

Process modules systron[®] PM

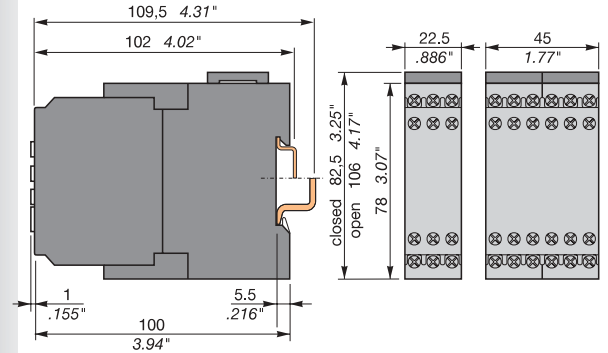
Process modules systron[®] PM

- ✓ Bus modules
- ✓ Interface modules
- ✓ Programmable controllers
- ✓ I/O modules



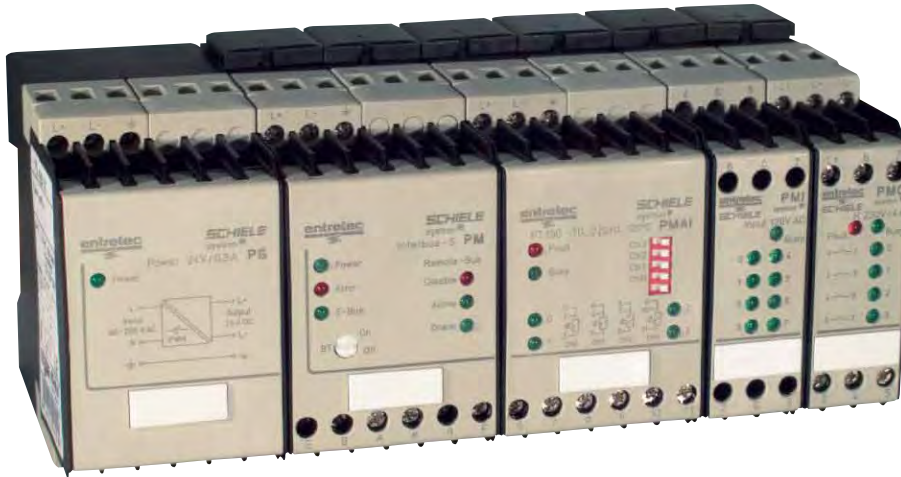
PROCESS AUTOMATION...

... no problem with the systron[®] PM.
Because of their small size and variety of modules, they adapt to most applications.



- ● ● ● ● ● ● ● ✓ **Input/output system to be connected to fieldbus**
 - Connecting sensors and actuators to the most popular bus systems:
CAN
DeviceNet
INTERBUS
PROFIBUS-DP
MODBUS
Schiele E/A-Bus
 - There are 3 compact AS interface modules available which include inputs and/or outputs.
- ● ● ● ● ● ● ● ✓ **Input/output system to be connected to serial interfaces**
 - For applications that do not require a bus system and to reduce cost
 - Interface modules are available for:
RS 232
RS 485
- ● ● ● ● ● ● ● ✓ **PLC: S 200, S 250, S 250c**
 - Use as a simple input/output system for fieldbusses or serial interfaces
 - S 250c: the micro PLC with real-time clock and a large data memory
 - Programmable with every PC, also in accordance with IEC 1131-3
- ● ● ● ● ● ● ● ✓ **Decentral intelligence at the fieldbus: S 250, S 250c**
 - Use the CPU S 250 or S 250c as an expansion unit for the bus modules to provide remote intelligence
- ● ● ● ● ● ● ● ✓ **Expansion modules**
 - For digital and analog signals, temperature probes, incremental encoders, displacement transducers, voltage monitoring up to 500 V AC or current monitoring up to 5 A AC

Process modules systron® PM



I/O modules

The systron® I/O modules are used for input/output signals. They are designed to collect sensor signals. The I/O modules are available for different standard bus systems and suitable for universal use, and they can be used as serial interface or stand-alone PLC. Entrelec/Schiele's compact design packages the bus module or the PLC/CPU module in a standard 45 mm (1.77") rail mounted enclosure. Only an additional 22.5 mm (7/8") is required for 8 digital inputs or outputs.

Performance

Since a bus structure can only be as efficient as its weakest station, the systron® I/O modules are compatible with the most stringent requirements of the bus system standards. The I/O modules are engineered to work smoothly together on a common bus structure. Designed and manufactured with the latest high technology methods, all process modules are fully isolated and trouble free operation is insured by the use of original ASIC circuits. All systron® I/O modules are CE approved, UL and CSA certified.

Mounting

Systron® PM snaps on a standard rail. The I/O units snap to the right of the bus or CPU module and are interconnected by a concealed flat cable (without tools). The ribbon cable is an integral part of the modules. Changing or adding I/O modules is extremely fast and easy.



Wire size and tightening torque

- Place for 2 cables each with 2.5 mm² (14 AWG) wire size. Also with wire end ferrules.
- Tightening torque for the double chambered cage clamp is 6-6½ lb-in.

System configuration

Configuration Rules

- 12 Expansion modules total
- 6 Expansion modules of one type (e. g. PMI, PMO, PMAI,...)

Limitations caused by a bus protocol (e. g. INTERBUS: read 4 words, write 4 words) have to be taken into consideration. All connected expansion modules together may not consume more power than the bus module can supply.

On the following two pages find an overview and some examples.



Connecting modules by a hidden flat ribbon cable

Process modules systron® PM - System configuration

Some rules for the configuration of a systron® PM module block:

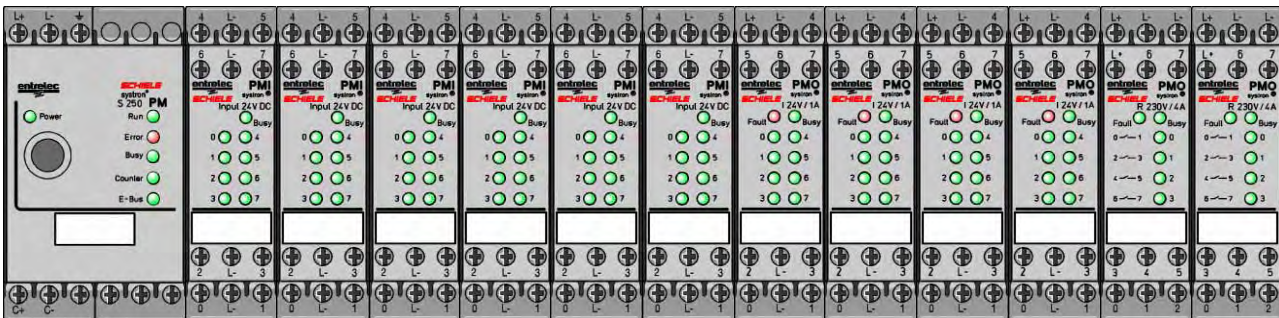
⇒ The number of expansion modules is limited by the power available to the bus/interface modules or the CPU.

