FL3X by STAR®

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FL3X Media 1000BASE-T1

Instructions for Use

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All operating parameters which are provided in this document can vary in different applications or over time. The herein described product, may solely be used as described in chapter 1.2 “Intended use”.
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Any semiconductor devices have an inherent chance of failure. You must 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 must be followed strictly.

EC Conformity

The FL3X Media 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 61000-4-2:2009
- EN 61000-4-3:2006 + A1:2008 + A2:2010
- EN 61000-4-4:2012
- EN 61000-4-5:2014 + A1:2017
- EN 61000-4-6:2014
- EN IEC 61000-6-2:2019
- EN 61000-6-3:2007 + A1:2011
- EN 61326-1:2013
- EN 55011:2016 + A1:2017

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).

UK Conformity

The FL3X Media 1000BASE-T1 complies with the essential requirements of the following applicable UK Regulations including current amendments, and carries the UK marking accordingly:

- 2016 Electromagnetic Compatibility Regulations

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

- EN 61000-4-2:2009
- EN 61000-4-3:2006 + A1:2008 + A2:2010
- EN 61000-4-4:2012
- EN 61000-4-5:2014 + A1:2017
- EN 61000-4-6:2014
- EN IEC 61000-6-2:2019
- EN 61000-6-3:2007 + A1:2011
- EN 61326-1:2013
- EN 55011:2016 + A1:2017

This product is compliant with “the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012”.

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
D1V3-F	17.11.2021	Updated chapter LED behavior, DIP Switch behavior
D1V4-F	01.02.2022	Updated 100BASE-TX and 1000BASE-T naming. Updated Imax
D1V5-F	16.02.2022	Updated chapter EC Conformity Added chapter UK Conformity Changed product pictures
D1V6-F	20.02.2023	Product name changes

Related Hardware / Software Versions

Product	Reference No.	Version	Remarks
FL3X Media 1000BASE-T1	3-0100-0A01	01	Old product: FL3X Media 1000BASE-T1

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Contents

1 General

1.1 Intended User Group

This product may only be used by expert technicians and/or engineers who are qualified and familiar with electronic components and systems.

Each person involved with setup or operation of the product must

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

NOTICE

If you are unsure of how to use the product as intended or have any questions about the use of the product, please discontinue use of the product immediately and contact the STAR ELECTRONICS GmbH & Co. KG Support.

⚠WARNING

The product may only be used by expert technicians and/or engineers who are qualified and familiar with electronic components and systems!

The use of the product by non-professionals is not permitted and strictly forbidden!

1.2 Intended use

The FL3X Media 1000BASE-T1 Configuration Tool is a software specially designed for testing purposes in connection with STAR ELECTRONICS GmbH & Co. KG's hardware devices.
For this intended use, the FL3X Media 1000BASE-T1 offers the following options:

- Configuration of STAR ELECTRONICS GmbH & Co. KG hardware
- Control the runtime behavior of STAR ELECTRONICS GmbH & Co. KG hardware

Any deviation from the intended use is only permitted with specific **prior written approval** of STAR ELECTRONICS GmbH & Co. KG.

⚠WARNING

Any use of the software on or in connection with a STAR ELECTRONICS GmbH & Co. KG hardware device product outside a fully controlled testing and/or laboratory environment may result in death or serious injury due to unpredictable behavior of a vehicle and/or potentially missing, deactivated or malfunctioning safety devices on a vehicle!

⚠WARNING

The FL3X Media 1000BASE-T1 may be used to communicate with networked electronic systems. E.g. Ethernet.

Any use of the product outside a fully controlled testing and/or laboratory environment may result in death or serious injury due to unpredictable behavior of a vehicle and/or potentially missing, deactivated, or malfunctioning safety devices on a vehicle!

The user is responsible to ensure the safety of the entire system. This includes amongst other things a safety shutdown.

	**NOTICE** The device is not a calibrated measurement device. STAR ELECTRONICS GmbH & Co. KG accepts no liability whatsoever for the correctness of any measurement results.

	**⚠WARNING** The FL3X Media 1000BASE-T1 is **NOT** designed, intended, or authorized and may **NOT** be used for or in connection with the following purposes and/or devices: - use as part of medical systems - life support applications - aviation, space, nuclear, or military applications - any other purposes / devices deviating from the intended use of the product specified by STAR ELECTRONICS GmbH & Co. KG.

	**⚠WARNING** The product may only be used by expert technicians and/or engineers who are qualified and familiar with electronic components and systems! The use of the product by non-professionals is not permitted and strictly forbidden!

