

# VersaMax IP Input Module

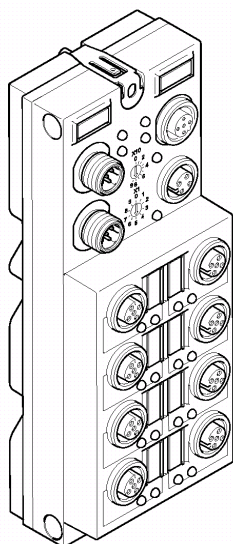
## 16 Point Input Module, Profibus

### IC676PBI016

GFK-2293

January 2004

Module IC676PBI016 is used to accept digital input signals.



#### Features

- Connection to Profibus-DP using M12 connectors
- Baud rates up to 12 Mbaud autobaud
- Connection to digital sensors using M12 connectors
- Flexible voltage supply
- Diagnostic and status indicators
- Short-circuit and overload protection of sensor supply
- IP67 protection

#### Ordering Information

|             |                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------|
| IC676PBI016 | 16 Point Input Module, Profibus                                                                  |
| IC676ACC001 | VersaMax IP Point Labels, qty 50                                                                 |
| IC676ACC002 | Protective Caps. Male, for unused I/O connectors and/or outgoing bus and power connectors, qty 5 |
| IC676ACC003 | Protective Caps, Female, for unused incoming power connections, qty 5                            |
| IC676ACC004 | Profibus Network Terminating Resistor                                                            |
| IC676ACC005 | Profibus Network Tee                                                                             |

#### Module Specifications

|                                             |                                                                                             |
|---------------------------------------------|---------------------------------------------------------------------------------------------|
| Housing dimensions (width x height x depth) | 60mm x 160mm x 44.5mm<br>(2.362in. x 6.299in. x 1.752in.)                                   |
| Connection style                            | 2-, 3-, and 4-wire                                                                          |
| Operating temperature                       | -25°C to +60°C (-13°F to +131°F)                                                            |
| Storage temperature                         | -25°C to +85°C (-13°F to +185°F)                                                            |
| Operating/storage humidity                  | 95%. Slight condensation is permitted occasionally on the outer housing, for short periods. |
| Degree of protection                        | IP67 according to IEC 60529                                                                 |
| Class of protection                         | Class 3 according to VDE 0106, IEC 60536                                                    |

#### Module Power

|                                    |                                                 |
|------------------------------------|-------------------------------------------------|
| Nominal value                      | 24VDC                                           |
| Range                              | 18VDC to 30VDC                                  |
| Current consumption $U_L$ at 24VDC | 35mA typical, 100mA maximum                     |
| Current consumption $U_S$ at 24VDC | 8mA typical plus sensor current<br>1.2A maximum |

