

STAR COOPERATION®

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# FlexMedia 1000BASE-T1

## Instructions for Use



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Any semiconductor devices have an inherent chance of failure. You have to protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions. The safety and handling instructions in this document have to be followed strictly.

## EC Conformity

The FlexMedia 1000BASE-T1 complies with the essential requirements of the following applicable European Community Directive(s) including current amendments, and carries the CE marking accordingly:

- 2014/30/EU EMC Directive

The following standard(s) have been used to assess the product:

- EN 61000-6-2 2019-11
- EN 61000-6-3 2011-09
- EN 61000-4-2 2009-12
- EN 61000-4-3 2011-04
- EN 61000-4-4 2013-04
- EN 61000-4-5 2019-03
- EN 61000-4-6 2014-08
- EN 61326-1 2013-07
- EN 55011 2018-05

This product is compliant with the European Community Directive 2011/65/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

## Revision History

Document number: 3-0100-0A01-D11

Version	Date	Description
D1V0-F	04.06.2020	First release
D1V1-F	04.11.2020	Updated chapter technical data
D1V2-F	04.11.2020	Updated chapter ordering information

## Related Hardware / Software Versions

Product	Reference No.	Version	Remarks
FlexMedia 1000BASE-T1	3-0100-0A01	01	

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## 1 General

### 1.1 Intended use

The FlexMedia 1000BASE-T1 is solely used to convert “100BASE-TX” into “100BASE-T1” or “1000BASE-TX” into “1000BASE-T1” and vice versa.

Only the herein described accessory parts are allowed to be used together with the FlexMedia 1000BASE-T1.

The FlexMedia 1000BASE-T1 is designed, intended, and authorized only for laboratory applications use. Any other use without the prior written consent of *STAR COOPERATION* prohibited.

The FlexMedia 1000BASE-T1 is NOT designed, intended, or authorized for





- use as part of medical systems,
- life support applications,
- aviation, space, nuclear, or military applications,
- use in areas where combustible or explosive gas mixtures are likely to occur,
- other applications in which a mistake or malfunction may result in death, personal injury or severe physical damage.

The product described in this document is an industrial device, i.e. is designed, intended, or authorized for professional use. It is not designed, intended, or authorized for home applications or consumers. For this reason, use by non-professionals is forbidden.

### 1.2 Used Pictograms

The meaning of used pictograms is shortly described below.

Follow the specific instructions in the document where these pictograms are placed.

	<b>NOTICE</b>
	Used to indicate a situation which may result in an operating failure. Damage of the product may occur, but there is no hazard of injury if not avoided.
	<b>Information</b>
	Used to indicate information provided only for purposes of clarification, illustration, and general information.
	<b>Reference</b>
	References to other documents.
	Product marking which shows the compliance of the product with the European Waste Electrical and Electronic Equipment Directive 2012/19/EU.

### 1.3 Safety and Handling Instructions


Please read the instructions for use carefully. To protect the device or the application against damage, or to avoid personal injury the FlexMedia 1000BASE-T1 has to be handled as described herein.

Changes or modifications of the FlexMedia 1000BASE-T1 are not allowed for safety and warranty reasons!

*STAR COOPERATION* is not liable for any damages arising from non-observance of the product information.

Follow the

- a) specific safety and handling instructions placed at dedicated document positions
- b) general safety and handling instructions below:

<b>NOTICE</b>	
	<p>To prevent damage to the FlexMedia 1000BASE-T1, or consequential damages:</p> <p style="text-align: center;">Do not open the FlexMedia 1000BASE-T1.</p> <p>Do not connect any other signals to the interfaces as described in the chapter “Interfaces”. Ensure that all signals are within the specified range.</p> <p>High temperatures can damage the FlexMedia 1000BASE-T1. Keep the FlexMedia 1000BASE-T1 away from heaters, stoves, fireplaces, and other sources of heat.</p> <p style="text-align: center;">Do not expose the FlexMedia 1000BASE-T1 to rain or use it near water.</p> <p style="text-align: center;">Do not use the FlexMedia 1000BASE-T1 in areas of explosion hazard.</p>

## 1.4 User Group

This document is written for expert technicians who are familiar with electronic components and systems.

Each person involved with assembly, line-up, operation, maintenance, or disposal of the FlexMedia 1000BASE-T1 has to

- be a qualified technician, or electrician, or engineer
- strictly adhere to this manual
- receive a briefing by an authorized person

## 1.5 Meaning of Text Styles

In this document *filenames*, are marked with a different text format.

