500-GAB1-X1), DeviceNet™ (EX500-GDN1), and Profibus-DP (EX500-GPR1) • Modular system controls up to four 16-solenoid valve manifolds and four 16-input units. • Decentralized control of solenoid valve manifolds valves with SI and input units. • Separate modular NPN & PNP input blocks allow you to add or remove inputs (2 per block) without rewiring or re-addressing. • IP65 protection rating • Use with Series VQC1000/2000/4000 and SV1000/2000/3000/4000 valves	**GW unit IP65** **SI unit with SV valves: IP65** **SI unit with VQC valves: IP67**
	0	16	IN313-DN1-B • DeviceNet™ compatible • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • Can be configured locally via the DIP switches or remotely via the DeviceNet network. • Status LEDs on unit for each output • Use with Series (N)VFR, (N)VFS, (N)VZS, ISO valves.	N
	32*	16	IN313-AB1-X10 • Allen-Bradley Remote I/O (RIO) compatible • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoid does not exceed 16.) • All 16 outputs are electronically fused for protection against overloading. • The serial unit has a bit for each output to notify the PLC when overloading occurs. • The serial unit can diagnose if output turns "ON" unintentionally, when output is supposed to be "OFF". • The serial unit has a bit to notify PLC when output drive faulted. And appropriate measures can be taken to guard against "unintended motion". • LED indicators for each output and for overload indication of each output • IP53 protection rating • Use with Series (N)VFR, (N)VFS, (N)VZS, ISO valves * 32 feedback inputs: 16 used for output overload detection and balance :16 used to detect mismatch between PLC signal and output. (Not used for sensor inputs.)	N
	32	16	EX230-SDN1 • DeviceNet compatible • 16 solenoid outputs and 32 inputs are available on the SI unit Out of 32 inputs • 16 inputs monitor solenoid overcurrent • 1 input monitors valve external power • 5 inputs accessible to the user via 3 numbers , M12 connectors • 2 inputs are reserved for actual application like weld package use • 8 inputs are inaccessible to the user. • LED indicators for each output for overload indication. • IP65 protection • Applicable to Series VSS/VSR ISO plug-in valves	Y

Assembly Tooling

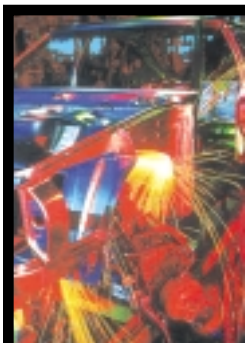
Hundreds of solenoid valves are used to control the many pneumatic actuators used on assembly lines. Controlling multiple banks of valves using a single communication line greatly reduces the cost and labor involved with parallel wiring. Additionally, a Serial Network provides diagnostic features to alert you to such problems as wire breaks or over-current conditions, and allows at-a-glance troubleshooting.

Paint Booths

Automotive paint booths have many different paint colors ready to be applied on the autos going through the line. A serial network makes it possible to control the color valves easier than labor-intensive parallel wiring, and reduces the number of PLC I/O cards required.

Robotic Welding

Typical automotive plants have up to 500 or more weld robots. On a weld pack with point-to-point (parallel) wiring, you have to wire the power, pressure selects, weld, and retract valves all separately. With a Serial Network system, you only need the power and communication lines from your PLC or control host. Serial Networks also allow all the weld packs to share a single communication line, allowing you to collect performance and diagnostic data to ensure the weld guns are operating at peak efficiency.



SMC
SERIAL NETWORKS

Solutions for the Semiconductor Industry

SOLENOID VALVE MANIFOLDS

The movement to larger and larger wafer sizes, with smaller and smaller device geometries, demands that processed chips be handled more quickly, more delicately, and with more precision.

Our Serial Network systems neatly integrate into just about any machine design to help achieve these goals.

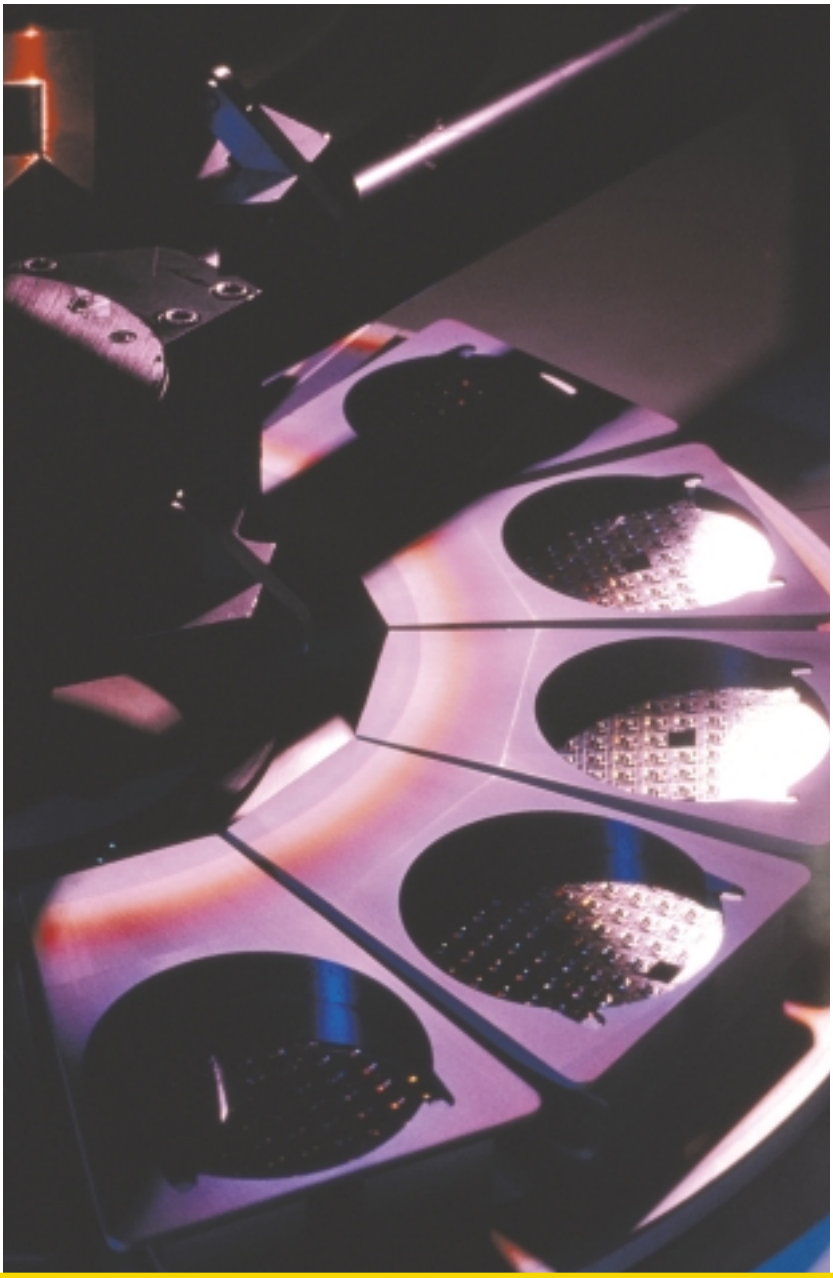
These are only a few of the many Serial Network products we offer for the Semiconductor Industry.

