Protected VARAN Digital Mixed Module PVDM 086

The PVDM 086 Protected VARAN Digital Mixed Module has eight +24 V/2 A digital outputs (positive switching) that are back readable and therefore can also be used as inputs. The outputs are short circuit protected.

There are also diverse diagnostic functions available in this module:

- The status of the outputs is back readable.
- Each I/O socket is monitored for current surges in the sensor supply. The status is shown with red LEDs and can be read back.

Input filters are provided to suppress noise in the signal lines.

Through the VARAN-Out port, the VARAN bus can be configured in a linear structure.

Technical data

Interfaces

Interfaces	1x VARAN-In (M12) 1x VARAN-Out (M12) (maximum length: 100 m)

Digital Outputs

Number of outputs	8
Short circuit protected	yes
Back readable	yes
Maximum allowed continuous current / channel	2 A
Maximum total current per group of 4 (I/O 1 – 4 or 5 – 8)	2 A
Maximum total current (all 8 channels)	4 A (100 % switch-on duration)
Voltage drop over supply (output active)	≤1 V
Residual current of output (inactive)	≤1 mA
Switch-on delay	<200 µs
Switch-off delay	<200 µs
Status display	LEDs yellow

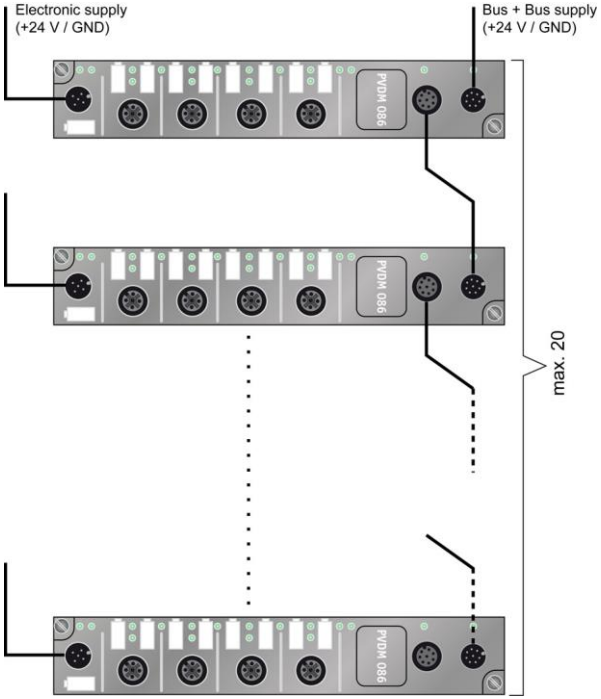
Digital Inputs (back readable output)

Number of inputs	8	
Input voltage	typically +24 V	maximum +30 V
Sensor supply current limit	maximum 100 mA per IO socket	
Signal level	low: <4.5 V	high: >+14 V
Switch threshold	typically +11 V	
Input voltage	typically 5 mA at +24 V	
Input delay	typically 5 ms	
Status display	LEDs yellow	

Electrical requirements

Supply voltage bus	18-30 V DC	
I/O supply	18-30 V DC	
Current consumption of bus supply	typically 85 mA	maximum 100 mA
Current consumption of I/O supply	depends on the load of the digital outputs and the current capacity on the sensor supply: maximum 4 A	

Not more than 20 modules should be connected in series!



The supply for the entire electronics is integrated into the VARAN bus. Outputs X3 – X6 are powered over the X7 supply. When using I/Os X3 – X6 as inputs for encoders or sensors that do not draw power from the electronics must be supplied through X7, due to the internal wiring. Otherwise it could lead to back supply and therewith damage to the electronics.