	Output current / mA		Power consumption internal / mA
	Operating temperature up to 45 °C	up to 55 °C	
Bus modules			
CAN	400	400	PMI 10
DEVICENET	400	400	PMO 40
INTERBUS	500	400	PMAI 80
PROFIBUS DP	400	400	MAOI 80
MODBUS	500	400	PMC 130
Schleier E/A-Bus	500	400	PMT 250
			PMM 50
			PMM adjust. 60
Interface modules			PMP 10
RS 232 / 485	500	400	PMSC 50
			S 250(c) --
CPUs			PMBM 80
S 200 / S 250 / S 250c	500	400	PMCI 100

Switching power supply recommended is the systron® PS. The output voltage is compatible with all process modules in identical type housing.

Power supply, systron® PS, versions are:
 24 VDC/1A
 24 VDC/ 1.5 A
 24 VDC/2A
 24 VDC/5A

- ⇒ **maximum 12 expansion modules** can be connected to one bus module, one interface module or one CPU.
- ⇒ in one block, up to 6 expansion modules of the same type may be connected, e. g. 6 PMI or 6 PMO (relay or transistor).



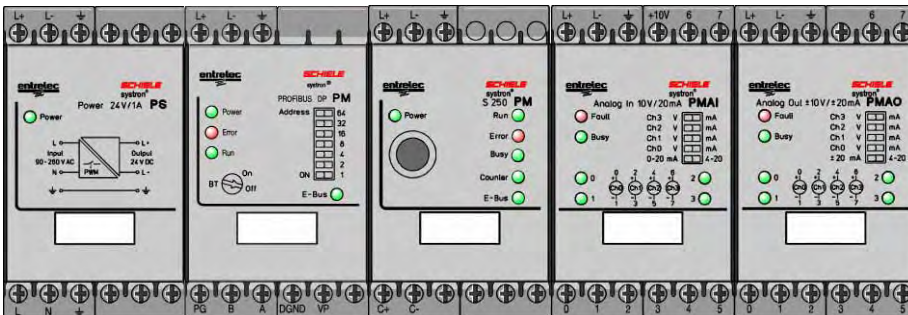
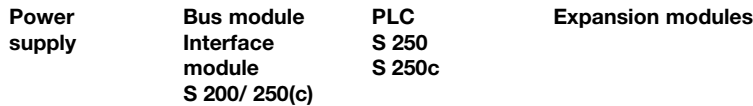
⇒ For proper configuration, the following module sequence must be followed:

First: Bus/Interface/PLC modules

Next: Expansion modules

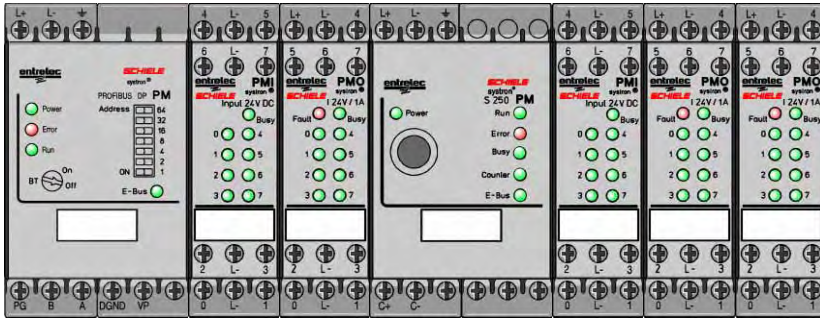
Exception: systron® S 250/S 250c. These PLCs can be placed between bus/interface modules and expansion modules.

They may also be placed between expansion modules. In such cases, the bus/interface modules will communicate with modules between itself and the PLC; the PLC will communicate with the expansion modules adjacent to it.



Process modules system[®] PM - System configuration

Bus module and S 250, each with input and output modules



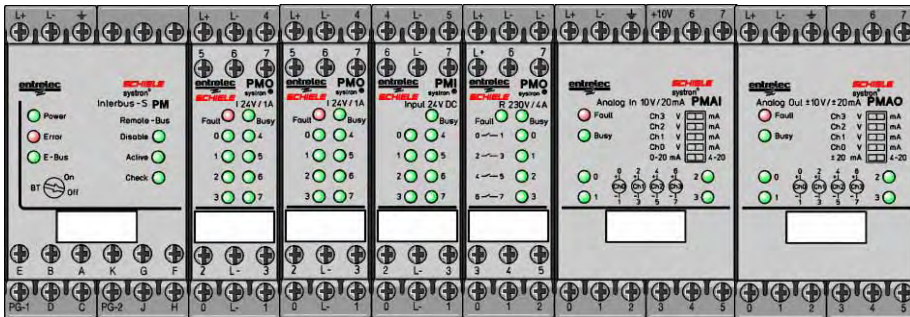
Directly at the bus:
 8 digital inputs
 8 digital transistor outputs

and

8 digital inputs
 16 digital transistor outputs, which are monitored by the S 250.
 Data being designated for the bus module are written into a defined flag word field in the S 250 memory.

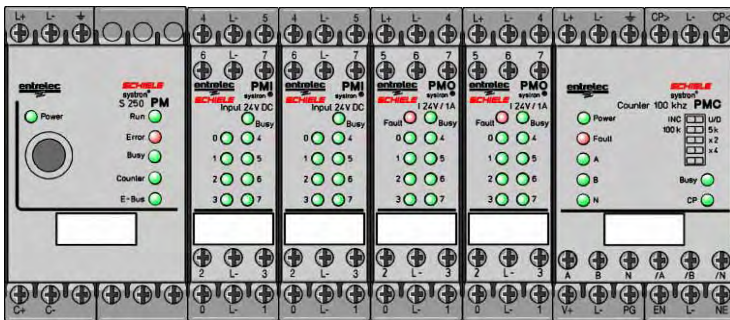
PM INTERBUS and MODBUS with input and output modules

When using INTERBUS and MODBUS, information is exchanged in data blocks. Therefore, expansion modules used with these systems must be grouped to avoid address gaps.

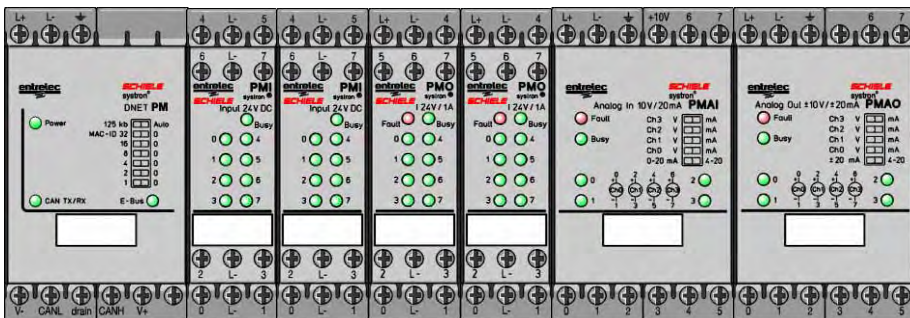


Using a non-grouped configuration would result in an address gap of 8 bits at the PMI and 12 bits at the PMO relay. These gaps occur because INTERBUS always transmits in 16 bit word size.
 If MODBUS was used with the I/O configuration shown, there would be only one address gap of 4 bits at the PMO relay. This gap occurs because MODBUS transmits data in byte size.