Serial Unit	Inputs	Outputs	Features	IP65
 SPECIAL	32	32	NP420-DN1 • DeviceNet™ compatible • Controls up to 16 double solenoid valves (32 outputs). (A combination of single and double solenoid valves as long as the maximum number of station does not exceed 16) with interlock capability, and built-in 32 discrete inputs with D-sub connector. • Power to each solenoid can be supplied through the interlock connector. • Stack mounting style with valve manifold for minimum footprint. • Use with Series VQ1000 plug-in valves.	N
 SPECIAL	0	16	EX160-SDN1 • DeviceNet™ compatible • Controls up to 8 double solenoid valves (16 outputs). (A combination of single and double solenoid valves as long as the maximum number of station does not exceed 8) with interlock capability. • Power to each solenoid can be supplied through the interlock connector. • Equipped with mechanical relay outputs • Stack mounting style with valve manifold for minimum footprint • Applicable for negative common valve only • Use with Series VQ1000/2000 plug-in valves.	N
	32	**32 on Series SV valves** **24 on Series VQC valves**	EX250-SDN1 (SI unit), EX250-IE1/-IE2/-IE3 (Input block) • DeviceNet™ compatible • Controls up to 32 solenoid valves and receives up to 32 inputs depending on the number of input blocks installed. • Input blocks can be added or removed at the point of use without rewiring or re-addressing. • Both M8 and M12 input connectors are available, and can be mixed on one manifold. • Built with two self-diagnostic features: 1. Over-current protection of input blocks (mechanical fuse) 2. Detects insufficient voltage supply to the valves and cuts-off network communication With a special option (available with model EX250-SDN1-X102), the network communication can still be maintained, sending voltage status to the master PC/PLC. • IP67 protection rating • Use with only for negative common valve Series VQC1000/2000/4000 and SV1000/2000/3000 valves.	**Y** **IP67**
	0	16	EX120-SDN1 • DeviceNet™ compatible • Controls up to 16 solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • The "X1" option provides internal connections to allow the DeviceNet™ connector to power the SI unit as well as the valves. • Compact, economical serial unit for Series VQ1000/2000, SX3000/5000, SY3000/5000 Plug-in valve, and Series SV1000/2000/3000/4000 valves	N

EX120-SDN1-XP1 The “XP1” takes advantage of all the attributes of the regular EX120-SDN1, but it utilizes twist-on connectors instead of the usual Phoenix connectors. The benefits of having the twist-on connectors consist of strain relief for your wiring and the decreased chance of wiring errors.

Process Modules

Serial Interface technology makes it easy to connect and disconnect process modules quickly without the expensive and time-consuming headaches of re-engineering cables or connectors. Customization and control of these modules becomes a simple process with the use of a few cables and a PC or PLC.



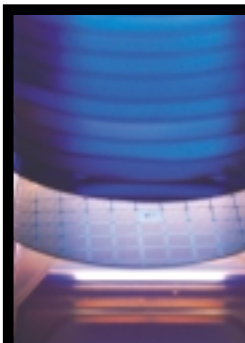
Precious Uptime

Downtime is greatly reduced by the extraordinary fault detection and troubleshooting capabilities inherent in Serial Networks. This is important because the creation of a wafer is a very expensive and time-sensitive undertaking. Any disruption in the production process can be extremely costly.

Special Instrumentation

Serial Interface makes it easy to add and upgrade instrumentation to meet ever-tightening process windows without additional wiring.

Process modules with this special instrumentation (gas analyzers, pressure regulators, and mass flow controllers) promote a more efficient production process by greatly minimizing errors.



The Packaging Industry is diverse and varied when it comes to the sheer number of applications that are utilized. SMC's broad range of Serial Network products also varies greatly in order to meet your specific application and machine design needs.
Our serial units, valves, and manifolds range from the very small and compact to the large and powerful.

Serial Unit	Inputs	Outputs	Features	IP65
	64	64	EX500-GAB1-X1, EX500-GDN1, EX500-GPR1 For applicable SI units, refer to pages 8, 10 &12. • Three major protocols are available: Allen-Bradley Remote I/O (RIO) compatible (EX500-GAB1-X1), DeviceNet™ (EX500-GDN1), and Profibus-DP (EX500-GPR1) • Modular system controls up to four 16-solenoid valve manifolds and four 16-input units. • Decentralized control of solenoid valve manifolds with SI and input units • Separate modular NPN & PNP input blocks allow you to add or remove inputs (2 per block) without rewiring or re-addressing. • IP65 protection rating • Use with Series VQC1000/2000/4000 and SV1000/2000/3000/4000 valves.	GW unit IP65 SI unit with SV valves: IP65 SI unit with VQC valves: IP67
	32	32 on Series SV valves 24 on Series VQC valves	EX250-SDN1 (SI unit), EX250-SPR1 (SI unit), EX250-IE1/-IE2/-IE3 (Input block) • Two major protocols are available: DeviceNet™ (EX250-SDN1) and Profibus-DP compatible (EX250-SPR1) • Controls up to 32 solenoid valves and receives up to 32 inputs depending on the number of input units installed. • Input blocks can be added or removed at the point of use without rewiring or re-addressing. • Both M8 and M12 input connectors are available, and can be mixed on one manifold. • Built with two self-diagnostic features: 1. Over-current protection of input blocks (mechanical fuse) 2. Detects insufficient voltage supply to the valves and cuts-off network communication With a special option (available with model EX250-SDN1-X102), the network communication can still be maintained, sending voltage status to the master PC/PLC. • IP67 protection rating • Only for negative common valve • Use with Series VQC1000/2000/4000 and SV1000/2000/3000 valves.	IP67
	32	32	EX240-SDN2 (SI unit), EX240-SPR1 (SI unit), EX240-SIB1 (SI unit), EX240-IE1 (Input unit) • Three major protocols are available: DeviceNet™ (EX240-SDN2), Profibus-DP (EX240-SPR1), and Interbus (EX240-SIB1) • Controls up to 32 solenoid valves and receives 8, 16, 24 or 32 inputs depending on the number of input units installed. • Input units can be added or removed at the point of use without rewiring or re-addressing. • Selectable input polarity (NPN/ PNP) on each input unit • Built with two self-diagnostic features: 1. Over-current protection of input units (electrical fuse) 2. Detects insufficient voltage supply to the valves and cuts-off network communication With a special DIP switch setting, the network communication can still be maintained, sending voltage status to the master PC/PLC. • As a standard, you can have two inputs on single M12 connector, or one per connector. • IP65 protection rating • Maximum baud rate: 12Mb (EX240-SPR1) • Use with Series VQ2000/4000 and VQC4000 valves.	Y
	0	16	EX124(U, D)-SDN1 • DeviceNet™ compatible • Same performance as Series EX120 with additional features • For use on the Upside (U) or Downside (D) of the manifold • IP65 protection rating • Use with Series VQ2000/4000 valves.	Y
	0	16	IN313-DN1-B, IN313-PR1, IN313-AB1/AB2 • Three major protocols are available: DeviceNet™ (IN313-DN1-B), Profibus-DP (IN313-PR1), Allen Bradley RIO (IN313-AB1, & IN313-AB2) • Controls up to 16 (32 in case of IN313-AB2), single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16 (32 for IN313-AB2.) In addition, IN313-AB2 has 32 auxiliary inputs. Each input module handles 4 inputs (8 modules maximum). • Can be configured locally via the DIP switches or remotely via the DeviceNet™ network (IN313-DN1-B). • LED indicators for each output • Use with Series (N)VFR, (N)VFS, (N)VZS, ISO valves.	N