Miscellaneous

Article number	14-108-086
Software macro	PVDM0850_IM
Hardware version	1.x

Environmental conditions

Storage temperature	-20 … +85 °C	
Operating temperature	0 … +60 °C	
EMV stability	according to EN 61131-2	
Shock resistance	EN 60068-2-27	150 m/s²
Protective system	EN60529	IP67

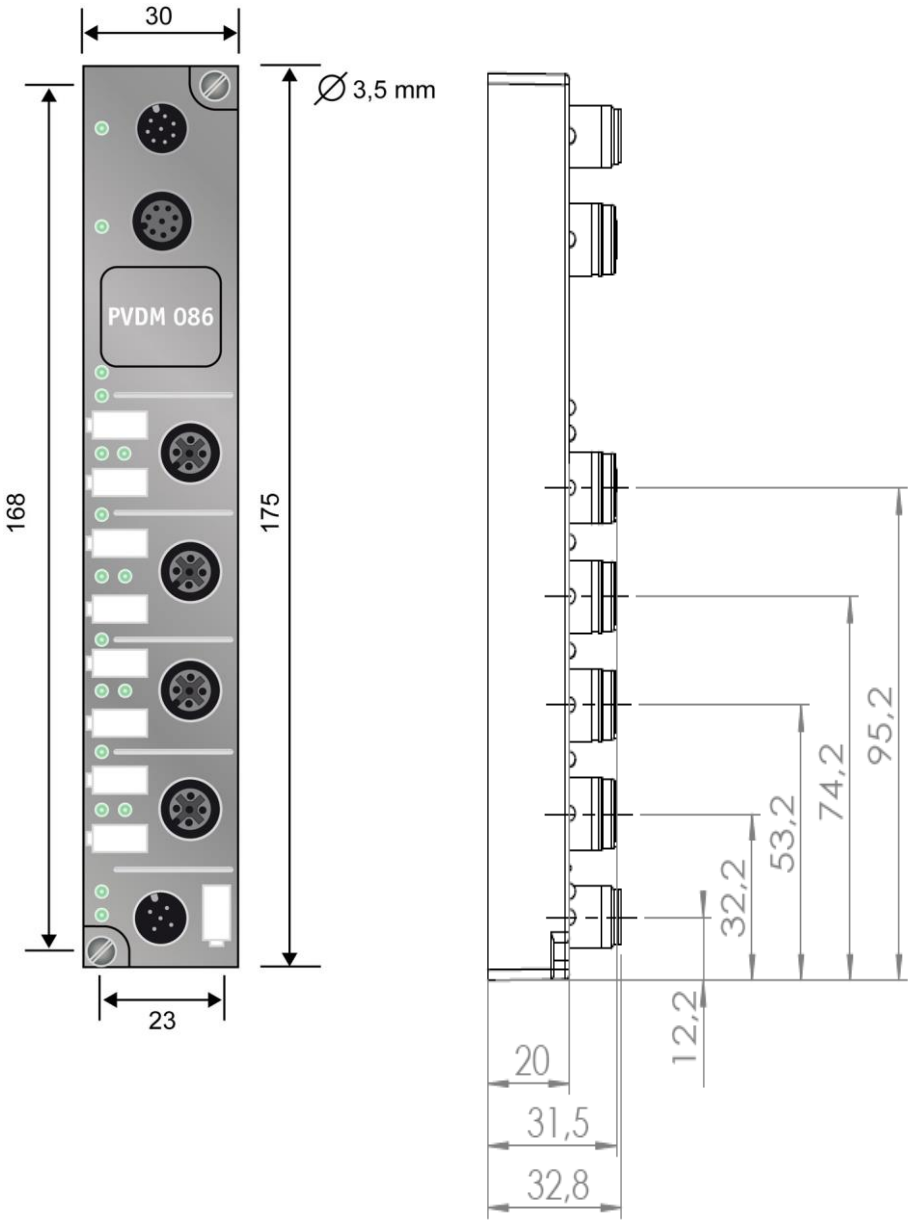
Important notice

If an M12 connector is not used, then protective covers are recommended to protect against contamination.