S 200/ S 250



PM DeviceNet with input and output modules



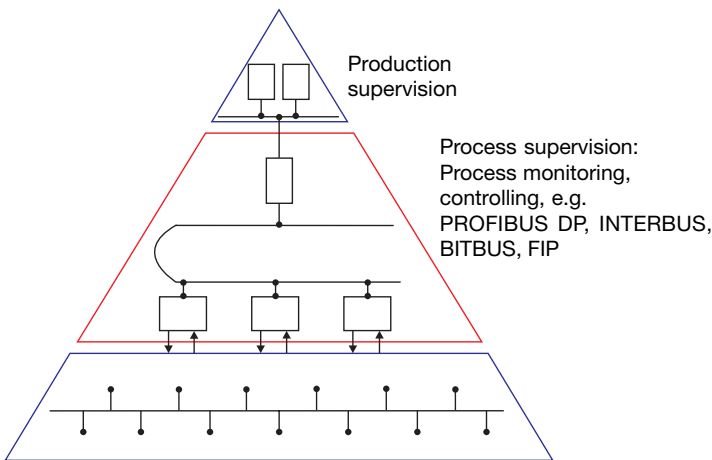
Bus modules systron® PM

Bus systems

Many bus systems have been developed to accommodate PLCs and associated modules made by specific manufacturers. However, due to diversified application requirements, users require the ability for modules from different manufacturers to communicate with each other.

Bus protocol standardization was developed to accommodate specific interests, such as the automotive industry. Currently we have a number of these standardized protocols.

Bus systems have been developed to manage data at all levels from direct control of sensors and actuators (e.g. CAN, AS Interface) to full system control and data transfer between a supervisory station, PLCs, and other intelligent devices.

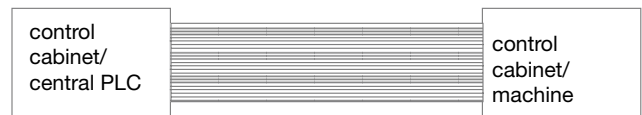


Field level:
Measuring stations, motors, digital inputs and outputs
e. g. AS-Interface, CAN

Conventional wiring

Conventional data transmission is from field modules to control modules (PLC) via parallel cable bundles. This has many disadvantages:

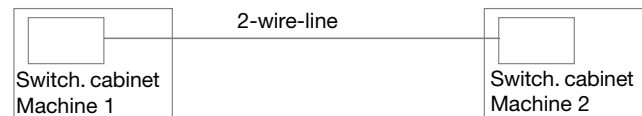
- Much cabling and installation material
- High cost for planning, installation, and start-up
- Integration of many devices requiring transmission of accurate and reliable signals
- Multiple safety considerations
- Large control enclosures



Bus systems

- one serial data line instead of many parallel lines

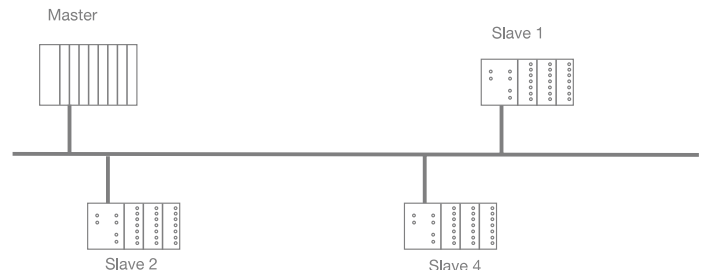
- > no cost for
 - o PLC input and output cards
 - o wiring material
 - o cable ducts and other installation material
 - o large control enclosures
- > other advantages
 - o shorter installation times
 - o greater flexibility



simple bus system

- many additional functions

- > Expanded capability for data exchange
- > Limited wiring errors; reduced opportunity for wiring failure
- > Controller program requires no modifications
- > Higher noise immunity
- > High flexibility; easy redesign and modification



Bus system with Master station and 3 Slave stations (Line structure)

CANopen

Characteristics

History:	Bus system developed by BOSCH and Intel for use in mobile applications, per ISO 11898.
Communication principle:	Multi-Master, object orientated
Topology:	Line (Bus)
Transmission rate:	Up to max. 1Mbit/ sec
Expansion:	40 meters at 1 Mbit/ sec., when using repeater up to 200 m at a lower transmission speed of 25 kBit/ sec
Kind of addressing:	Object orientated (by Identifiers)
Message length:	0 - 8 Byte Data frame length
Number of messages:	2032 at 11 Bit Identifier length
Error mechanisms:	CRC, Bitlevel supervision, Bit-Stuffing, message frame monitoring, active error reaction, Hamming-Distance: 6
Cable:	Two-wire line, twisted, shielded
Efficiency:	0-53%
Typical applications:	Automobiles (e. g. BMW 7-series, Mercedes S-series and others), also commercial vehicles, automated processes, automation systems for buildings, textile machines, medical production processes, machine tools, etc.

DeviceNet™

Characteristics

History:	Open protocol, mainly developed by ALLEN-BRADLEY based on CAN for device networks.
Communication principle:	Master-Slave, Peer-to-Peer
Topology:	Line (Bus)
Number of stations:	Up to 64 nodes
Transmission rate:	Up to max. 500KB/sec.
Expansion:	500 m at 125 KB/s, 200 m at 250 KB/s and 100 m at 500 KB/s
Kind of addressing:	Sender sends code together with data
Message length:	0 - 8 Byte Data frame length
Error- Mechanisms:	CRC, Bitlevel-supervision, Bit-Stuffing, message frame monitoring, active error reaction, Hamming-Distance: 6
Cable:	Two-wire line, twisted, shielded



Characteristics

INTERBUS was developed by Phoenix Contact as a bus system for networking of a programmable controller and decentralized modules per EN 50 254.

Communication principle:	Single Master/Multiple Slave
Topology:	Ring, both lines in one cable, therefore looks like a line
Bus access/ mode:	Shift register, shifted through all slave stations by the master
Number of stations:	Max. 256 I/O modules, fieldbus 256 bus terminals and I/O modules (all stations have repeater function)
Transmission rate:	Field bus: 500 kBit/sec, peripheral bus: 300 kBit/ sec
Cable:	Fieldbus: 5-wire, twisted pairs Peripheral bus: 15-wire, twisted pairs
Interface:	Fieldbus: RS485, peripheral bus: TTL-level
Expansion:	Fieldbus: 500 kBit/sec, max. 12.8 km, if using optical cable up to 80 km Peripheral bus: 300 kBit/sec, max. 10 km
Kind of addressing:	By physical position in the ring, or addressing by software
Message length:	Max. 512 Byte message frame monitoring, Control informations, user data, etc. 2 ... 16 Byte per stations
Efficiency:	10 to 98%, depending on the data frame length
Error mechanisms:	CRC, longitudinal verification, Hamming-Distance 4
Typical application:	Connecting decentral I/O modules to the controller



Characteristics

Originally developed by Siemens as a Profibus optimization for control of sensors and actuators. This is now standardized in EN 50 170.