Drop Packer

The Drop Packer has a myriad of sensors that detect product jams and voids in the flow. Lane guides and jam reliefs control the flow of the product so it is in the proper arrangement prior to entering the loading area. From there, the product may be dropped, lowered or raised into a case. Serial Interface allows you to simplify installation, control and maintenance, saving time and money.

Automatic Case Packer

The Case Packer performs the functions of erecting a case, collating the product, inserting a pad, inserting a partition, loading the product into the case, and closing the case.

Various valve manifolds, actuators, vacuum products, and cylinders perform these operations. Serial Interface allows the smooth coordination of the multitude of sequential operations.

Tray Packer

Yet another example of a Serial Interface application in the Packaging Industry is the Tray Packer. The tray packer performs the functions of erecting a tray, collating the product, and loading the product into the tray through the use of valve manifolds, actuators, and cylinders. With a Serial Interface system you achieve more effective control and maintenance with less wiring.

Research and technology is bringing the latest medical treatment to more of the world's population than ever before. To meet demand, the industry is striving to implement the most efficient and intelligent process control systems.

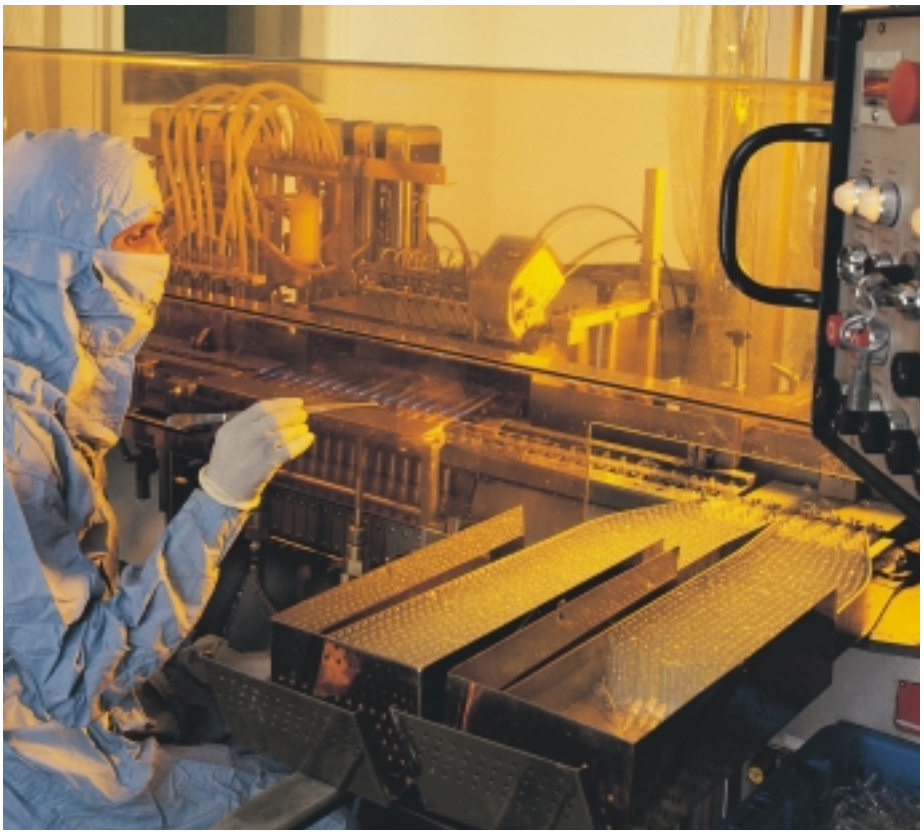
Whether it is for clinical laboratory automation or pharmaceutical and medicinal production, SMC's Serial Network systems are part of the solution. Not only our technical options and quality, but the "clinically clean" appearance of our products make them ideally suited to medical applications.

Serial Unit	Inputs	Outputs	Features	IP65
	0	16	EX140-SDN1 • DeviceNet™ compatible • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • Compact design to allow placement on small footprint and low-profile • Use with Series SZ3000/5000 and SQ1000/2000 valves.	N
	0	16	EX120-SAB1, EX121-SAB1, EX122-SAB1 • Allen-Bradley Remote I/O (RIO) compatible • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • Terminal strip wiring with LED indicator • Compact, economical serial unit for Series VQ1000/2000, SX3000/5000, SY3000/5000 Plug-in valves, and SV1000/2000/3000/4000 valves.	N
	32	32 on Series SV valves 24 on Series VQC valves	EX250-SDN1 (SI unit), EX250-IE1/ -IE2/ -IE3 (Input block) • DeviceNet™ compatible • Controls up to 32 solenoid valves and receives up to 32 inputs depending on the number of input blocks installed. • Input blocks can be added or removed at the point of use without rewiring or re-addressing. • Both M8 and M12 input connectors are available and can be mixed on one manifold. • Built with two self-diagnostic features: 1. Over-current protection of input blocks (mechanical fuse) 2. Detects insufficient voltage supply to the valves and cuts-off network communication With a special option (available with model EX250-SDN1-X102), the network communication can still be maintained, sending voltage status to the master PC/PLC. • IP67 protection rating • Only for negative common valve • Use with Series VQC1000/2000/4000 and SV1000/2000/3000 valves.	IP67
	0	16	EX120-SPR1, EX121-SPR1, EX122-SPR1 • Profibus-DP compatible • Controls up to 16 single solenoid valves. (A combination of single and double solenoid valves as long as the maximum number of solenoids does not exceed 16.) • Utilizes 9-pin D-sub network connector. • Only for negative common valve • Compact, economical serial unit for Series VQ1000/2000, SX3000/5000, SY3000/5000 Plug-in valve, and SV1000/2000/3000/4000 valves • Maximum baud rate: 1.5Mb	N

Clinical Labs

Many clinical lab automation systems have become modular, allowing customization and addition or removal of individual diagnostic instruments. Serial Networks allow quick and easy addition or removal of devices while providing centralized control from one PC.