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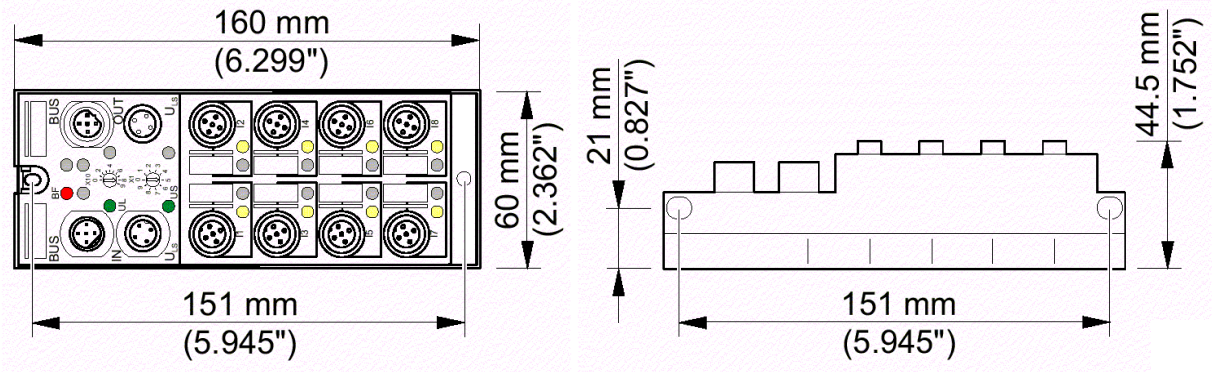
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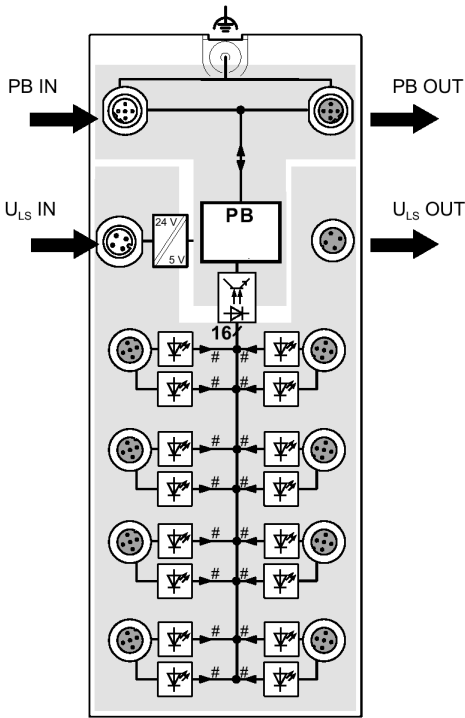
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Module Dimensions



Internal Circuit Diagram



|  |                         |
|--|-------------------------|
|  | Isolating transformer   |
|  | LED (status indicators) |
|  | Optocoupler             |
|  | Digital input           |
|  | Isolated area           |

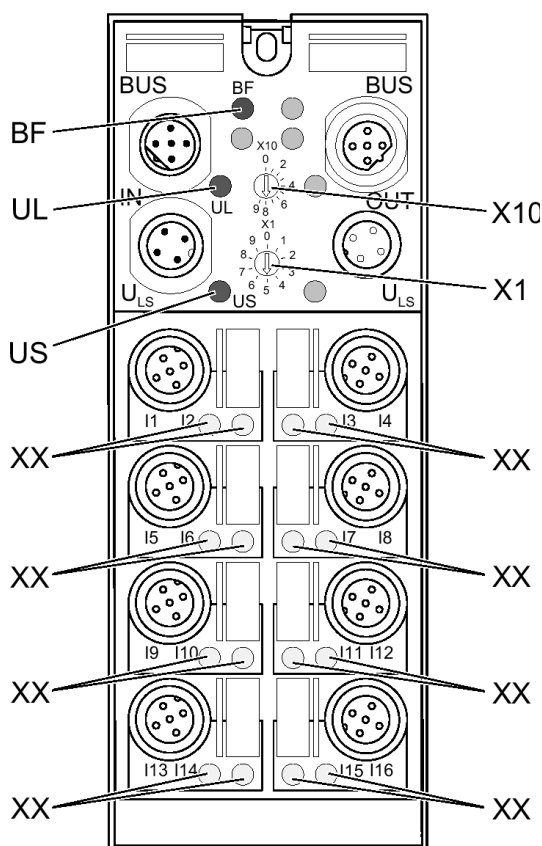
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### Module LEDs and Rotary Switches



| LEDs |               |                                                                                                                                                                                                                                                                                        |
|------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BF   | Red LED       | Bus failure                                                                                                                                                                                                                                                                            |
|      | ON            | <ul style="list-style-type: none"> <li>No cyclic data transmission</li> <li>Profibus not connected; master not online</li> <li>Incorrect settings (configuration via master, station address)</li> <li>Synchronization or parameterization running</li> <li>Timeout expired</li> </ul> |
| UL   | Green LED     | Communications power                                                                                                                                                                                                                                                                   |
|      | ON            | Communications power present                                                                                                                                                                                                                                                           |
|      | OFF           | Communications power too low                                                                                                                                                                                                                                                           |
| US   | Red/green LED | Voltage supply for I1 to I16                                                                                                                                                                                                                                                           |
|      | ON (red)      | Voltage supply overload                                                                                                                                                                                                                                                                |
|      | ON (green)    | Voltage supply present                                                                                                                                                                                                                                                                 |
|      | OFF           | Voltage too low                                                                                                                                                                                                                                                                        |
| XX   | Yellow LED    | Input status indicator                                                                                                                                                                                                                                                                 |
|      | ON            | Input active                                                                                                                                                                                                                                                                           |
|      | OFF           | Input not active                                                                                                                                                                                                                                                                       |

