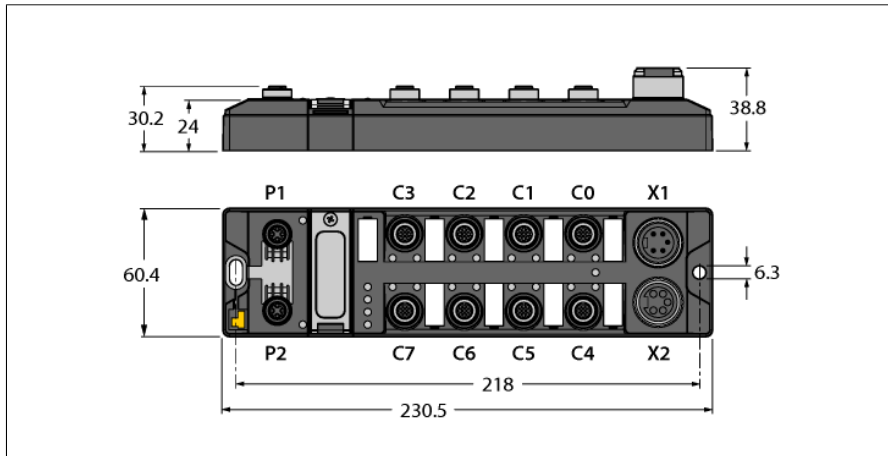


**Compact Multiprotocol I/O Module for Ethernet**  
**16 Digital PNP Outputs**  
**TBEN-L5-16DOP**



- EtherNet/IP™, Modbus® TCP, or PROFINET® slave
- Integrated Ethernet switch
- Supports 10 Mbps/100 Mbps
- 2 x M12, 4-pin, D-coded, Ethernet fieldbus connection
- Glass fiber reinforced housing
- Shock and vibration tested
- Fully potted module electronics
- Protection classes IP65, IP67, IP69K
- 7/8" connector for power supply, 5-pin
- Separated power groups for safety shutdown
- Max. 2 A per output
- Output diagnostics per channel
- FLC/ARGEE programmable

|                         |               |
|-------------------------|---------------|
| <b>Type designation</b> | TBEN-L5-16DOP |
| Ident-No.               | 6814087       |

|                                   |  |
|-----------------------------------|--|
| <b>Supply</b>                     |  |
| Supply voltage                    | 24 VDC   |
| Admissible range                  | 18...30 VDC  |
|                                   | Total current max. 9 A per voltage group                                   |
|                                   | Total current V1 + V2 max. 11 A  |
| Voltage supply connection         | 5-pin male 7/8" connector X1   |
| Sensor/Actuator supply $V_{AUX2}$ | supply of ports C0-C7 from V2  |
|                                   | short-circuit proof, 120 mA per port                                       |
| Electrical isolation              | galvanic isolation of the voltage groups V1 and V2, voltages up to 500 VAC |

|                                |                         |
|--------------------------------|-------------------------|
| <b>System data</b>             |                         |
| Fieldbus transmission rate     | 10 Mbps/100 Mbps        |
| Fieldbus connection technology | 2 x M12, 4-pin, D-coded |
| Protocol detection             | automatic               |
| Web server                     | default: 192.168.1.254  |
| Service Interface              | Ethernet via P1 or P2   |

|                                     |          |
|-------------------------------------|----------|
| <b>Field Logic Controller (FLC)</b> |          |
| Supported from firmware version     | 3.2.9.0  |
| Released from ARGEE version         | 2.0.24.0 |

|                               |  |
|-------------------------------|--|
| <b>Modbus TCP</b>             |  |
| Addressing                    | Static IP, BOOTP, DHCP                         |
| Supported function codes      | FC1, FC2, FC3, FC4, FC5, FC6, FC15, FC16, FC23 |
| Number of TCP connections     | 8  |
| Input register start address  | 0 (0x0000 hex)                                 |
| Output register start address | 2048 (0x0800 hex)                              |

|                                 |                                    |
|---------------------------------|------------------------------------|
| <b>EtherNet/IP™</b>             |                                    |
| Addressing                      | acc. to EtherNet/IP™ specification |
| Quick Connect (QC)              | < 150 ms                           |
| Device Level Ring (DLR)         | supported                          |
| Number of TCP connections       | 3                                  |
| Number of CIP connections       | 10                                 |
| Input Assembly Instance         | 103                                |
| Output Assembly Instance        | 104                                |
| Configuration Assembly Instance | 106                                |