Sample transportation and robotic handling systems are connected into the same network. Complex, unsightly and expensive wiring of conventional systems is eliminated and built-in network diagnostics make maintenance quick and easy, reducing downtime and helping laboratories increase sample turn-around time.



Pharmaceutical Manufacturing

Process control in the manufacture of medicinal products and pharmaceuticals can be automated cost effectively using Serial Network systems. At each stage of production, many process valves are pilot controlled from banks of solenoid valves. SMC's compact remote valve manifolds save space and reduce piping and wiring costs.

Input devices such as switches and sensors for level, pressure, and temperature control can be connected directly at each remote location while maintaining centralized control.

Options for closed or open networks allow the customer to standardize on one brand of components or use a variety of brands available on today's market.

Here are a few **Frequently Asked Questions** we receive on our Serial **Network Products**. If you have questions that aren't answered here, please contact us at 1-800-SMC-SMC1.

Q How does a serial system work?

A With a parallel-wired valve manifold (point-to-point), the solenoid valves are individually turned on or off at the PLC I/O card; that's why you have to wire them one by one to the PLC. A serial system uses a scanner card instead of an I/O card, and the scanner card tells all the serial units (like our EX120s, for example) which outputs to turn on or off. The serial units are each identified by a different address, so they know which scanner messages to ignore and which ones to obey.

Q How do I address the solenoid valves?

A The outputs are addressed much the same way as with a parallel I/O card. It depends on configured I/O mapping.

Q Is there a current limit on the outputs?

A Yes, just as there is a current limit on the I/O card, there is a current limit on the serial unit. SMC's Serial Network products are designed to operate all of our major valve Series SX, SY, VQ, and our new Series SV and VQC valves, to name a few. We also have special products for applications with different current needs. Ask your SMC representative for more information.

Q Will my program run slower using a serial network?

A Not usually. The scan time will be somewhat longer if you are using more than one scanner card. Scanner cards vary, I/O response time will be different depending upon the network scan time.

Q What if something goes wrong?

A Troubleshooting a Serial Network system isn't difficult. In fact, many protocols (such as DeviceNet™) have built-in diagnostic features and indicating LEDs to show which I/O points are on, the status of the serial unit, and so on.

Q What Protocol should I choose?

A To determine the protocol necessary for your system, consider the following:

- Open protocols provide complete system design specifications; such information is not available for closed protocols.
- Is cost a major issue when building my system? (Open protocols are usually less expensive and more prevalent in the market.)
- Do I want complete compatibility of my system? (Closed protocols can usually guarantee a seamless compatibility because the entire system is made up of one manufacturer's components and software.)
- What are my overall system requirements? (What are your transmission distance needs? What communication speed do you need?)

Cost/Benefit Analysis
Serial Network Products

SMC SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS & DISCRETE I/O

Think That Serial Interface Products Are More Expensive? Do The Math! It is a common misperception that Serial Network products are much more costly than Parallel products. When considering both the comparable up-front costs and greater long-term benefits, SMC's Serial Network products can actually SAVE you valuable TIME and MONEY.

Serial Interface System-Cost/Benefit Analysis

Number of output points	96	192	384	768	1536
Number of manifolds	4	8	12	24	48
Conventional Wiring System-Costing					
PLC	$ 770	$770	$770	$770	$770
16 point output card	$1,680	$3,360	$6,720	$13,440	$26,880
Wiring cost	$960	$1,920	$3,840	$7,680	$15,360
Valve Manifolds	$5,400	$10,800	$16,200	$32,000	$64,800
Total cost	**$8,810**	**$16,850**	**$2,7530**	**$54,290**	**$107,810**
Serial Interface System-Costing					
PLC	$770	$770	$770	$770	$770
Scanner card	$995	$995	$995	$995	$995
Wiring cost	$400	$800	$1,200	$2,400	$4,800
Valve Manifolds	$6,408	$12,816	$19,224	$38,448	$76,896
Total cost	**$8,573**	**$15,381**	**$22,189**	**$42,613**	**$83,461**
Direct cost saving derived by using Serial Interface System	**$237**	**$1,469**	**$5,341**	**$11,677**	**$24,349**

Apart from savings in component cost, there are two major cost factors still need to be considered: Installation **costs** and **Downtime costs.**

Installation Costs

Initial wiring is only one aspect of the machine installation process. Testing, configuration, and troubleshooting time are also involved. With the virtual "plug and play" capability of Serial Networks, you will spend a fraction of the time working on these processes. But that's not all. For original equipment manufacturers, once the machine has been thoroughly tested, it then needs to be broken down, moved to the customer location, and installed. Then the process of testing, configuration, and troubleshooting begins again. Depending upon the size of the machine or application, this can take days or even weeks. A Serial Network can save you hundreds or even thousands of dollars by reducing the installation time.

Downtime Costs

Production downtime is so costly that when your line is down, **every minute counts.** A major benefit of our Serial Network products is **reduced downtime**, which gives you an overall **lower cost of ownership**. Status LEDs on the serial unit tell at a glance whether the I/O point in question is on or off. The dramatic wiring reduction allows much faster wire identification for maintenance. And built-in self-diagnostic features can report a problem before it becomes critical. If a problem should arise, a Serial Network can help you get your line running again fast.

Assumptions

1. Allen-Bradley PLC 1747-L524, list price: $770 as of 10/01
2. Allen-Bradley I/O card 1740OB, list prices: $280 as of 10/01
3. Allen-Bradley Scanner module 1747 SN, list price: $995 as of 10/01
4. Wiring costs are estimated at $10/point and $100/node for SI system. Your costs may vary.
5. SMC valve manifold VV5QC11-12N7SDQNO, list price $1,602, for serial interface system and VV5QC11-12C6FDO, list price $1,350 for conventional wiring system considered The series VQC manifolds considered are fitted with 12 numbers, double solenoid coil valves.