### Selecting the Station Address

The rotary switches are used to set up the two digits that represent the module's station address. Rotary switch X10 selects the first digit, and switch X1 selects the second digit.

The Profibus master addresses the module by means of this station address. The address must be a number from 1 to 99. A new address is only accepted when the module is powered up.

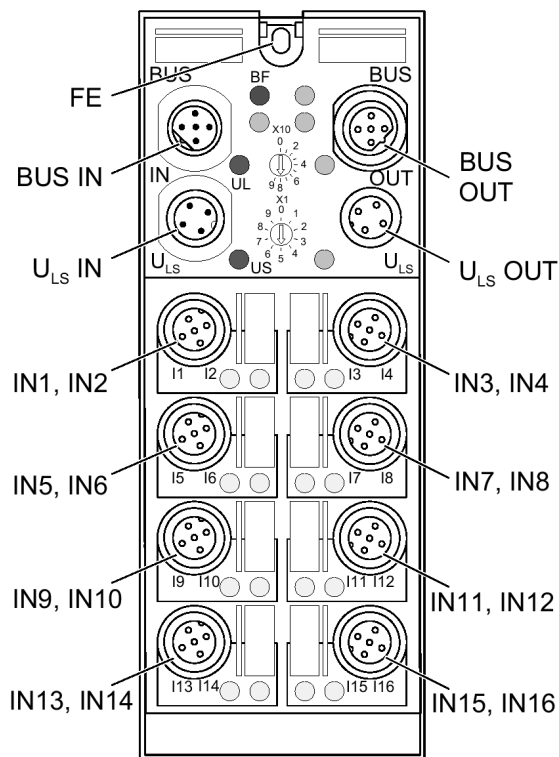
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### Module Connectors

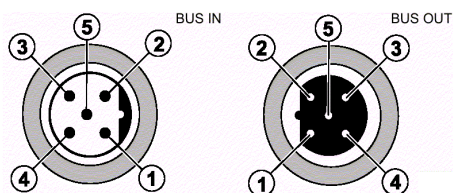


| Connector   | Function                                  |
|-------------|-------------------------------------------|
| FE          | Functional earth ground                   |
| BUS IN      | Profibus In                               |
| BUS OUT     | Profibus Out                              |
| ULs IN      | Voltage supply in                         |
| ULs OUT     | Voltage supply out for additional modules |
| IN1 TO IN16 | Inputs 1 to 16                            |

### Connection Guidelines

- **Meet Noise Immunity Requirements.** Connect FE using a mounting screw, or (when mounting the module on the side or on a non-conductive surface), using a cable connection to the FE connection point.
- **Ensure IP67 Protection.** Cover the unused sockets with protective caps (IC676ACC002 and ACC003).
- **Avoid Damage to the Electronics.** Supply the sensors with the appropriate voltage  $U_S$  at the connection points.
- **Avoid Polarity Reversal of the supply voltages  $U_L$ ,  $U_S$ , and  $U_A$**  to avoid damage to the device.
- **Connect the sensors to the** correct points as shown on the next page.