## 2 Product Description


### 2.1 FlexMedia 1000BASE-T1 at a glance

The FlexMedia 1000BASE-T1 is a converter for 100/1000BASE-T1 to 100/1000BASE-TX and vice versa. With the FlexMedia 1000BASE-T1, it is possible to connect an automotive Ethernet network to a standard PC for testing or diagnostic purposes. It supports up to 1000 MBit/s in full duplex mode on both sides.

- Master and slave mode selectable via DIP-switch
- 100 MBit/s and 1000 MBit/s mode selectable via DIP-switch
- Automatic selection of A0 and A2 mode
- Marvell 88Q2112-A2-NYD2A000 transceiver is used for the 1000BASE-T1 conversion
- Supply voltage: 8-48V DC
- Status LEDs
- RJ45 connector for 1000BASE-TX
- D-Sub 9 pin male connector for 1000BASE-T1
- IP20
- Temperature range -40°C to +70°C

### 2.2 Accessory Parts

For further information about accessories for the FlexMedia 1000BASE-T1 see chapter 7.2 Accessory Parts.

	<b>NOTICE</b>		
	Use only accessory parts from <i>STAR COOPERATION</i> listed in chapter 7.2 Accessory Parts to ensure proper function and for warranty reasons! Other accessories without prior written consent of <i>STAR COOPERATION</i> must not be used.		

## 3 Technical Data

### 3.1 Electrical Characteristics

Supply voltage	Min.	Typ.	Max.
Operating	+8.0 V	-	+48.0 V
Absolute maximum (non-operating)	-60.0 V	-	+60.0 V
Latency between BASE-T1 and BASE-TX	Up to 3 $\mu$ s		
Supply current - operating	typical 140 mA		

Table 1: Electrical characteristics

### 3.2 Physical Characteristics

Connectors	
- Power	WAGO picoMAX 2091 (wire size 0,25 ... 1,5 mm <sup>2</sup> )
- Ethernet (BASE-TX)	RJ45
- Ethernet (BASE-T1)	D-Sub 9
Weight approx.	145 g
Dimensions approx. L x W x H	92mm * 65mm * 28mm

Table 2: Physical characteristics

### 3.3 Environmental Conditions

Temperature	Operating: -40°C - +70°C Non-operating: -40°C - +70°C Storage: -40°C - +70°C
Relative Humidity	0% - 90% r. H., non-condensing

Table 3: Environmental conditions

### 3.4 Interfaces

The FlexMedia 1000BASE-T1 has a power connector with clamp contacts, an RJ45 connector for the xBASE-Tx (Ethernet), an D-Sub 9 pol connector for xBASE-T1, a 2 pin DIP-switch and some LED's. The following figures show the position of each interface.





Figure 1: Side with Power and Ethernet (1000BASE-TX)



Figure 2: Side with 1000BASE-T1

### 3.4.1 Power

The valid range of the power supply for the FlexMedia 1000BASE-T1 is within 8 - 48 V DC. The power supply input of the FlexMedia 1000BASE-T1 is reverse protected.


The green LED near the power cable shows the power supply status, if the LED is on, the power is OK.

Power cable		
Pin	Signal Name	Description
1	GND	Ground signal
2	Uin	Power in allowed in the range from 8 - 48 V

Table 4: Power cable

### 3.4.2 Ethernet (RJ45)

The FlexMedia 1000BASE-T1 support a 100 or 1000BASE-TX (100 or 1000 MBit/s Ethernet) interface at the Ethernet connector. This connector supports both 100MBit/s and 1000 MBit/s in full-duplex mode. 10 MBit/s mode and half-duplex mode are not supported.

	NOTICE
	The maximum allowed length of the Ethernet cable is 30m.

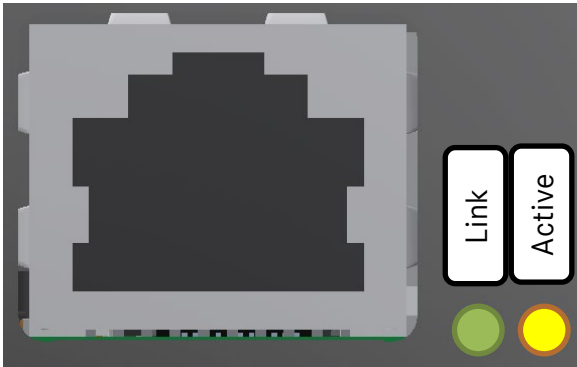


Figure 3: Ethernet connector with yellow and green LED

### 3.4.3 LEDs and DIP-switches

The FlexMedia 1000BASE-T1 has two additional LEDs at the power connector side: a LED for IEEE(A2) (yellow) near the DIP switch and a LED for Power status (green) near the Power connector.