SMC SERIAL NETWORKS

Open Network Protocol

SOLENOID VALVE MANIFOLDS & DISCRETE I/O

Protocol	Promoting Organization Main Adopting Enterprise	SI Type No.	Compatible Valve Manifold	I/O Number	Valve Common	IP65
DeviceNet™ CompoBus/D	ODVA, SEMI, A-B, & OMRON	EX120/121/122-SDN1	** VQ, SX , SY & SV	16 out	Positive	N
		EX124 (U, D)-SDN1	VQ2000/4000/5000	16 out	Positive	Y
		EX140-SDN1	SQ1000/2000, SZ3000/5000	16 out	Positive	N
		EX160-SDN1	VQ1000/2000	16 out	Negative	N
		EX230-SDN1	ISO	16 in, 16 out	Negative	Y
		EX240-SDN1/2	VQ2000/4000/5000, VQC4000	32 in, 32 out	Negative/Positive	Y
		EX250-SDN1	VQC1000/2000/4000, SV1000/2000/3000	32 in, 32 out	Negative	IP67
		EX500-GDN1(GW unit)	VQC1000/2000/4000, SV1000/2000/3000/4000	64 in, 64 out	—	Y
		EX500-S001 (SI unit)	SV1000/2000/3000/4000	16 out	Non polar	Y
		EX500-Q001 (SI unit)	VQC1000/2000/4000		Positive	IP67
		EX500-Q101 (SI unit)			Negative	IP67
		IN313-DN1-B	(N)VFR/VFS, (N)VZS, ISO		Positive	N*
		NP420-DN1	VQ1000	32 in, 32 out	Positive	N
SDS	SEMI & Honeywell	EX141-SSD1	SQ1000/2000, SZ3000/5000	16 out	Positive	N
Profibus DP	PNO, PTO, DIN & SIEMENS	IN313-PR1	(N)VFR/VFS, (N)VZS, ISO	16 out	Negative	N*
		EX120/121/122-SPR1	** VQ, SX , SY & SV	16 out	Negative	N
		EX240-SPR1	VQ2000/4000, VQC4000	32 in, 32 out	Negative	Y
		EX250-SPR1	VQC1000/2000/4000, SV1000/2000/3000	32 in, 32 out	Negative	Y
		EX500-GPR1 (GW unit)	VQC1000/2000/4000, SV1000/2000/3000/4000	64 in, 64 out	—	Y
		EX500-S001 (SI unit)	SV1000/2000/3000/4000	16 out	Non polar	Y
		EX500-Q001 (SI unit)	VQC1000/2000/4000		Positive	IP67
		EX500-Q101 (SI unit			Negative	IP67
Interbus	Interbus Club, Phoenix Contact	EX120/121/122-SIBI	** VQ, SX , SY & SV	16 out	Negative	N
		EX240-SIBI	VQ2000/4000, VQC 4000	32 in, 32 out	Negative	Y
ASi	AS-International Association & SIEMENS	EX120-SAS4	** VQ, SX, SY & SV	4 out	Negative	N
		EX120-SAS2		8 out	Negative	N
		EX120-SAS5		4 out	Negative	N
		EX210-SAS1	VQ2000/4000	2 in, 2 out	Negative	Y
		EX210-SAS2		2 in, 2 out	Positive	Y
		EX210-SAS3		4 out	Negative	Y
		EX210-SAS4		4 out	Positive	Y
		EX210-SAS5		8 out	Negative	Y
		EX210-SAS6		8 out	Positive	Y
LonWorks	SEMI, Echelon	Special Order	** VQ, SX, SY & SV	16 out	Negative	N
CC-Link	CLPA & Mitsubishi	EX120/121/122-SMJ1	** VQ, SX, SY & SV	16 out	Positive	N
		EX124 (U, D)-SMJ1	VQ2000/4000/5000	16 out	Positive	Y
		EX140-SMJ1	SQ1000/2000, SZ3000/50000	16 out	Positive	N

* IP53 comes as optional.

** VQ1000/2000, SX3000/5000, SY3000/5000, SV1000/2000/3000/4000

Closed Network Protocol

SMC SERIAL NETWORKS

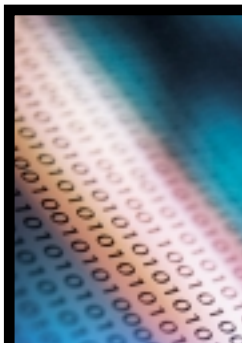
SOLENOID VALVE MANIFOLDS & DISCRETE I/O

Protocol	Promoting Organization Main Adopting Enterprise	SI Type No.	Compatible Valve Manifold	I/O Number	Valve Common	IP65
Remote I/O	Allen-Bradley	IN313-AB1	(N)VFR/S, (N)VZS & ISO	16 out	Positive	N*
		IN313-AB2		32 in, 32 out	Positive	N*
		EX120/121/122-SAB1	** VQ, SX, SY & SV	16 out	Positive	N
		EX500-GAB1-X1	VQC1000/2000/4000 SV1000/2000/3000/4000	64 in, 64 out	—	Y
		EX500-S001-X1 (SI unit)	SV1000/2000/3000/4000	16 out	Non polar	Y
		EX500-Q001-X1 (SI unit)	VQC1000/2000/4000		Positive	IP67
		EX500-Q101-X1 (SI unit)			Negative	IP67
		EX124 (U, D)-SAB1	VQ2000/4000/5000		Positive	Y
MELSECNET MINI-S3	Mitsubishi	IN313-MB1	(N)VFR/S, (N)VZS & ISO	16 out	Positive	N*
		EX120/121/122-SMB1	** VQ, SX, SY & SV	16 out	Positive	N
		EX123/124(U, D)-SMB1	VQ2000/4000/5000	16 out	Positive	Y
Sysbus	OMRON	IN313-TA1	(N)VFR/S, (N)VZS & ISO	16 out	Positive	N*
		EX120/121/122-STA1	** VQ, SX , SY & SV	16 out	Positive	N
		EX123(U, D)-STA1	VQ2000/4000/5000	16 out	Positive	Y
Compo Bus-S	OMRON	EX120/121/122-SCS1	** VQ, SX, SY & SV	16 out	Positive	N
		EX120/121/122-SCS2		8 out	Positive	N
		EX124(U, D)-SCSI	VQ2000/4000/5000	16 out	Positive	Y
		EX124(U, D)-SCS2		8 out	Positive	Y
		EX140-SCS1	SQ1000/2000, SZ3000/5000	16 out	Positive	N
		EX140-SCS2		8 out	Positive	N
S-Link	SUNX	EX120/121/122-SSL1	** VQ, SX , SY & SV	16 out	Positive	N
		EX120/121/122-SSL2		8 out	Positive	N
		EX123(U, D)-SSL1	VQ2000/4000/5000	16 out	Positive	Y
		EX123(U, D)-SSL2		8 out	Positive	Y
NKE Wire saving system	NKE	EX120/121/122-SUW1	** VQ, SX, SY & SV	16 out	Positive	N
		IN313-UW1	(N)VFR/S, (N)VZS, ISO	16 out	Positive	N*
		EX123(U, D)-SUW1	VQ2000/4000/5000	16 out	Positive	Y
		EX140-SUW1	SQ1000/2000, SZ3000/5000	16 out	Positive	Y
NKE Wire saving H system	NKE	EX120/121/122-SUH1	** VQ, SX, SY & SV	16 out	Positive	N
		EX123(U, D)-SUH1	VQ2000/4000/5000	16 out	Positive	N
		EX140-SUH1	SQ1000/2000, SZ3000/5000	16 out	Positive	Y

* IP53 comes as optional.