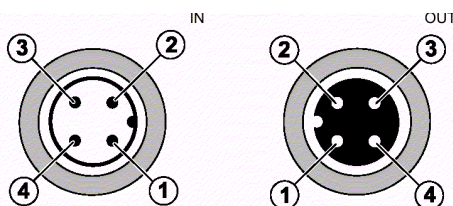
### Profibus Pin Assignments



The thread is used for shielding.

| Pin | In            | Out           |
|-----|---------------|---------------|
| 1   | VP            | VP            |
| 2   | RxD/TxD-N (A) | RxD/TxD-N (A) |
| 3   | DGND          | DGND          |
| 4   | RxD/TxD-P (B) | RxD/TxD-P (B) |
| 5   | Shield        | Shield        |

### Pin Assignment of the Voltage Supply



| Pin | In         | Out        |
|-----|------------|------------|
| 1   | $U_L$ +24V | $U_L$ +24V |
| 2   | $U_S$ GND  | $U_S$ GND  |
| 3   | $U_L$ GND  | $U_L$ GND  |
| 4   | $U_S$ +24V | $U_S$ +24V |

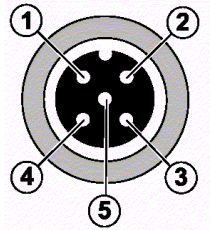
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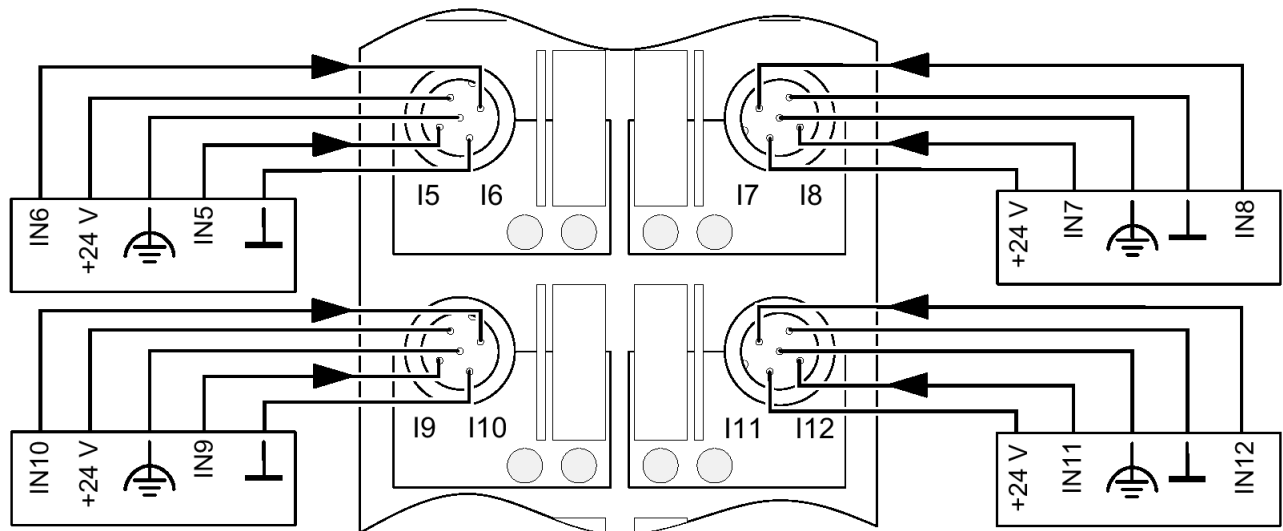
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#### Pin Assignment of the Inputs



|   |                      |
|---|----------------------|
| 1 | US +24V              |
| 2 | Input 2, 4, 6 ... 16 |
| 3 | GND                  |
| 4 | Input 1, 3, 5 ... 15 |
| 5 | FE                   |

#### Connection Examples



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### Program Data

|                    |          |
|--------------------|----------|
| ID number          | 06FB hex |
| Input address area | 16 bits  |

### Process Input Data Format

This module provides 16 bits of process data. Connection points are assigned to these 8 bits as shown below:

| Byte       | 0  |    |    |    |    |    |    |   | 1 |   |   |   |   |   |   |   |
|------------|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|
| Bit Number | 7  | 6  | 5  | 4  | 3  | 2  | 1  | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Input      | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

### Module Diagnostic Data

The module also provides 12 bytes of diagnostic data to the master, in the format shown below. Of this data, bytes 0 through 6 are Profibus standard data. Bytes 7 through 12 are specific to this module. If a diagnostic event occurs, the module generates a telegram containing the diagnostic data to the master. The module can read the current diagnostic data at any time.