Communication principle:	PROFIBUS-DP Multimaster/Multiple slave (up to 3 masters in one system, usually only one master)
Topology:	Line (Bus)
Number of stations:	32, with repeaters 122
Transmission rate:	Up to 12 Mbit/sec (usually 1.5 Mbit/ sec)
Cable:	Two-wire line, twisted, shielded
Interface:	RS 485
Expansion:	800 m at 1.5 Mbit/ sec
Kind of addressing:	By projecting/address switch/ station-oriented
Message length:	0 ... 246 Byte (usually 1 ... 32 Byte)
Efficiency:	0 - 70 %
Error mechanisms:	CRC (Longitudinal and transverse verification) Hamming-Distance: 4
Typical application:	I/O connection to the PLC

MODBUS

Characteristics

History:	MODBUS was invented by Modicon, its protocol is defined in the "Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev. G." JBUS was invented by April, its protocol is a subgroup of the MODBUS protocol.
Communication principle:	Single Master/Multiple Slave
Topology:	Logic and physical bus
Bus access/ mode:	Communication by process image
Number of stations:	Up to 8 settable by DIP switch Up to 247 settable by software
Transmission rate:	0.3 / 0.6 / 1.2 / 2.4 / 4.8/ 9.6/ 19.2 / 38.4 kb/s, settable by software
Cable:	Two-wire line, twisted, shielded
Interface:	RS 485 without handshake
Expansion:	Max. 1200 m
Kind of addressing:	Slaves have a defined address, set by DIP switch or by software
Error mechanism:	CRC

SCHIELE E/A-Bus

Characteristics

History:	Bus system developed by Schiele to network Schiele PLCs and man machine interfaces.
Communication principle:	Single-Master/Multiple-Slave
Topology:	Line
Bus access/ mode:	Polling (cyclical request of all bus stations)
Number of stations:	Up to 31 stations with S 800, up to 7 with S 400
Transmission rate:	187.5 kBaud
Cable:	Two-wire line, twisted, shielded
Electr. interface:	RS 485
Expansion:	600 m max.
Kind of addressing:	Station-oriented, slaves have settable address
Error mechanisms:	CRC, timeout supervision
Typical applications:	Configuration of smaller networks with PLCs S 400 and S 800, PMs (by bus module E/A-Bus) and interfaces man machine IMM 40 and IMM 70 of ENTRELEC-SCHIELE.

systron® PM Bus module CANopen



- Simple I/O system
- Automatic baud rate detection
- High transmission reliability
- Extremely short reaction times

Operation

The bus module CANopen, combined with I/O modules systron® PM, processes data of sensors and actuators from various manufacturers, thus enabling communication by a simple protocol.

PM CANopen supports direct access to device parameters as well as time-critical process communication.

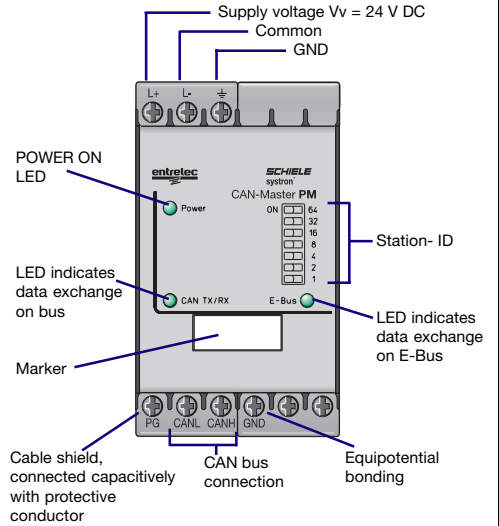
CANopen

■ Approvals:

Bus modules systron® PM	P/N:
Bus module CANopen	2 423 427 00

Accessories	P/N:
System Manual	
German	2 423 403 50
English	2 423 403 51
French	2 423 403 52

Design



Technical data

Complying with	DS301/ DS-401
Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	60...320 mA
Reverse polarity protection	Diode
Electrical isolation L+/ L- <-> internal supply	DC/ DC converters
CAN <-> internal bus	Optocoupler
Reaction to supply interruption	10 ms bypass time at 24 V rated voltage
Interface	ISO/ DIS 11898
Protocol	CANopen
Device profile	I/O module
Recommended cable	CAN
Transmission rate	20 kbps / 125 kbps / 250 kbps / 500 kbps
Expansion	max. 1000 m at 20 kbps max. 100 m at 500 kbps
System configuration	
Number of stations	max. 127
Address setting	DIP switches
Internal supply for expansion modules	
0° ... +55° C	400 mA
Max. number of expansion modules	12
Noise immunity	acc. IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
CAN bus/ CPU	yes
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External <-> CAN connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.44 lb (200 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

Maximum configuration

PM CANopen

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 400 mA max.

Per PM CAN module

- 48 digital inputs with 6 PMI modules
- 48 digital outputs 6 PMO transistor modules or a mixed configuration with PMO relay, but 6 PMO modules maximum
- 24 digital outputs with 6 PMO relay modules
- 16 analog inputs with 4 PMAI
- 16 analog outputs with 4 PMAO
- 2 counter modules PMC
- 8 BALLUFF linear displacement transducers with 2 positioning modules PMT
- > max. 2 PMT or 4 PMAI/ PMAO modules total
- 6 potentiometer modules PMP
- 1 PLC S 250 or S 250c

systron® PM Bus module DeviceNet 





- Simple I/O system
- One MAC ID only for digital and analog data
- Automatic baud rate detection

Operation

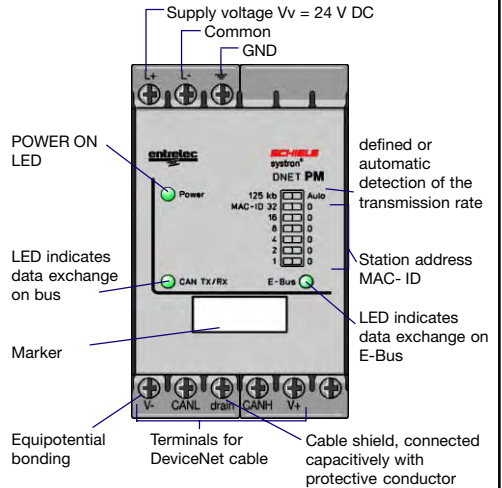
The bus module DeviceNet in combination with the I/O modules systron® PM, processes data of sensors and actuators of different sources, so they can communicate by a simple protocol. It allows implementation of both simple and complex devices, and supports common communication as master/slave and multimaster. The DeviceNet communication allows users to define the information sent between devices using the connection-based scheme.

DeviceNet™

■ Approvals:  

Bus modules systron® PM	P/N:
Bus module DeviceNet	2 423 426 00
Accessories	P/N:
System Manual bus modules/ interface modules	
German	2 423 403 50
English	2 423 403 51
French	2 423 403 52

Design



Technical data

Complying with	DeviceNet Specification, Rel. 2.0
Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	60...320 mA
Reverse polarity protection	Diode
Electrical isolation L+/ L- <-> internal supply	DC/ DC converter
CAN <-> internal bus	Optocoupler
Reaction to supply interruption	10 ms bypass time at 24 V rated voltage
Interface	ISO/ DIS 11898
Protocol	DeviceNet
Device profile	Generic Device
Recommended cable	DeviceNet
Transmission rate	125 kbps/ 250 kbps / 500 kbps
Expansion	max. 500 m at 125 kbps max. 250 m at 250 kbps max. 100 m at 500 kbps
System configuration	
Number of stations	max. 64
Address setting	DIP switch
Internal supply for expansion modules	
0° ... +55° C	400 mA
Max. number of expansion modules	12
Display of operational status	
POWER	green LED
CAN TX/RX	green LED
Expansion bus (E-Bus)	green LED
Noise immunity	acc. to IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
CAN bus/ CPU	yes
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External <-> CAN connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.44 lb (200 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 400 mA max.

per PM DeviceNet module

- 48 digital inputs with 6 PMI modules
- 48 digital outputs 6 PMO transistor modules or a mixed configuration with PMO relay, but 6 PMO modules maximum
- 24 digital outputs with 6 PMO relay modules
- 20 analog inputs with 5 PMAI
- 20 analog outputs with 5 PMAO
- 2 counter modules PMC
- 8 BALLUFF linear displacement transducers with 2 positioning modules PMT
- 6 potentiometer modules PMP
- 1 PLC S 250 or S 250c

systron® PM Bus module INTERBUS



■ Fast collecting of sensor signals and controlling actuators

Operation

The fast bus to collect sensor signals and control actuators. 2048 I/O signals are transferred within about 4 ms.