** VQ1000/2000, SX3000/5000, SY3000/5000, SV1000/2000/3000/4000

Series EX123 and EX124 differ from each other primarily in their power sources. Series EX123 has a common power supply between the serial unit and valves. Series EX124 has a separate power supply between the serial unit and the valves.



EX500 Specifications

SOLENOID VALVE MANIFOLDS

Series EX500 is an IP65-rated modular system that allows the connection of up to 64 inputs and 64 outputs on a single node, fully utilizing your rack space. A gateway unit connects the network to the valve manifolds and input manifold. Each valve manifold can have up to 16 solenoids, and each input manifold can have up to 16 NPN or PNP inputs. Series EX500 connects using standard M12 connectors.

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Supported Protocols	Open	DeviceNet™, Profibus-DP (CC-Link or request)
	Closed	Allen-Bradley RIO
System Configuration		Gateway unit with four I/O drops (on single PLC channel) O n e
Gateway Unit	Supply Voltage	24VDC±10% (for input and control), 24VDC+10%, -5% (for solenoid valves)
	Current Consumption	200mA
	Inputs	64 points (1/2 rack), 4 branches (16 points per branch)
	Outputs	64 points (1/2 rack), 4 branches (16 points per branch)
	Power Connector	5-pin M12 male
	Branch Connector	8-pin M12 female
	Branch Length	5m or less (10m or less total length)
	Indications	Status LEDs for power, run, communication, error, I/O state
	Dimensions (mm)	160W x 48.8H x 88D
Serial Units	Current Consumption	100mA or less (serial unit)
	Power Handling	Up to 1W/channel, 16 channel maximum per drop
	Outputs	16 points
Input Units	Supply Voltage	24 VDC ± 10%
	Indication	Green LED when on
	Current Consumption	100mA or less per input unit
	Inputs	16 points
	Short Protection	1A circuit breaker (toggle power to reset)
Input Blocks	Input Type	Selectable NPN or PNP
	Inputs	2 points
	Input Connection	3-pin M8 female and 4-pin M-12 female
Protection		IP65 (all components)

Refer to EX500 operation manual for a complete listing of specifications.

Click here for more information

EX250 Specifications

SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS

Series EX250 is a compact and light-weight design that controls 32 outputs and 32 inputs. Compatible with our Series VQC and SV valves for total IP67 protection. It features “one side access” in which the electrical connections are on the same surface as that of the pneumatics. The maximum number of outputs is 24 when connected to the Series VQC valve.

Input modules can be added or removed at the point of use (2 or 4 points per block).

Option of M8 and M12 input connectors

Series EX250 is built with self-diagnostic features to protect the input blocks from over-current and detect insufficient voltage supply to the valves.

In the event of insufficient supply voltage to the valves, a special version EX250-SDN1-X102 can send voltage status to the master PC/PLC.

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Supported Protocols			DeviceNet™, Profibus DP (CC-Link or request)
Serial Unit	Supply Voltage		24 VDC (tolerance varies by protocol)
	Current Requirement		100mA at 24 VDC maximum
	Inputs		32 points
	Outputs		32 points on Series SV valve, 24 on Series VQC valves*
	Dimensions (mm)		63W x 59.8H x 74.9D
Solenoid Outputs	Supply Voltage		24VDC +10%, -5%
	Current Consumption		Varies according to solenoid valve series and size
	Power Handling		Up to 2.1W/channel, 32 channel maximum
Input Blocks	Supply Voltage		24VDC±20% (Approximately 1V drop for internal circuit)
	Indication		LED when on
	Sensor Supply Current		30mA maximum sensor supply per input (120mA max/input unit)
	Short Protection		500mA (replaceable fuse)
	Input Type		Selectable NPN, PNP (IEC1131-2)
	Input Connection		5-pin M8/M12
	Dimensions (mm)	M8 type	21W x 59.8H x 67.4 D
		M12 type	21W x 59.8H x 72.6 D
Protection			IP67 (all components)

* This limitation is because of VQC manifold construction, even though the SI unit provides 32 outputs. Maximum number of stations is 24. (Mixed single and double solenoid valve)

Click here for more information

Series EX240 is an IP65-rated “mixed I/O” unit that mounts directly on SMC’s Series VQ2000/4000 and VQC4000 solenoid valve manifolds. EX240 controls outputs for up to 32 solenoid valves and receives 8, 16, 24, or 32 inputs, depending on the number of 8 point input modules installed. Input modules can be added or removed at the point of use. EX240 is compatible with DeviceNet™, Profibus®-DP, and Interbus networks.

Series EX240 is built with self-diagnostic features to protect the input units from over-current and to detect insufficient voltage supply to the valves.

In the event of insufficient supply voltage to the valves, the network communication can still be maintained with a special DIP switch setting, sending voltage status to the master PC/PLC.

Supported Protocols			DeviceNet™, Profibus-DP, Interbus
Serial Unit	Supply Voltage		24 VDC (tolerance varies by protocol)
	Current Requirement		200mA at 24 VDC maximum (includes input unit control circuit)*
	Inputs		32 points, up to 4 units (8 points per unit)
	Outputs		32 points
	Power Connector		Compatible connector: Amphenol C091 31D0051002
	Network Connector	DeviceNet™	Sealed micro-connector (5-pin M12 Connector)
		Profibus-DP	Shielded 12-pin IP 65 circular connector
		Interbus	Sealed 9-pin circular connector
	Dimensions (mm)	DeviceNet™	54W x 88.5H x 120D
		Others	54W x 98.4H x 120D
Solenoid Outputs	Supply Voltage		24VDC +10%, -5%
	Current Consumption		Varies according to solenoid valve series and size
	Power Handling		Up to 2.1W/channel, 32 channel maximum
Input Blocks	Supply Voltage		24VDC±20% (Approximately 2V drop for internal circuit)
	Indication		LED when on
	Sensor Supply Current		60mA maximum sensor supply per input (500mA max/input unit)
	Short Protection		600mA (toggle power to reset)
	Input Type		Selectable NPN, PNP (IEC1131-2)
	Input Connection		5-pin M12
	Dimensions		54W x 72.4H x 120D
Protection			IP65 (all components)

Click here for more information

* Current consumption is 200mA for serial unit and input block(s) combined.
Refer to EX240 operation manual for a complete listing of specifications.

EX230 Specifications

SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS

Series EX230 is a compact and lightweight SI unit that fits on Series VSS/VSR, ISO plug-in type valves. This unit is compatible with DeviceNet protocol and controls up to 16 outputs and 32 inputs.

Out of 32 inputs:

- 16 inputs monitor solenoid overcurrent.
- 1 input monitors valve external power.
- 5 inputs accessible to the user via 3 numbers of M12 connectors
- 2 inputs are reserved for actual application like weld package use
- 8 inputs are inaccessible to the user.

This SI unit has IP65 protection rating.