**Compact Multiprotocol I/O Module for Ethernet**  
**16 Digital PNP Outputs**  
**TBEN-L5-16DOP**



Industrial  
Automation

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**PROFINET**

|                                 |                                 |
|---------------------------------|---------------------------------|
| Addressing                      | DCP                             |
| Conformance class               | B (RT)                          |
| MinCycleTime                    | 1 ms                            |
| Fast Start-Up (FSU)             | < 150 ms                        |
| Diagnostics                     | acc. to PROFINET alarm handling |
| Topology detection              | supported                       |
| Automatic addressing            | supported                       |
| Media Redundancy Protocol (MRP) | supported                       |

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**Digital outputs**

|                               |   |
|-------------------------------|---|
| Number of channels            | 16  |
| Connection Technology Outputs | M12, 5-pol  |
| Output type                   | PNP   |
| Type of output diagnostics    | channel diagnostics                                     |
| Output voltage                | 24 VDC from potential group                             |
| Output current per channel    | 2.0 A, short-circuit proof, max. 2.0 A per port         |
| Output delay                  | 1.3 ms  |
| Load type                     | EN 60947-5-1: DC-13                                     |
| Short-circuit protection      | yes   |
| Potential separation          | galvanic isolation to P1/P2<br>, voltages up to 500 VDC |

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**Standard/Directive conformity**

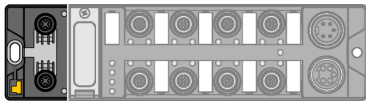
|                                |  |
|--------------------------------|--|
| Vibration test                 | acceleration to 20 g<br>acc. to EN 60068-2-6 |
| Shock test                     | acc. to EN 60068-2-27                        |
| Drop and topple                | acc. to EN 60068-2-31/IEC 60068-2-32         |
| Electro-magnetic compatibility | acc. to EN 61131-2                           |
| Approvals and certificates     | CE   |

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**General Information**

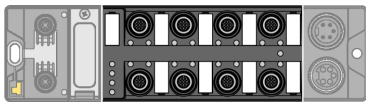
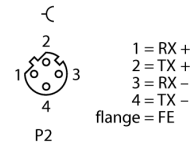
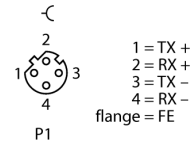
|                        |                           |
|------------------------|---------------------------|
| Dimensions (W x L x H) | 60.4 x 230.4 x 39mm       |
| Operating temperature  | -40...+70 °C              |
| Storage temperature    | -40...+85 °C              |
| Altitude               | max.5000 m                |
| Protection class       | IP65<br>IP67<br>IP69K     |
| Housing material       | PA6-GF30                  |
| Housing color          | Black                     |
| Window material        | Lexan                     |
| Material screw         | 303 stainless steel       |
| Material label         | Polycarbonate             |
| Halogen-free           | yes                       |
| Mounting               | 2 mounting holes Ø 6.3 mm |

**Compact Multiprotocol I/O Module for Ethernet**  
**16 Digital PNP Outputs**  
**TBEN-L5-16DOP**



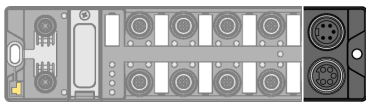
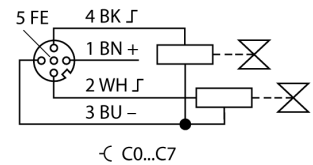
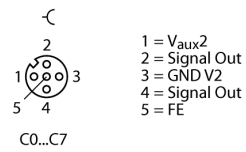
**Accessories**  
 Ethernet cable (example):  
 RSSD RSSD 441-2M  
 Ident no. U-02482

M12 x 1 Ethernet



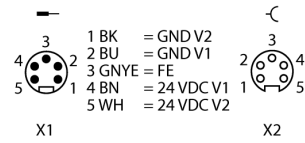
**Accessories**  
 Accessories:  
 Connection cable , 2-channel (example):  
 RK 4.4T-2-RS 4.4T  
 Ident no. U2445  
 Splitter, 1-channel (example):  
 YB2-FSM 4.5-2FKM 4.5  
 Ident no. U0875-78