Depending on the master used, up to 256 stations can be connected to it. The bus module allows transmission of a maximum of 4 words in reading mode and 4 words in writing mode.

Interface modules are available for many different manufacturers' control and plug-in cards for PCs.

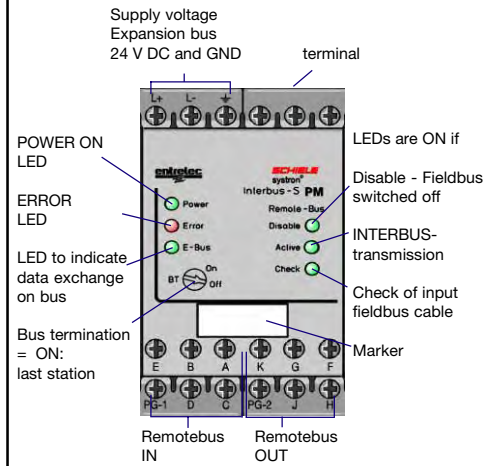
INTERBUS bus interface module complies with EN 50 254 and is certified as number 29.

Certificate no. 29



■ Approvals:

Design



Bus modules systron® PM	P/N:
PM INTERBUS	2 423 421 00
Accessories	P/N:
System Manual bus modules/ interface modules	
German	2 423 403 50
English	2 423 403 51
French	2 423 403 52

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 400 mA max.

Technical data

Complying with	EN 50 254
Certification	No. 29
Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	60...320 mA
Interface	
Transmission rate	500 kB
Distance to next station	400 m
Distance to total	12 km
System configuration	
Number of stations	depending on bus master
Address setting	depending on physical arrangement
Internal supply for expansion modules	
0° ... +45°C	500 mA
0° ... +55° C	400 mA
Max. number of expansion modules	12
Data quantity	read: 4 words write: 4 words
Display of operational status	
POWER	green LED
ERROR	red LED
Expansion bus (E-Bus)	green LED
Remote-Bus not active	red LED
Remote-Bus active	green LED
Remote-Bus Check	green LED
RUN	--
Noise immunity	acc. to IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
Remote-Bus IN/ CPU	yes
Remote-Bus IN/ Remote-Bus Out	--
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External <-> bus connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.55 lb (250 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

per PM INTERBUS module:

- 48 digital inputs with 6 PMI modules
- 48 digital outputs 6 PMO transistor modules or a mixed configuration with PMO relay, but 6 PMO modules maximum
- 24 digital outputs with 6 PMO relay modules
- 4 analog inputs with 1 PMAI
- 4 analog outputs with 1 PMAO
- 2 counter modules PMC
- 8 BALLUFF linear displacement transducers with 2 positioning modules PMT
- 2 potentiometer modules PMP
- 1 PLC S 250 or S 250c

Data quantity:
Read 4 words, write 4 words

Terminal arrangement:

incoming fieldbus			outgoing fieldbus		
Pin no.	Signal	Color	Pin no.	Signal	Color
A	/DO1	green	F	/DO2	green
B	DO1	yellow	G	DO2	yellow
C	/DI1	pink	H	/DI2	pink
D	DI1	grey	J	DI2	grey
E	GND1	brown	K	GND2	brown

**systron® PM Bus module
PROFIBUS DP**



Slave acc. to EN 50 170

Operation

The bus to transmit larger quantities of data. In slave mode, PROFIBUS DP interface module is capable of transmitting max. 128 bytes reading and 128 bytes writing. Adjustment to baud rate set on master is done automatically, max. transfer rate being 1.5 MBaud. PROFIBUS DP module complies with EN 50 170 and is certified.

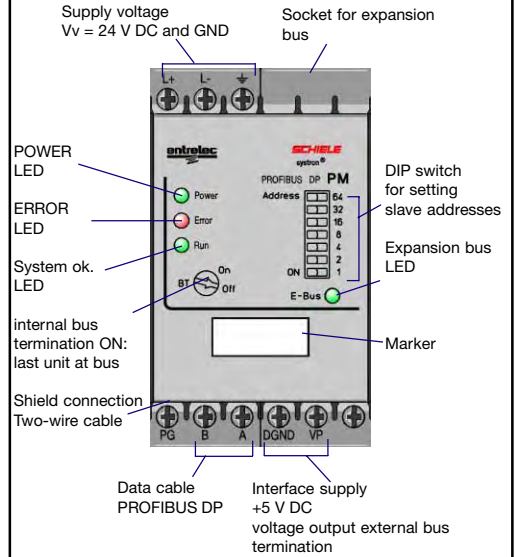
Certificate no. Z00116



Approvals:

Bus modules systron® PM	P/N:
Bus module PROFIBUS DP	2 423 422 00
Accessories	P/N:
System Manual bus modules/ interface modules	
German	2 423 403 50
English	2 423 403 51
French	2 423 403 52
Interface adapter PROFIBUS DP	2 423 422 90
Tool disk with GSD files a. o.	2 426 401 50

Design



Technical data

Complying with	EN 50 170
Certification	no. Z00116
Supply voltage	24 V DC
Voltage range including ripple	20...30 V
Power consumption	60...320 mA
Interface	
Transmission rate	up to 1.5 MB
Distance to next station	depending on cable type and repeater
total	as above
System configuration	
Number of stations	125 slaves max.
Address setting	DIP switches
Internal supply for expansion modules	
0° ... +55°C	400 mA
Max. number of expansion modules	12
Data quantity	128 bytes
read	128 bytes
write	128 bytes
Display of operational status	
POWER	green LED
ERROR	red LED
Expansion bus (E-Bus)	green LED
RUN	green LED
Noise immunity	acc. to IEC 1000-4-5, class 3
Electrical isolation	
Supply/ CPU	yes
Bus/ CPU	yes
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External <-> bus connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.55 lb (250 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 400 mA max.

per PROFIBUS DP module:

- 48 digital inputs with 6 PMI modules
- 48 digital outputs 6 PMO transistor modules or a mixed configuration with PMO relay, but 6 PMO modules maximum
- 24 digital outputs with 6 PMO relay modules
- 20 analog inputs with 5 PMAI
- 20 analog outputs with 5 PMAO
- 3 counter modules PMC
- 4 BALLUFF linear displacement transducers with 1 positioning module PMT
- 24 potentiometers with 6 potentiometer modules PMP
- 1 PLC S 250 or S 250c

Terminal arrangement:

Socket Pin no.	Bus module connection
1	PG
3	B
5	DGND
6	VP
8	A
	other terminals not connected

systron® PM Bus module MODBUS



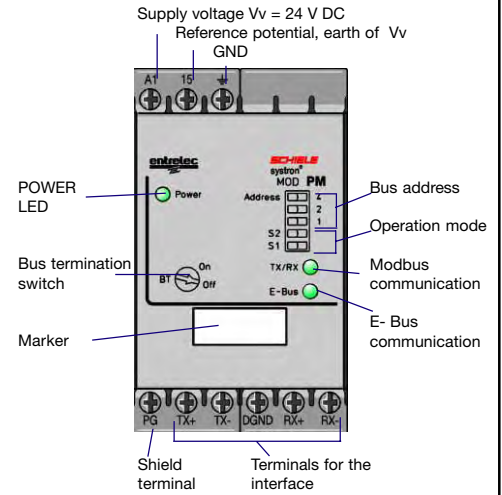
- Standard protocol for RS 485 interfaces
- MODBUS protocol is often integrated in visualization packages

Operation

Designed to be used on MODBUS/ J-Bus as well as for ASCII- and RTU-protocol.
 Default address and baud rate can be set by front-mounted DIP switches.
 Addresses and several intelligent functions can be configured by software (analog scaling, analog input with threshold detection and logical output dedicated).
 The MODBUS module complies with the MODBUS protocol.
 The software package below is used to test and configure the system.

■ Approvals:

Design



Bus modules systron® PM	P/N:
Bus module MODBUS	2 423 425 00
Accessories	P/N:
Configuration Kit including software, connection cable and system manual	
German	2 423 425 60
English	2 423 425 61
French	2 423 425 62

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 500 mA max.

Technical data

Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	60...320 mA
Interface	RS485 2-/ 4-wire
Transmission rate	300...38.400 Baud settable by software
Max. distance to next station	1200 m
total	1200 m
System configuration	
Number of stations	8, settable by DIP- Schalter, 247 by software
Address setting	DIP switches/ software
Internal supply for expansion modules	
0° ... +45°C	500 mA
0° ... +55° C	400 mA
Max. no. of expansion modules	12
Data quantity	read 48 digital inputs/ 20 analog inputs write 48 digital outputs/ 20 analog output
Display of operational status	
POWER	green LED
Expansion bus (E-Bus)	green LED
Communication	green LED
Noise immunity	to IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
Bus/ CPU	yes
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External connections <-> bus connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.55 lb (250 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

per PM MODBUS

- | | | | |
|--------|-----------------|---|----------|
| 6 | PMI | | |
| 6 | PMO Transistor | ➤ | one type |
| 6 | PMO Relay | ➤ | |
| 5/ 6 * | PMAI | | |
| 5/ 6 * | PMAO | | |
| 5/ 6 * | PMC | ➤ | one type |
| 5/ 6 * | PMT | | |
| 6 | PMP | | |
| 4 | PMSC | | |
| 1 | S 250 or S 250c | | |

* 5 Module maximum including all functions, and 6 modules without "intelligent" functions.

systron® PM Bus module MODBUS RS 232



- Standard protocol for RS 232 interfaces
- MODBUS protocol is often integrated in visualization packages
- Access on flag words of a S 250 which is configured as expansion device

Operation

Designed to be used on MODBUS/ J-Bus as well as for ASCII- and RTU-protocol. Address and baud rate can be set by front-mounted DIP switches.

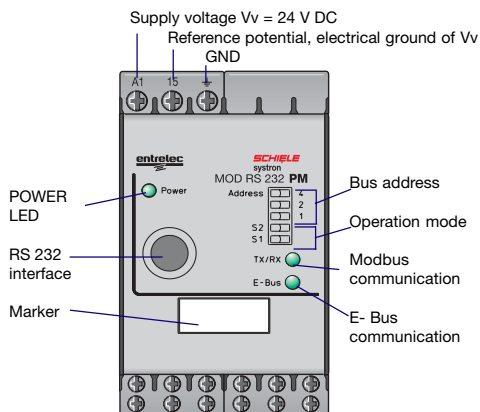
By software it is possible to configure addresses and several intelligent functions (analog scaling, analog input with threshold detection and logical output dedicated).

The MODBUS module complies with the MODBUS protocol.

Via a RS 232 interface on the front face, data can be exchanged by PC or by S 250.

■ Approvals:

Design



Bus modules systron® PM	P/N:
Bus module MODBUS RS 232	2 423 425 10
Accessories	P/N:
Configuration Kit including software, connection cable and system manual	
German	2 423 425 60
English	2 423 425 61
French	2 423 425 62
Connection cable PC-PM RS 232	2 423 419 00

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 500 mA max.

Technical data

Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	60...320 mA
Interface	RS 232 - 8 pin Mini-DIN
Transmission rate	300...38.400 Baud settable by software
Max. distance	15 m
System configuration	
Number of stations	1
Address setting	DIP switches/ software
Internal supply for expansion modules	
0° ... +45° C	500 mA
0° ... +55° C	400 mA
Max. no. of expansion modules	12
Data quantity	48 digital inputs/ 20 analog inputs
	48 digital outputs/ 20 analog output
Display of operational status	
POWER	green LED
Expansion bus (E-Bus)	green LED
Communication	green LED
Noise immunity	acc. to IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
Interface/ CPU	yes
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External connections <-> bus connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.55 lb (250 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

per PM MODBUS

- | | | | |
|--------|-----------------|---|----------|
| 6 | PMI | | |
| 6 | PMO Transistor | ➤ | one type |
| 6 | PMO Relay | ➤ | |
| 5/ 6 * | PMAI | | |
| 5/ 6 * | PMAO | | |
| 5/ 6 * | PMC | ➤ | one type |
| 2 | PMT | | |
| 6 | PMP | | |
| 4 | PMSC | | |
| 1 | S 250 or S 250c | | |

* Max. 5 Module including all functions, and 6 modules without "intelligent" functions.

**systron® PM Bus module
Schiele E/A-Bus**



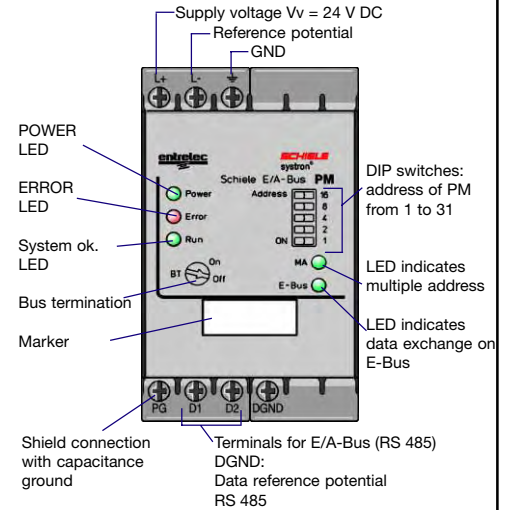
- Simple protocol
- Up to 31 expansion units connectable to systron® S 800,
- Up to 7 expansion units connectable to systron® S 400

Operation

Schiele E/A-Bus is the simple link between Schiele PLCs, the man-machine interfaces and the process modules.
With a two-wire cable you can combine systron® S 800, S 400, man machine interfaces (except IMM 20), and all process modules.
This network is programmed with the standard programming software of the master-PLC.