| Byte Number | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | Diagnostic Data            |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|----------------------------|
| Byte 0      | X     | X     | X     | X     | X     | X     | X     | X     | Station Status 1           |
| Byte 1      | X     | X     | X     | X     | X     | X     | X     | X     | Station Status 2           |
| Byte 2      | X     | X     | X     | X     | X     | X     | X     | X     | Station Status 3           |
| Byte 3      | X     | X     | X     | X     | X     | X     | X     | X     | Master address diagnostics |
| Byte 4      | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | High ID Number             |
| Byte 5      | 0     | 1     | 1     | 0     | 1     | 0     | 1     | 1     | Low ID Number              |
| Byte 6      | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | Diagnostic header          |
| Byte 7      | M.7   | M.6   | M.5   | M.4   | M.3   | M.2   | M.1   | M.0   | Module Diagnostics         |
| Byte 8      | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | Reserved                   |
| Byte 9      | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | Reserved                   |
| Byte 10     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | Reserved                   |
| Byte 11     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | Reserved                   |
| Byte 12     | X     | X     | 0     | 0     | 0     | 0     | 0     | 0     | Reserved                   |

### Byte 7, Format of the Module Diagnostics Data

| Bit Number | Used For                                            | Comment                                 |
|------------|-----------------------------------------------------|-----------------------------------------|
| M.0 - M.2  | Reserved                                            | 0                                       |
| M.3        | Status of the US Sensor Supply                      | 1 if the Sensor Supply is less than 18V |
| M.4 - M.5  | Reserved                                            | 0                                       |
| M.6        | Status of the U <sub>L</sub> Module Supply          | 1 if the Module Supply is less than 18V |
| M.7        | Overload Status of the U <sub>S</sub> sensor supply | 1 if the Sensor supply is overloaded    |

**Technical Data**

| <b>Discrete Inputs</b>                 |                                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------|
| Number                                 | 16                                                                                    |
| Switching thresholds                   | Maximum low level voltage less than 5V<br>Minimum high level voltage greater than 11V |
| Nominal input voltage $U_{IN}$         | 24VDC                                                                                 |
| Permissible range                      | $-30V < U_{IN} < +30VDC$                                                              |
| Nominal input current $U_{IN}$         | 3mA                                                                                   |
| Characteristic curve of the current    | Constant                                                                              |
| Delay time                             | On: <1ms, typical<br>Off: 2ms, typical                                                |
| Permissible cable length to the sensor | 100m (328ft))                                                                         |

| <b>Sensor Supply</b>        |                       |
|-----------------------------|-----------------------|
| Minimum sensor voltage      | $U_S - 1V$            |
| Nominal current per channel | 75mA                  |
| Nominal current per module  | 1.2A                  |
| Overload Protection         | Electronic per module |
| Short-circuit protection    | Electronic per module |

| <b>Error Messages</b>          |                                                                                                                                                                                         |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short circuit of sensor supply | Yes. If an error is triggered by an overload or short circuit of the sensor supply, the module switches off the sensor supply of the channels and sends an error message to the master. |
| Overload of sensor supply      | Yes. If the sensor supply $U_S$ is too low, the module reports a peripheral fault to the master.                                                                                        |

| <b>Profibus Interface</b>                |                                                                                                                  |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Baud Rate, incoming and outgoing         | 12 Mbaud maximum. For transmission rates above 3 Mbaud, T-pieces with integrated series inductance must be used. |
| Shield connection, incoming and outgoing | Direct to FE                                                                                                     |

| <b>Electrical Isolation/Isolation of the Voltage Areas</b>                                                                                                                                                                                         |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 24V supply (bus logic) / bus connection<br>24V supply (bus logic) / FE<br>24V supply (bus logic) / digital inputs (sensor Supply)<br>Bus Connection / FE<br>Bus Connection / digital inputs (sensor supply)<br>FE / digital inputs (sensor supply) | Test voltage: 500VAC, 50Hz, 1 minute |