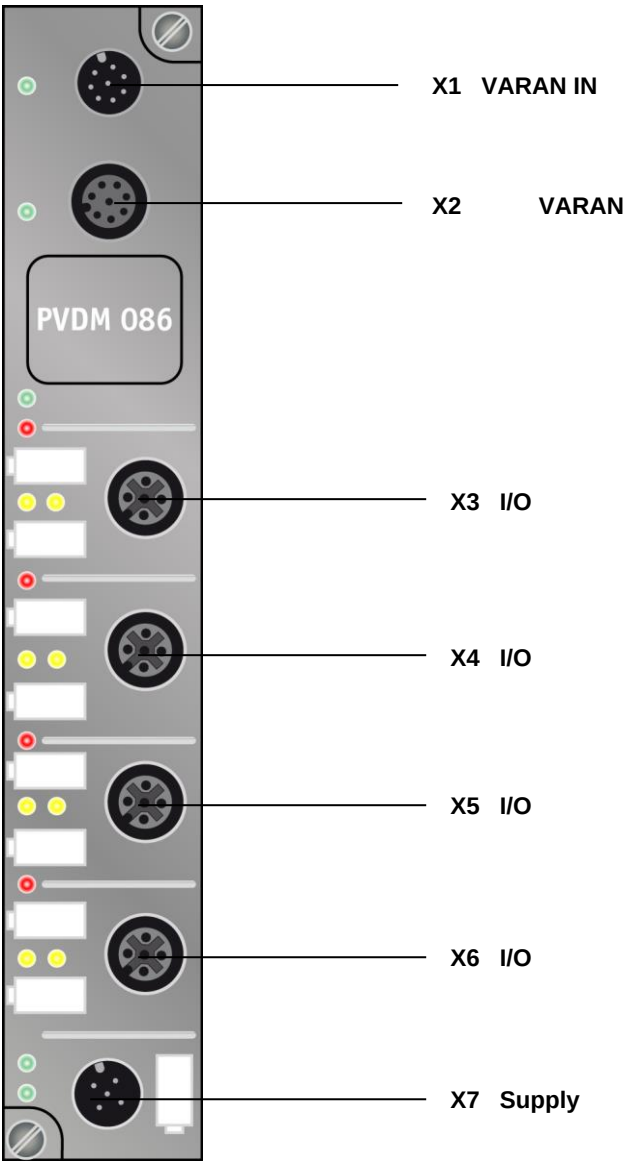
Srew Erni (Art.No: 374343):

Nut Erni (Art.No: 374342):

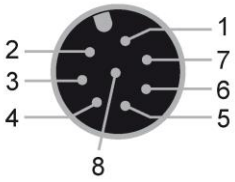
Mechanical Dimensions



Connector layout

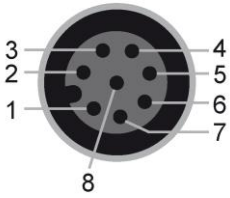


X1 VARAN-In (M12 plug, 8-pole type A)



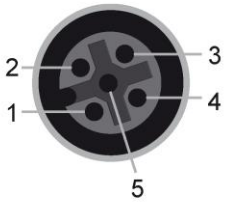
Pin	Function
1	n c
2	TX/RX+
3	TX/RX-
4	n c
5	RX/TX+
6	GND
7	+24V bus supply
8	RX/TX-

X2 VARAN-Out (M12 plug socket, 8-pole type A)



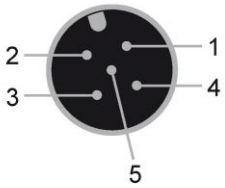
Pin	Function
1	n c
2	TX/RX+
3	TX/RX-
4	n c
5	RX/TX+
6	GND
7	+24V bus supply
8	RX/TX-

X3 – X6 I/O (M12 plug socket, 5-pole type A)



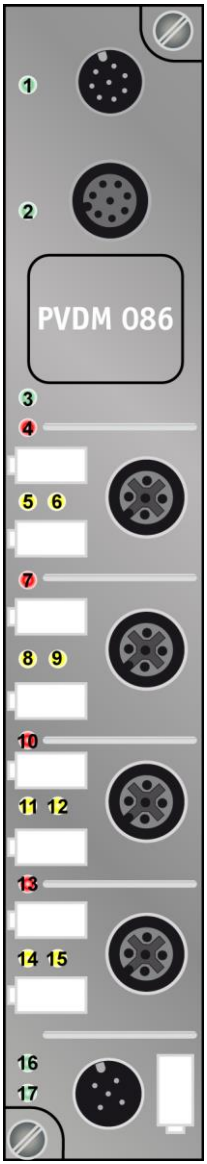
Pin	Function
1	+24 V sensor supply
2	Signal B
3	GND
4	Signal A
5	Earth (Cable shielding)