IEEE(A2) LED	Description
Off	The device operates in Legacy (A0) 1000BASE-T1 Mode
On	The device operates in Compliant (A2) 1000BASE-T1 Mode


Power LED	Description
On	The device is powered on

Ethernet		
Green LED (Link)	Yellow LED (Active)	Description
On	Off	The link is established, no data exchange occurring
On	Blinking	Data exchange is in progress
Off	Off	No link is established, the data exchange is not possible

1000BASE-T1		
Green LED (Link)	Yellow LED (Active)	Description
On	Off	The link is established, no data exchange occurring
On	Blinking	Data exchange is in progress
Blinking	Off	No link is established, the data exchange is not possible

The DIP-Switch '1' configures the 1000BASE-T1 interface - it changes between Master or Slave function. If the switch is up the transceiver is configured as Slave, if the switch is down it is configured as Master.

The DIP-Switch '2' configures the bitrate of **both** ethernet interfaces. If the switch is down, the converter is configured in 1000MBit/s mode (1GBit/s), if the switch is up it is configured in 100MBit/s mode.

	NOTICE
	It is not possible to convert between 100MBit/s and 1000MBit/s.

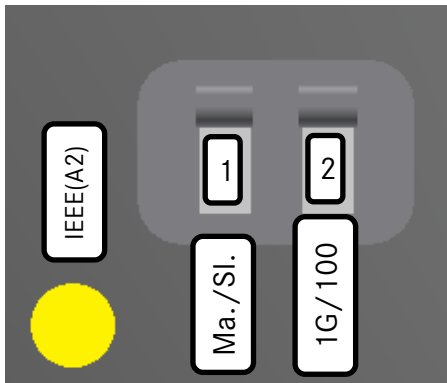


Figure 4: LED for IEEE(A2) (yellow) and the DIP-switches

### 3.4.4 1000BASE-T1 (D-Sub)

The FlexMedia 1000BASE-T1 support a 100/1000BASE-T1 interface.

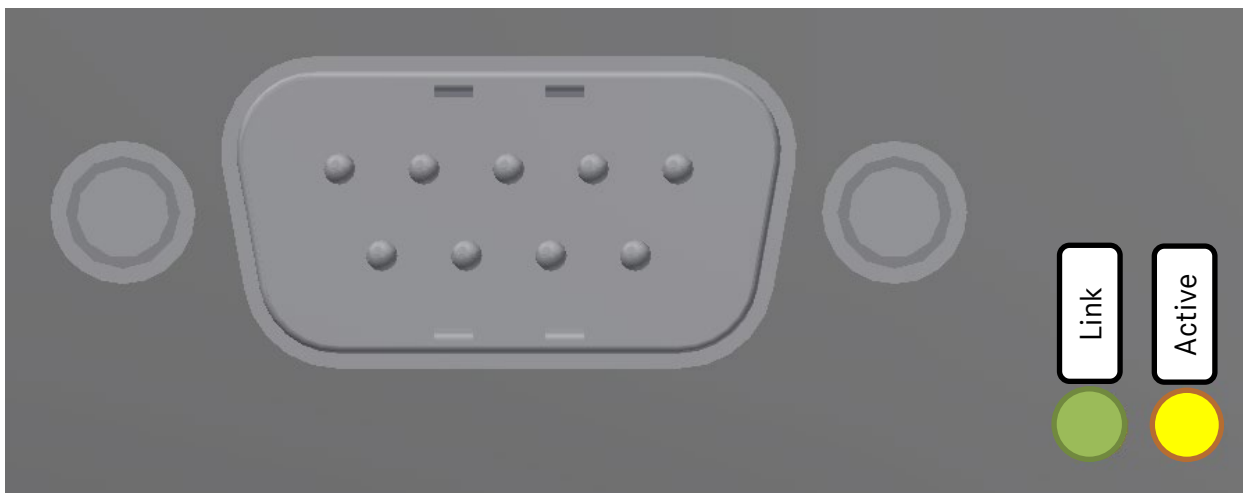


Figure 5: 1000BASE-T1 D-Sub connector with yellow and green LED

Connector DSub (1000BASE-T1 2-wire ethernet)		
Pin	Signal Name	Description
1, 2, 6 - 9	NC	Not connected
3	ETH-GND	Ground signal connected over an inductor to internal ground
4	ETH_BP	1000BASE-T1 bus plus signal
5	ETH_BM	1000BASE-T1 bus minus signal

Table 5: Connector for D-Sub (2-wire ethernet)

The 1000BASE-T1 connector supports both A0 (legacy) and A2 (IEEE-compliant) mode.