M12 x 1 Output



**Accessories**  
 Power supply cable (example):  
 RSM RKM 40-2M  
 Ident no. U2280-0

7/8" Power Supply



**Compact Multiprotocol I/O Module for Ethernet**  
**16 Digital PNP Outputs**  
**TBEN-L5-16DOP**



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**Module LED Status**

| LED         | Color     | Status      | Description  |
|-------------|-----------|-------------|--|
| ETH1 / ETH2 | Green     | ON          | Ethernet link (100 Mbps)   |
|             |           | flashing    | Ethernet communication (100 Mbps)  |
|             | Yellow    | ON          | Ethernet link (10 Mbps)  |
|             |           | flashing    | Ethernet communication (10 Mbps)   |
|             |           | OFF         | No Ethernet link   |
| BUS         | Green     | ON          | Active connection to a master  |
|             |           | Flashing    | Steady flashing: Ready<br>Sequence of 3 flashes in 2 seconds: FLC/ARGEE active |
|             |           |             |  |
|             | Red       | ON          | IP address conflict or Restore Mode or Modbus timeout                          |
|             |           | Flashing    | Blink/Wink command active  |
|             | Green/red | Alternating | Autonegotiation and/or waiting for DHCP/Boot-P addressing                      |
|             | OFF       | Power off   |  |
| ERR         | Green     | ON          | Diagnostics disabled   |
|             | Red       | ON          | Diagnostics enabled<br>$V_2$ undervoltage diagnosis is parameter-dependent     |
| PWR         | Green     | ON          | $V_1$ and $V_2$ power on   |
|             | Red       | ON          | $V_2$ power off or below defined tolerance of 18 V                             |
|             |           | OFF         | $V_1$ power off or below defined tolerance of 18 V                             |

**LED Status I/O**

| LED          | Color | Status          | Description  |
|--------------|-------|-----------------|--|
| LED 0 ... 15 | Green | ON              | Output active  |
|              |       |                 |  |
|              | Red   | ON              | Output active with overload/short circuit                              |
|              |       | flashing        | Power overload at the corresponding port. Both port LEDs are flashing. |
|              | OFF   | Output inactive |  |

# Compact Multiprotocol I/O Module for Ethernet

## 16 Digital PNP Outputs

### TBEN-L5-16DOP

#### Process Data Mapping of the Single Protocols

For more details on the corresponding protocols see manual.

#### Modbus TCP Register Mapping

|               | Reg    | Bit 15       | Bit 14       | Bit 13       | Bit 12       | Bit 11       | Bit 10       | Bit 9       | Bit 8       | Bit 7       | Bit 6       | Bit 5       | Bit 4       | Bit 3       | Bit 2       | Bit 1       | Bit 0       |
|---------------|--------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Status (RO)   | 0x0000 | -            | FCE          | -            | -            | CFG          | COM          | V1          | -           | V2          | -           | -           | -           | -           | -           | -           | Diag Warn   |
| Diag (RO)     | 0x0001 | -            | -            | -            | -            | -            | -            | -           | -           | -           | -           | -           | -           | -           | -           | -           | I/O Diag    |
| Outputs (RW)  | 0x0800 | DO15<br>C7P2 | DO14<br>C7P4 | DO13<br>C6P2 | DO12<br>C6P4 | DO11<br>C5P2 | DO10<br>C5P4 | DO9<br>C4P2 | DO8<br>C4P4 | DO7<br>C3P2 | DO6<br>C3P4 | DO5<br>C2P2 | DO4<br>C2P4 | DO3<br>C1P2 | DO2<br>C1P4 | DO1<br>C0P2 | DO0<br>C0P4 |
| I/O Diag (RO) | 0xA000 | SCO7         | SCO6         | SCO5         | SCO4         | SCO3         | SCO2         | SCO1        | SCO0        | SCS7        | SCS6        | SCS5        | SCS4        | SCS3        | SCS2        | SCS1        | SCS0        |
| I/O Diag (RO) | 0xA001 | -            | -            | -            | -            | -            | -            | -           | -           | SCO15       | SCO14       | SCO13       | SCO12       | SCO11       | SCO10       | SCO9        | SCO8        |