X7 Supply (M12 plug, 5-pole type A)



Pin	Function
1	GND
2	GND
3	I/O supply
4	+24 V bus supply
5	Earth (Cable shielding)

Status LEDs



LED No.	Color	Function
1	green	VARAN IN Link
	yellow	VARAN IN ACTIVE
2	green	VARAN OUT Link
	yellow	VARAN OUT ACTIVE
3	green	Total Diagnosis STATUS OK
	red	Total Diagnosis STATUS ERROR
4	red	Short circuit in the supply of I/Os 7+8
5	yellow	I/O 8 active
6	yellow	I/O 7 active
7	red	Short circuit in the supply of 5+6
8	yellow	I/O 6 active
9	yellow	I/O 5 active
10	red	Short circuit in the supply of 3+4
11	yellow	I/O 4 active
12	yellow	I/O 3 active
13	red	Short circuit in the supply of 1+2
14	yellow	I/O 2 active
15	yellow	I/O 1 active
16	green	+24 V DC
17	green	+24 V DC I/O supply

General Information on the Digital Outputs

All 8 outputs are supplied from a common +24 V connection.

The cross sectional area of the +24 V and the 0 V supply must be designed for the maximum output current of a group.

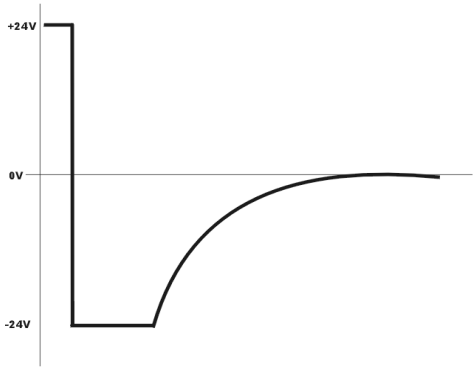
Caution!
If inductive loads are not provided with predective circuits, a high spike current flows over the 0 V line since the internal predection circuit dissipates spike voltages against 0 V. With an incorrect length or too thin a 0 V line can lead to undesired responses from outputs of the affected modules.

Turning off the +24 V supply turns off the outputs. In this case, the output LEDs show the actual status of the outputs and not the status given by the CPU.

A voltage cannot be applied to an output whose supply voltage exceeds 0.7 V.

All outputs are predected internally against +24 V. The disconnection of inductive loads is limited to –24 V as shown in the graph below, however, an additional predective circuit (freewheeling diode) connected directly to an inductive load is recommended to avoid system disruptions through voltage spikes (cross talk over analog lines). This, however, results in the internal voltage limit being effective to only –0.6 V.

Disconnection of inductive loads:



Addressing

The input module is processed by the operating system automatically (process image).

Address	Access		Function
16#00	READ	BYTE	Back readable inputs 1..8
16#01	READ/WRITE	BYTE	Reserved
16#02	WRITE	BYTE	Output 1..8
16#03	READ/WRITE	BYTE	Reserved
16#04	READ/WRITE	BYTE	Bit 0 Output error status 1+2 Bit 1 Output error status 3+4 Bit 2 Output error status 5+6 Bit 3 Output error status 7+8 Bit 4 – 7 Reserved

Control Address Mapping

Address (hex)	Size (Byte)	Description
0000	264	SPI Master
0140	64	Reserved
0180	64	VARAN Configuration registers

VARAN Recommended Shielding

The VARAN real-time Ethernet bus system offers robust performance in harsh industrial environments. Through the use of IEEE 802.3 standard Ethernet physics, the potential between an Ethernet line and sending/receiving components is kept separate. The VARAN Manager resends messages to a bus participant immediately when an error occurs. It is principally recommended that the shielding guidelines below be followed.