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Supported Protocols		DeviceNet™
Serial Unit	Supply Voltage	11 to 25 VDC (without sensors)
		20 to 25 VDC (with sensors)
	Current Requirement	0.5A maximum
	Inputs	32 points
	Outputs	16 points
	Dimensions	167W x 57H x 71D
Solenoid Outputs	Input voltage	10 to 26.4 VDC
	Power handling	2.8W maximum
Inputs	Input voltage	20 to 25 VDC (supplied through DeviceNet connecter)
	Indication	LED indicator
	Sensor Supply Current	30mA per point
	Short protection	Self reset
	Input type	PNP
	Input connection	M12 female
Protection		IP65

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IN313 Specifications

SOLENOID VALVE MANIFOLDS & DISCRETE I/O

Series IN313 is a rugged Serial Interface unit designed to be used with SMC's mid and large-size Series (N)VFR, (N)VFS, (N)VZS and VS ISO-standard solenoid valve manifolds. The standard IN313 controls outputs for up to 16 solenoid valves, and is compatible with DeviceNet™, Profibus®-FMS/DP, Allen-Bradley RIO, and many other PLC networks. The optional IN313-AB2 unit for Allen-Bradley RIO is capable of controlling outputs for 32 solenoid valves (2 manifolds), and up to 32 inputs (in banks of 4).

Click here for more information

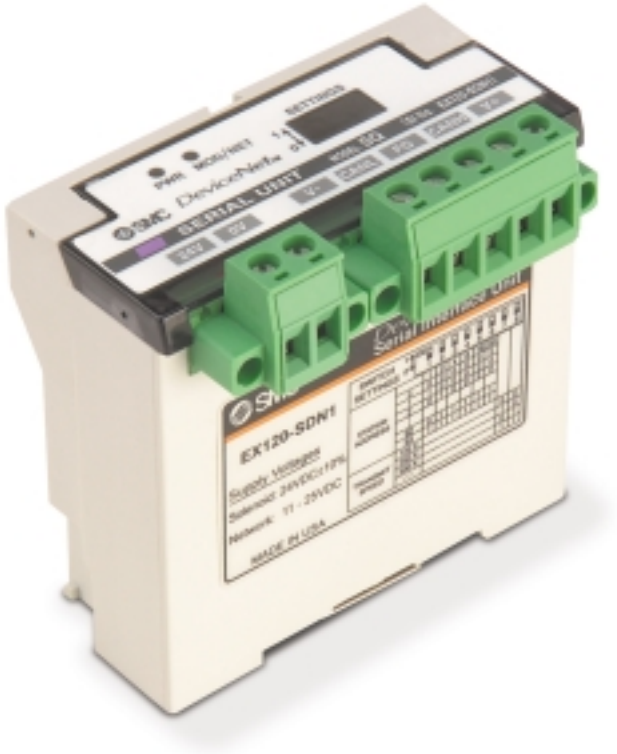
Supported Protocols	Open	DeviceNet™, Profibus-DP
	Closed	Allen-Bradley, Fuji, Hitachi, Matsushita, Mitsubishi, Omron, Sharp, Toshiba, Toyota
Serial Unit	Supply Voltage	24VDC ±10%
	Current Requirement	Varies by network
	Outputs	16 points
		32 points (IN313-AB2 only)
	Indications	Status LEDs for power, communication, error, I/O state (varies by protocol)
	Connection	Plug-in (2 terminal strips for power and network in manifold block)
	Line Noise Resistance	±1500V p-p power supply noise, 1µs pulse width for 3 min., 1ns pulse on first transition
	Dielectric Strength	>1.5kVAC, 1 minute max. duration (between plastic casing and a terminal)
	Insulation Resistance	>10MΩ (between the plastic casing and a terminal)
	Dimensions (mm)	112W x 54H x 72D
Solenoid Outputs	Supplyt Voltage	24 VDC ± 10%
	Power Handling	Up to 2.1W/channel, 16 channel maximum (32 channels maximum for IN313-AB2)
Sensor Inputs (IN313-AB2 only)	Supply Voltage	24 VDC ± 10%
	Current Handling	Up to 6.2mA per input at 24 VDC
	Inputs	32 points
	Input Type	Optically isolated NPN

Refer to each unit's operation manual for a complete listing of specifications.

EX120/121/122 Specifications

SMC SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS



Series EX120 are compact units that mount directly on SMC's VQ, SX and SY series solenoid valve manifolds. The EX120 units control up to 16 outputs each on most networks, including DeviceNet™, Profibus®-DP, Interbus, ASi, and most PLC-based networks.

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Supported Protocols	Open		DeviceNet™, Profibus-DP, Interbus, CC-Lilnk
	Closed		Allen-Bradley, Mitsubishi, Omron and others
Serial Unit	Supply Voltage		24VDC (tolerance varies by protocol)
	Current Requirement	Omron	300mA at 24 VDC maximum (Closed protocol)
		Others	100mA at 24 VDC maximum (Closed protocol)
	Indications		Status LEDs for power, communication, error, I/O state (varies by protocol)
	Connection	DeviceNet™ units	Phoenix wire connectors for network and power lines
		Interbus units	5-pin DIN 45322 (power supply), 9-pin D-sub (network)
		Profibus DP units	5-pin DIN 45322 (power supply), 9-pin D-sub (network)
		Others	Terminal strip
	Line Noise Resistance		±1500V p-p power supply noise, 1µs pulse width for 3 min., 1ns pulse on first transition
	Dielectric Strength		>1.5kVAC, 1 min. maximum duration (between plastic casing and a terminal)
	Insulation Resistance		>10MΩ (between the plastic casing and a terminal)
	Dimensions (mm)	Profibus-DP, Interbus, Asi, Allen Bradlley (RIO)	EX120 64W x 54.4H x 60.8D
			EX121/EX122 64W x 64.4H x 60.8D
		Others	EX120 64W x 30H x 60.8D
			EX121/EX122 64W x 40H x 60.8D
Solenoid Outputs	Supply Voltage		24 VDC +10%, -5%
	Power Handling		Up to 2.1W per channel, 16 channel maximum
	Driver Circuit		Open collector transistor

Refer to each unit's operation manual for a complete listing of specifications.

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Other SMC Serial Network Products

SOLENOID VALVE MANIFOLDS

Series EX123/EX124

Series EX123/124 are IP65 units that mount directly on SMC's Series VQ2000/4000/5000 solenoid valve manifold. EX123/124 controls up to 16 outputs. Series EX123 differs from the EX124 by way of their power sources. Series EX123 has a common power supply between the serial unit and valves, whereas EX124 has a separate power supply between the serial unit and the valves.

Click here for more information

Series EX140

Series EX140 is a compact unit that mounts directly on SMC's Series SZ3000/5000 and SQ1000/2000 solenoid valve manifolds. It controls up to 16 outputs each on the DeviceNet™, CC-Link, NKE, and CompoBus/S protocols.