■ Approvals:

Design



Bus modules systron® PM	P/N:
Bus module Schiele E/A-Bus	2 423 420 00
Accessories	P/N:
System Manual bus modules/ interface modules	
German	2 423 403 50
English	2 423 403 51
French	2 423 403 52

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 400 mA max.

Technical data

Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	60...320 mA
Interface	RS 485
Transmission rate	187.5 kBaud
Distance to	
- next station	max. 600 m
- total	max. 600 m
System configuration	
Number of stations	31 (S 800), 7 (S 400)
Address setting	DIP switches
Internal supply for expansion modules	
0° ... +45°C	500 mA
0° ... +55°C	400 mA
Max. number of expansion modules	12
Display of operational status	
POWER	green LED
ERROR	red LED
Expansion bus (E-Bus)	green LED
Multiple address	green LED
RUN	green LED
Noise immunity	acc. to IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
E/A bus/ CPU	yes
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External <-> bus connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.55 lb (250 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

per PM Schiele E/A-Bus module:

- 32 digital inputs with 4 PMI modules
- 32 digital outputs 4 PMO transistor modules or a mixed configuration with PMO relay, but 6 PMO modules maximum
- 24 digital outputs with 6 PMO relay modules
- 16 analog inputs with 4 PMAI
- 16 analog outputs with 4 PMAO
- 2 counter modules PMC
- 2 stepper motor controllers PMSC
- 24 potentiometers with 6 potentiometer modules PMP

Interface module PM RS 232



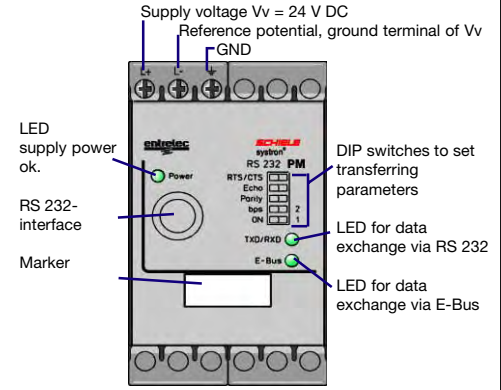
- Used to register and control sensor and actuator signals via serial interface RS 232

Operation

An interface module can be controlled via an RS232 serial port available on each personal computer. Transmission speed and format can be set by DIP switches on the front face. In accordance with the specifications for serial interfaces, the maximum distance between PC and PM RS 232 is 15 m. Data is transferred by a simple ASCII protocol. Select to transmit with or without transmission monitoring (Checksum). Timeout monitoring can be configured.

■ Approvals:

Design



Interface modules	P/N:
PM RS 232	2 423 423 00
Accessories	P/N:
System Manual bus modules/ interface modules	
English	2 423 403 51
German	2 423 403 50
French	2 423 403 52
Connection cable PC-PM RS 232	2 423 419 00
Tool disk with examples	2 426 401 50

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 400 mA max.

Technical data

Supply voltage	20...30 V
Power consumption	60...320 mA
Electrical isolation	
Supply/ processor	yes
Interface/ processor	yes
Supply voltage failure	10 ms bypass time at 24 V rated voltage longer interrupt: system stop supply voltage restart: system start-up
Interfaces	
Type of interface	8-pin Mini-DIN
Setting	DIP switches
Transmission rate/Baud	1200 / 9600 / 19200 / 38400
Recommended cable	low-capacitive cable at 38.4 kb/s
Protocol	Schiele RS
Distance to the next station / total	15 m
System configuration	
No. of stations / address setting	1
Internal supply for expansion modules	
0 ... 45 °C	500 mA
0 ... 55 °C	400 mA
Number of expansion modules	12
Diagnostic functions	
Power	LED green
RxD/ TxD	LED green
Expansion bus	LED green
Dielectric withstand	
External connections <-> internal connections	acc. to VDE 0160, 500 V AC
Noise immunity	acc. to IEC 1000-4-4, stage 3, 2 kV
Degree of protection	
Housing	IP 50
Terminals	IP 20
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Weight	0.44 lb (200 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

per RS 232 module:

- 48 digital inputs with 6 PMI modules
- 48 digital outputs with 6 PMO transistor modules
- or
- a mixed configuration together with PMO relay, but 6 PMO maximum
- 24 digital outputs with 6 PMO relay modules
- 24 analog inputs with 6 PMAI
- 24 analog outputs with 6 PMAO
- 6 high-speed counters with 6 PMC
- 20 BALLUFF linear displacement transducers with 6 PMT modules
- 24 potentiometers with 6 potentiometer modules PMP
- 1 PLC S 250 or S 250c

Interface module PM RS 485



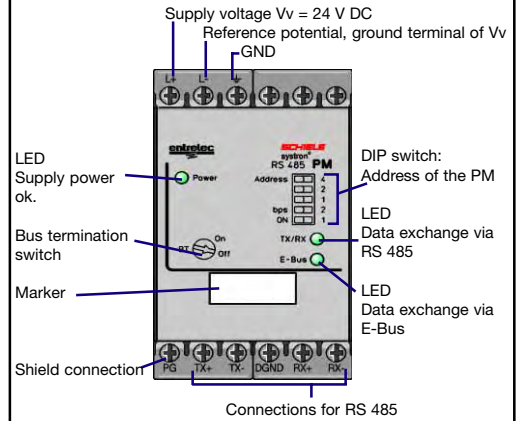
- Up to 8 interface modules
- Distances up to 1200 meters

Operation

With one RS 485 interface, it is possible to operate with eight other interface modules. Because of the noise immune data transfer, it is possible to transfer data up to 1200 m. Data is transferred by a simple ASCII protocol. Select to transmit with or without transmission monitoring (Checksum). Timeout monitoring can be configured.

■ Approvals:

Design



Interface modules	P/N:
PM RS 485	2 423 424 00
Accessories	P/N:
System Manual bus modules/ interface modules	
English	2 423 403 51
German	2 423 403 50
French	2 423 403 52
Tool disk with examples	2 426 401 50

Maximum configuration

- ⇒ 12 Expansion modules total
- ⇒ max. 6 of each type
- ⇒ internal supply for expansion modules 400 mA max.

Technical data

Supply voltage	20...30 V
Power consumption	60...320 mA
Electrical isolation	
L+/ L- against internal supply	DC/ DC converter
RS 232/ 485 against internal bus	Optocoupler
Interface	
Setting	DIP switches
Transmission rate/ Baud	1200 / 9600 / 19200 / 38400
Recommended cable	E/A-Bus cable
Distance	
to the next station	1200 m
total	1200 m
System configuration	
Number of stations	8
Address setting	DIP switches
Internal supply for expansion modules	
0 ... 45 °C	500 mA
0 ... 55 °C	400 mA
Number of expansion modules	12
Display of operational status	
Power	LED green
RxD/ TxD	LED green
Expansion bus	LED green
Dielectric withstand	
External connections <-> internal connections	acc. to VDE 0160, 500 V AC
Noise immunity	acc. to IEC 1000-4-4, stage 3, 2 kV
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals	Screw terminals, max. 2 x 2.5 mm ²
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Weight	0.44 lb (200 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

per RS 485 module:

- 48 digital inputs with 6 PMI modules
- 48 digital outputs with 6 PMO transistor modules
- or
- a mixed configuration together with PMO relay, but 6 PMO maximum
- 24 digital outputs with 6 PMO relay modules
- 24 analog inputs with 6 PMAI
- 24 analog outputs with 6 PMAO
- 6 high-speed counters with 6 PMC
- 20 BALLUFF linear displacement transducers with 6 PMT modules
- 24 potentiometers with 6 potentiometer modules PMP
- 1 PLC S 250 or S 250c

systron® PM Bus module CAN-Master



- Can start-up a CAN bus system
- Works together with a S 250 or S 250c
- Automatic baud rate detection
- High transmission reliability
- Extremely short reaction times

Operation

The bus module CAN-Master, combined with I/O modules systron® PM, processes data of sensors and actuators from various manufacturers, thus enabling communication by a simple protocol.