If no link established, the device changes the mode of operation randomly between A0 (legacy) and A2 (IEEE compliant). The link should be established in 1-2 seconds. The LED IEEE(A2) indicates the current mode of operation.




## NOTICE

The maximum allowed length of the 1000BASE-T1 cable is 30m.

## 4 Getting Started

### 4.1 Assembly and Line-up

Read and follow these instructions when connecting and using the FlexMedia 1000BASE-T1:

NOTICE	
	<p>Ensure that all signal lines connected to the FlexMedia 1000BASE-T1 are in the allowed range.</p> <p>Be sure to connect all cables as described in this manual.</p> <p>Never insert anything metallic into the openings of the FlexMedia 1000BASE-T1.</p> <p>Ensure to grasp the plug and not the cable when disconnecting the FlexMedia 1000BASE-T1.</p>

### 4.2 Configuration and Operation

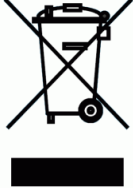
Use the power connector of the FlexMedia 1000BASE-T1 to connect with a power-supply within the correct voltage range.

Connect the 1000BASE-T1 and Ethernet (1000BASE-Tx) with their networks. Check the pinouts.

Adjust the Master/Slave-DIP-switch and the Bitrate-DIP-switch if necessary.

Check the state of the LEDs.

## 5 Shipping, Maintenance and Disposal

	<p>Dispose off properly per regulations of the country where end-of-life occurs.</p>
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## 6 Troubleshooting

This chapter contains some frequently asked questions about the FlexMedia 1000BASE-T1.

<b>1</b>	Effect	No LINK at the 1000BASE-T1 connector.
	Solution	Check the DIP-switch for correct Master/Slave configuration and the DIP-switch for Bitrate. A 100/1000BASE-T1 communication is a Point-to-Point- Connection where one communication partner acts as 'Master' and one communication partner acts as 'Slave'.

<b>2</b>	Effect	No LINK at the Ethernet connector.
	Solution	Check the "Link Speed & Duplex" settings of the connected network adapter. See chapter 3.4.2 for supported configurations.

## 7 Ordering Information

### 7.1 FlexMedia 1000BASE-T1

Product	Description	Ordering number
FlexMedia 1000BASE-T1	Media converter between 1000BASE-T1 and -Tx	3-V1000A01

### 7.2 Accessory Parts

Product	Description	Ordering number
Customer specific parts		Please contact <i>STAR COOPERATION</i>

### 7.3 Related Documents

Document	Description	Ordering number
[1]		
[2]		
[3]		

## 8 Appendix

### 8.1 Appendix A: Guideline for handling ESD sensitive Products

- Any tester, equipment, or tool used at any production step or for any manipulation of semi-conductor devices must have its shield connected to ground.
- The product itself and the carrier system of the product respectively must be placed on a conductive table top or covered by an antistatic surface (superficial resistivity equal to or higher than  $0.5M\Omega/cm^2$ ), grounded through a ground cable (conductive cable from protected equipment to ground isolated through a  $1M\Omega$  resistor placed in series).
- All manipulation of finished goods has to be made at such a grounded worktable.
- The worktable must be free of all non-antistatic objects.
- An antistatic floor covering grounded through a conductive ground cable (with serial resistor between  $0.9M\Omega$  and  $1.5M\Omega$ ) should be used.
- It is recommended that you wear an antistatic wrist or ankle strap, connected to the antistatic floor covering or to the grounded equipment.
- If no antistatic wrist or ankle strap is worn, touch the surface of the grounded worktable before each manipulation of the ESD sensitive product.
- It is recommended that antistatic gloves or finger coats be worn.
- It is recommended that nylon clothing be avoided while performing any manipulation of parts.

### 8.2 Appendix B:

#### 8.2.1 Acronyms and Abbreviations

Item	Definition
BD	Bus driver
BP	Bus plus
BM	Bus minus
ECU	Electronic Control Unit
EMC	Electromagnetic Compatibility
ESD	Electro Static Discharge
NC	Not Connected
PCB	Printed Circuit Board
PL	Physical Layer

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Figure 5: 1000BASE-T1 D-Sub connector with yellow and green LED..... 11

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