Click here for more information

Series EX210

Series EX210 is IP65 unit that mounts directly on SMC's Series VQ2000 and VQ4000 solenoid valve manifolds. Series EX210 controls up to 8 PNP or NPN outputs on ASi networks.

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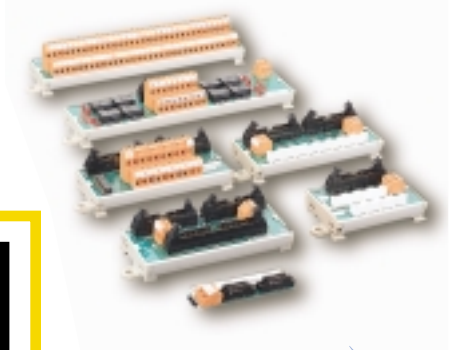

Series PCW

Series PCW Wiring simplifies wiring between a PLC and all types of connected equipment. It has an improved wiring system, and is easy to handle. The single block pressure connection system using a connector allows standardization of wiring work, limits the possibility of incorrect wiring, and greatly improves work efficiency.

Click here for more information

DeviceNet™ Electro Pneumatic Regulator

Features

- DeviceNet compatible
- Digital signal feedback of output pressure
- Maximum 64 units can be connected
- In case of signal failure, output pressure can be set as “stay-put” or 0 Mpa

How to Order

ITV 2 0 3 0 – 4 0 N 2 B S - X80

Model

2	2000 type
3	3000 type

Pressure range

1	0.005 to 0.1MPa
3	0.005 to 0.5MPa
5	0.005 to 0.9MPa

Thread type

Nil	Rc(PT)
N	NPT
T	NPTF
F	G(PF)

Port size

2	1/4
3	3/8

Option (bracket)

Nil	Without bracket
B	Flat bracket
C	L-bracket

DeviceNet compatible

Cable connector type

Nil	Without
S	Straight type 3m

Specifications

Model	ITV2010 / ITV3010	ITV2030 / ITV3030	ITV2050 / ITV3050
Maximum supply pressure	0.2MPa	0.1MPa	
Maximum output pressure	0.1MPa	0.5MPa	0.9MPa
Power supply Voltage	24VDC ±10%		
Current consumption	Maximum 120mA Note 1)		
Input signal	Input signal indicated by 12 bits (resolution 4096) Note 2)		
Output signal	Output signal retransmitted by 12 bits (resolution 4096) Note 3)		
Linearity	±1% full span or less		
Repeatability	0.5% full span or less		
Sensitivity	±0.5% full span or less		
Temperature characteristics	±0.12% full span or less/°C		
Ambient and fluid temperature	0 to 50°C (with no condensation)		

Note 1) Excludes current consumption of DeviceNet communication line.
Note 2) Can set pressure with 4096 resolution, corresponding to the maximum setting pressure 100%.
Note 3) Can monitor pressure with 4096 resolution corresponding to the maximum output pressure 100%.

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Glossary of Terms

SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS

What exactly is the difference between an open network and a closed network? Are they protocols? What is a protocol? We have provided the following frequently used terms in order to help you gain an understanding of Serial Network systems.

Client/Server:	A common form of distributed system in which software is split between server tasks and client tasks. A client sends requests to a server, according to some protocol, asking for information or action, and the server responds. There may be one centralized server or several distributed ones. The server is an application that contains data while the client is an application that wants to access the data. In this model, the client will typically initiate the action to request the data it wants from the server.
Active Hub	Multiple-port repeater or amplifier that lengthens the branching ability of a bus.
Address	An individual identifier that tells the node which commands to respond to.
Binary Logic	A parameter used to describe a signal. A transmission using binary logic only has two states, “ON” and “OFF”. The “ON” signal usually means high. The “OFF” signal usually means low or no signal.
Bit	One binary digit. The smallest unit of binary information. A bit can have a value of “1” or “0”.
Branch	A bus topology term used to describe a drop off the trunk line.
Bus	A group of lines used for data transmission or control.
Bus Topology	The physical layout of the nodes and the interconnecting physical media.
Bus line	Any type of wires that carry data from node to node.
Closed Network	Proprietary in nature, one manufacturer controls every aspect of the network, including the protocol used for formatting the message frames used in serial transmission. Third party devices can be connected in some cases (usually with the manufacturer’s permission).
Decentralized Connection	A multi-endpoint connection in which data sent by any entity associated with a connection-endpoint is received by all other entities.
Device Level Bus	An industrial bus that connects basic control elements together or to a host controller (for example: PLCs, sensors, valves, operator interfaces, PC terminals, bar code readers, etc.)
Dropline	A branch from a trunk line, usually of smaller size than the trunk line.
Gateway	A device that connects two or more communications networks. A gateway may transfer messages between networks by translating protocols.
Input Device	Any connected equipment that will supply information to the central processing unit such as control devices (switches, buttons, sensors) or peripheral devices. Each type of input device has a unique interface to the processor.
Interface Card	Generic terms for the gateway in a PLC or PC that interfaces the host's bus to a device level bus.
LED	Abbreviation for Light Emitting Diode.
Message	One complete group of continuous bits from beginning to end.
Multiplex	A method to transmit numerous messages in sequence over two wires.
Network	A series of points (or devices) connected by some type of communications medium.
Node	A point on the network bus, where it connects to a secondary station, at which network messages are received and responses placed.
Open Network	Commonly referred to as the "Bus" type. It is a flexible, non-proprietary protocol. Customers can choose from a wide array of supporting devices because specifications are available and manufacturers are encouraged to develop products.
Physical Media	The wire or optical cable that is used to transmit the data from node to node. Usually connectors and the components that transmit or receive the signal are considered the physical media.
Protocol	A small program that is embedded in nodes to organize, decipher, and react to the transmitted data.
Router	A higher level bridge for connection of wide area networks. This product would seldom be used on a device level bus. The destination network and destination address are included in the header of the message.
Scan Time	The time required to read all inputs, execute the control program, and update local and remote I/O.
Scanner Module/Master Module	A product that plugs into the PLC backplane and interfaces the PLC’s bus to the network.
Serial Data Transfer	Multiple pieces of information transmitted one piece at a time
Signal	An electro-magnetic transmission that indicates or represents an occurrence.
Tee	A product that creates a single branch or drop from a bus.
Trunk line	The main bus line.

SMC Sales Branch Information

SERIAL NETWORKS

SOLENOID VALVE MANIFOLDS & DISCRETE I/O

If you wish to order our Serial Network products or want additional information, please contact your SMC sales representative at one of the offices conveniently located near you. **Give us a call today and discover just how amazing SMC Serial Network system can be.**

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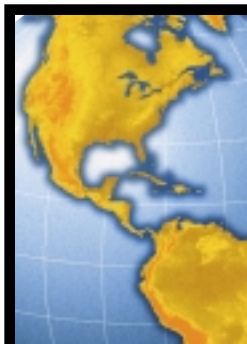

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