PM CAN-Master works together with an S 250 or S 250c.

CAN-Master is able to start a CAN bus system. Data can be exchanged by Process Data Objects.

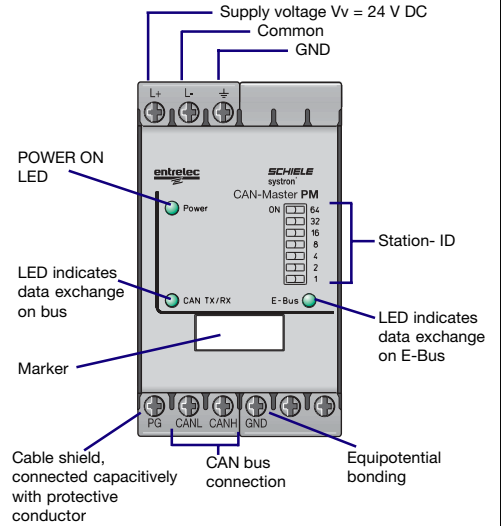
CAN-Master

■ Approvals:

Bus modules systron® PM	P/N:
Bus module CAN-Master	2 423 427 10

Accessories	P/N:
System Manual	
German	2 423 403 50
English	2 423 403 51
French	2 423 403 52

Design



Technical data

Complying with	DS301/ DS-401
Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	60...320 mA
Reverse polarity protection	Diode
Electrical isolation L+/ L- <-> internal supply	DC/ DC converters
CAN <-> internal bus	Optocoupler
Reaction to supply interruption	10 ms bypass time at 24 V rated voltage
Interface	ISO/ DIS 11898
Protocol	CANopen Min-Boot-up
Device profile	-
Recommended cable	CAN
Transmission rate	20 kbps / 125 kbps / 250 kbps / 500 kbps
Expansion	max. 1000 m at 20 kbps max. 100 m at 500 kbps
System configuration	
Number of stations	max. 127
Address setting	DIP switches
Internal supply for expansion modules	
0° ... +55° C	400 mA
PLC Interface	S 250 (c)
Noise immunity	acc. IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
CAN bus/ CPU	yes
Dielectric withstanding voltage acc. to VDE 0160	
External <-> internal connections	500 V AC
External <-> CAN connections	500 V AC
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.44 lb (200 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm

Maximum configuration

Per PM CAN module

- 48 digital inputs with 6 PMI modules
- 48 digital outputs 6 PMO transistor modules or a mixed configuration with PMO relay, but 6 PMO modules maximum
- 24 digital outputs with 6 PMO relay modules
- 16 analog inputs with 4 PMAI
- 16 analog outputs with 4 PMAO
- 2 counter modules PMC
- 8 BALLUFF linear displacement transducers with 2 positioning modules PMT
- > max. 2 PMT or 4 PMAI/ PMAO modules total
- 6 potentiometer modules PMP
- 1 PLC S 250 or S 250c

systron® PMBM Expansion Schiele E/A-Bus master



- Simple protocol E/A bus Master
- Up to 7 expansion units connectable to systron® S 250 and S250c

Operation

The systron® PMBM Schiele I/O bus master module provides a link on a two-wire cable between the S 250c CPU and a remote station such as the S 400, Man Machine Interface IMM 40-70 (except IMM 20) and process module PM E/A.

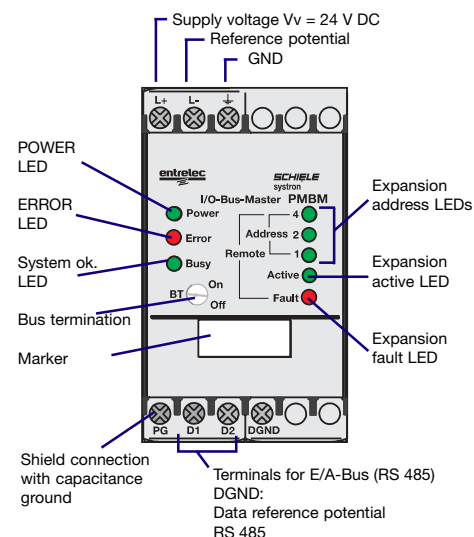
A maximum of 7 remote expansions with a total of 112 logical Inputs, 112 logical Outputs and 56 Analog Inputs and Outputs and 7 high speed counters are allowed.

These remote I/Os are automatically seen by the S 250c as their own I/Os. The network is programmed with the usual programming software of the S 250c.

■ Approvals:   in process

Modules systron® PMBM	P/N:
Bus module Schiele E/A-Bus master	2 423 476 00
Accessories	P/N:
System Manual systron® S 200 / S 250	
German	2 423 402 50
English	2 423 402 51
French	2 423 402 52

Design



Maximum configuration

Up to 7 remote expansions with a total I/O amount of (remote I/O operands):

- ⇒ 112 digital Inputs (7 Input words)
- ⇒ 112 digital Outputs (7 Output words)
- ⇒ 56 analog Inputs and Outputs (112 I/O words)
- ⇒ 7 high speed counters (7 Input words) depending on the number of locally connected I/Os onto the S 250 CPU

Technical data

Supply voltage	24 V DC
Voltage range including ripple	20...30 V DC
Power consumption	
external (onto 24 V DC)	≤ 30...50 mA
internal (from PM)	≤ 80 mA
Interface	RS 485
Transmission rate	187.5 kBaud
Distance to	
- next station	max. 600 m
- total	max. 600 m
System configuration	
Number of slave stations	7 expansions like S 400, PM E/A or IMM
Amount of remote I/O operands	7 Digital Input and Output words 56 Analog Input and Output words 7 Input words for high speed counters
Display of operational status	
POWER (Power)	green LED
ERROR (Error)	red LED
System OK (Busy)	green LED
Expansion address (Address)	3 x green LED
Expansion active (Active)	green LED
Expansion fault (Fault)	red LED
Noise immunity	acc. to IEC 1000-4-4, class 3, 2 kV
Electrical isolation	
Supply/ CPU	yes
E/A bus/ CPU	yes
Dielectric withstanding according to VDE 0160	
External <-> internal connections	500 V AC, 1 minute
External <-> bus connections	500 V AC, 1 minute
Ambient temperature	
Operating temperature	0 ... +55°C
Storage temperature	-25 ... +75°C
Degree of protection	
Terminals	IP 20
Housing	IP 50
Terminals, screw	max. 2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.55 lb (250 g)
Dimensions (W x H x D)	45 x 82.5 x 100 mm