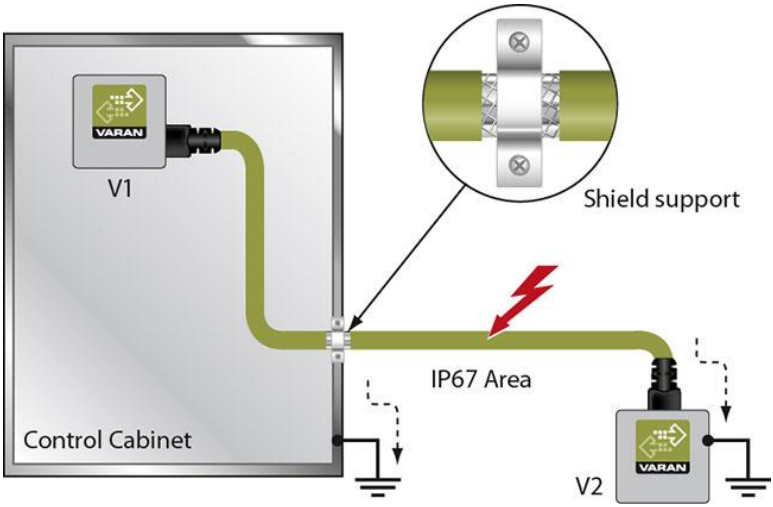
For applications in which the bus line is run outside the control cabinet, correct shielding is required. This is especially important, if due to physical requirements, the bus lines must be placed next to sources of strong electromagnetic noise. It is recommended that whenever possible, to avoid wiring VARAN-Bus lines parallel to power cables.

SIGMATEK recommends the use of **CAT5e** industrial Ethernet bus lines.

For the shielding variants, an S-FTP bus line is recommended, which is a symmetric, multi-wire cable with unshielded pairs. For the total shielding, a combination of foil and braiding is used; it is recommended that an unvarnished variant be used.

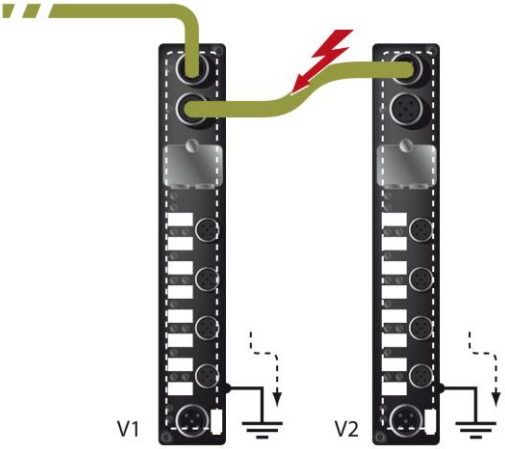
1. Wiring from the Control Cabinet to an External VARAN Component

If the Ethernet lines are connected from a VARAN component to a VARAN node outside the control cabinet, the shielding should be placed at the entry point to the control cabinet housing. All noise can then be deflected from the electronic components before reaching the module.



2. Wiring Outside of the Control Cabinet

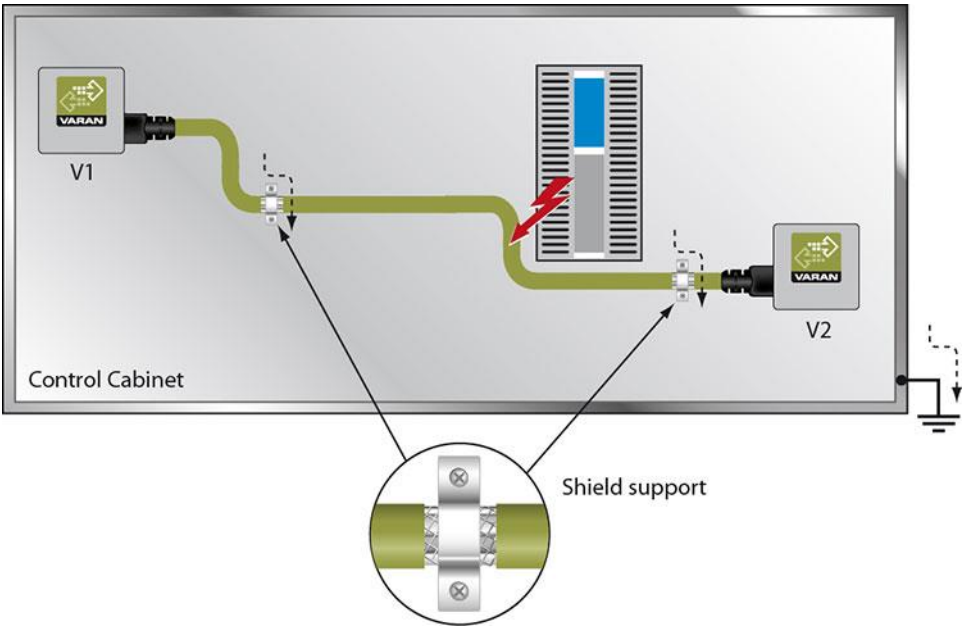
If a VARAN bus cable must be placed outside of the control cabinet only, no additional shield connection is required. This requires that only IP67 modules and connectors be used. These components are very robust and noise resistant. The shielding for all sockets in IP67 modules are internally connected to common bus or electrically connected to the housing, whereby the deflection of voltage spikes does not flow through the electronics.