#### EtherNet/IP™ data mapping with activated scheduled diagnostics, default settings

|                                  | Word | Bit 15       | Bit 14       | Bit 13        | Bit 12       | Bit 11       | Bit 10       | Bit 9       | Bit 8       | Bit 7       | Bit 6       | Bit 5       | Bit 4       | Bit 3       | Bit 2       | Bit 1       | Bit 0       |
|----------------------------------|------|--------------|--------------|---------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Input data (station -> scanner)  |      |              |              |               |              |              |              |             |             |             |             |             |             |             |             |             |             |
| GW status                        | 0    | -            | FCE          | -             | -            | CFG          | COM          | V1          | -           | V2          | -           | -           | -           | -           | -           | -           | Diag Warn   |
| Diag 1                           | 1    | -            | -            | Sched<br>Diag | -            | -            | -            | -           | -           | -           | -           | -           | -           | -           | -           | -           | I/O<br>Diag |
| Diag 2                           | 2    | SCO7         | SCO6         | SCO5          | SCO4         | SCO3         | SCO2         | SCO1        | SCO0        | SCS7        | SCS6        | SCS5        | SCS4        | SCS3        | SCS2        | SCS1        | SCS0        |
| Diag 3                           | 3    | -            | -            | -             | -            | -            | -            | -           | -           | SCO15       | SCO14       | SCO13       | SCO12       | SCO11       | SCO10       | SCO9        | SCO8        |
| Output data (scanner -> station) |      |              |              |               |              |              |              |             |             |             |             |             |             |             |             |             |             |
| Control                          | 0    | reserved     |              |               |              |              |              |             |             |             |             |             |             |             |             |             |             |
| Outputs                          | 1    | DO15<br>C7P2 | DO14<br>C7P4 | DO13<br>C6P2  | DO12<br>C6P4 | DO11<br>C5P2 | DO10<br>C5P4 | DO9<br>C4P2 | DO8<br>C4P4 | DO7<br>C3P2 | DO6<br>C3P4 | DO5<br>C2P2 | DO4<br>C2P4 | DO3<br>C1P2 | DO2<br>C1P4 | DO1<br>C0P2 | DO0<br>C0P4 |

#### EtherNet/IP™ data mapping with activated summarized diagnostics

|                                  | Word | Bit 15       | Bit 14       | Bit 13       | Bit 12       | Bit 11       | Bit 10       | Bit 9       | Bit 8       | Bit 7       | Bit 6       | Bit 5       | Bit 4       | Bit 3       | Bit 2       | Bit 1       | Bit 0       |
|----------------------------------|------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Input data (station -> scanner)  |      |              |              |              |              |              |              |             |             |             |             |             |             |             |             |             |             |
| GW status                        | 0    | -            | FCE          | -            | -            | CFG          | COM          | V1          | -           | V2          | -           | -           | -           | -           | -           | -           | Diag Warn   |
| Diag 1                           | 2    | -            | -            | -            | -            | -            | -            | -           | -           | -           | -           | -           | -           | -           | -           | -           | I/O<br>Diag |
| Output data (scanner -> station) |      |              |              |              |              |              |              |             |             |             |             |             |             |             |             |             |             |
| Control                          | 0    | reserved     |              |              |              |              |              |             |             |             |             |             |             |             |             |             |             |
| Outputs                          | 1    | DO15<br>C7P2 | DO14<br>C7P4 | DO13<br>C6P2 | DO12<br>C6P4 | DO11<br>C5P2 | DO10<br>C5P4 | DO9<br>C4P2 | DO8<br>C4P4 | DO7<br>C3P2 | DO6<br>C3P4 | DO5<br>C2P2 | DO4<br>C2P4 | DO3<br>C1P2 | DO2<br>C1P4 | DO1<br>C0P2 | DO0<br>C0P4 |

#### PROFINET process data

|         | Byte | Bit 7        | Bit 6        | Bit 5        | Bit 4        | Bit 3        | Bit 2        | Bit 1        | Bit 0       |
|---------|------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|
| Outputs | 0    | DO8<br>C4P2  | DO7<br>C4P4  | DO6<br>C3P2  | DO5<br>C3P4  | DO4<br>C2P2  | DO3<br>C2P4  | DO2<br>C1P2  | DO1<br>C1P4 |
|         | 1    | DO16<br>C8P2 | DO15<br>C8P4 | DO14<br>C7P2 | DO13<br>C7P4 | DO12<br>C6P2 | DO11<br>C6P4 | DO10<br>C5P2 | DO9<br>C5P4 |

Key:

|          |  |           |   |
|----------|--|-----------|---|
| Dlx      | Digital input channel x                    | CFG       | I/O Configuration error                                 |
| DOx      | Digital output channel x                   | FCE       | I/O-ASSISTANT Force Mode active                         |
| Cx       | Port x                                     | I/Odiag   | I/O diagnostics connected                               |
| Px       | Pin x                                      | SchedDiag | Manufacturer-specific diagnostics configured and active |
| DiagWarn | Diagnostic at least on 1 channel           | SCSx      | Short-circuit at port x                                 |
| V1       | Undervoltage V1                            | SCG1      | Short-circuit supply ports C0-C3                        |
| V2       | Undervoltage V2                            | SCG2      | Short-circuit supply ports C4-C7                        |
| COM      | Communication error on internal module bus | SCOx      | Short-circuit output channel x                          |