Attention!
The earth bus for the PVDM 086 has to be connected to both metal sleeves for the mounting screws (upper right and lower left) in the plastic housing. A conductive path must be provided.

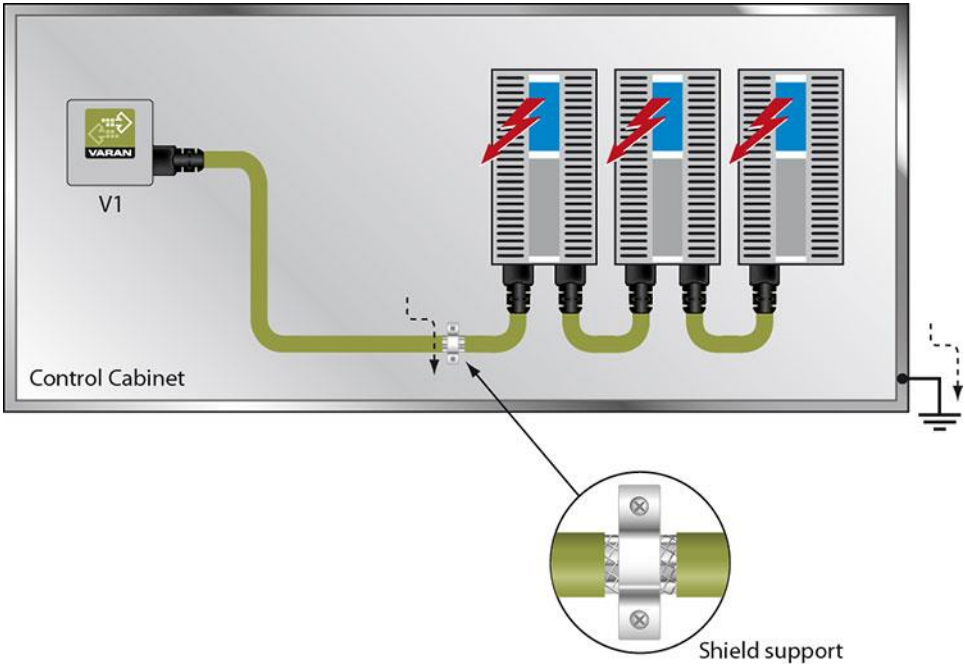
3. Shielding for Wiring Within the Control Cabinet

Sources of strong electromagnetic noise located within the control cabinet (drives, Transformers, etc.) can induce interference in a VARAN bus line. Spike voltages are deflected over the metallic housing of a RJ45 connector. Noise is conducted through the control cabinet housing without further action from the electronic components To eliminate sources of noise during data transfer, it is recommended that the shielding from all electronic components be connected within the control cabinet.



4. Connecting Noise-Generating Components

With the connection of power components that generate strong electromagnetic noise, it is also critical to ensure correct shielding. The shielding should be placed before a power component (or a group thereof).



5. Shielding Between Two Control Cabinets

If two control cabinets must be connected over a VARAN bus, it is recommended that the shielding be located at the entry points to both cabinets. Noise can thereby be kept from reaching the electronics within the control cabinet.