1.3 Meaning of Text Styles

In this document *filenames*, "*buttons", "controls*" and '*menu entries*' are marked with a different text format.

Any placeholder or variable is marked with '%...%'. E.g. %version%.

1.4 Used Pictographs

The meaning of the pictographs used, is shortly described below.

Follow the specific instructions in the document, where these pictographs are placed.

	**NOTICE** 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.

	**Information** Used to indicate information provided only for purposes of clarification, illustration, and general information.

	**Reference** References to other documents.

1.5 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 Instructions for Use must be handled as described herein.

Changes or modifications of the Instructions for Use are not allowed for safety and warranty reasons!

STAR ELECTRONICS GmbH & Co. KG 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:

	⚠ WARNING
	FL3X Media 1000BASE-T1 can be used to interfere with networked electronic systems. By connected measurement hardware like the FlexDevice-L, FlexConfig RBS can be used to transmit messages via FlexRay, CAN, LIN or Ethernet busses. If transmitted messages are received by real electronic control units, e.g. within a test car, these messages could result in an unpredictable behavior or a failure of the electronic control unit. This may result in serious injury of persons or material damage! Only qualified and briefed persons may use FL3X Media 1000BASE-T1! Only Transmit messages, where the expected behavior of the receiver is known.

2 Product Description

2.1 FL3X Media 1000BASE-T1 at a glance

The FL3X Media 1000BASE-T1 is a converter for “100BASE-T1 to 100BASE-TX” or “1000BASE-T1 to 1000BASE-T” and vice versa. With the FL3X Media 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 100/1000BASE-T1 conversion
- Supply voltage: 8-48V DC
- Status LEDs
- RJ45 connector for 100BASE-TX or 1000BASE-T
- D-Sub 9 pin male connector for 100/1000BASE-T1
- IP20
- Temperature range -40°C to +70°C

2.2 Accessory Parts

For further information about accessories for the FL3X Media 1000BASE-T1 see chapter 7.2 Accessory Parts.

	NOTICE
	Use only accessory parts from STAR ELECTRONICS GmbH & Co. KG listed in chapter 7.2 Accessory Parts to ensure proper function and for warranty reasons! Other accessories without prior written consent of STAR ELECTRONICS GmbH & Co. KG 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 µs		
Supply current - operating	Typ.: 140 mA; Max.: 200 mA		

Table 1: Electrical characteristics

3.2 Physical Characteristics

Connectors	
- Power	WAGO picoMAX 2091 (Wire size 0,25 … 1,5 mm², without ferrule only)
- Ethernet (BASE-T)	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 FL3X Media 1000BASE-T1 has a power connector with clamp contacts, an RJ45 connector for the 100BASE-TX/1000BASE-T (Ethernet), an D-Sub 9 pol connector for 100/1000BASE-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 (100BASE-TX/1000BASE-T)

Figure 2: Side with 100/1000BASE-T1

3.4.1 Power

The valid range of the power supply for the FL3X Media 1000BASE-T1 is within 8 - 48 V DC. The power supply input of the FL3X Media 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 FL3X Media 1000BASE-T1 support a 100BASE-TX or 1000BASE-T (100 or 1000 MBit/s Ethernet) interface at the Ethernet connector. This connector supports both 100MBit/s and1000 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.

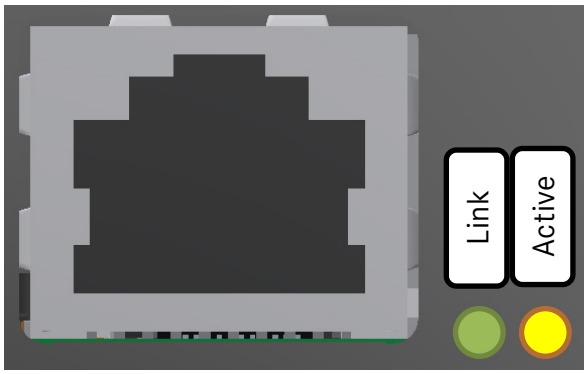


Figure 3: Ethernet connector with yellow and green LED

3.4.3 LEDs and DIP-switches

The FL3X Media 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

100/1000BASE-T1		
Green LED (Link) 100/1000 Mode	**Yellow LED (Active)**	**Description**
On/On	Off	The link is established, no data exchange occurring
On/On	Blinking	Data exchange is in progress
Off/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.

NOTICE

By changing 100/1000 Mode the connectors will perform a restart. All links will be disconnected for a moment

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.

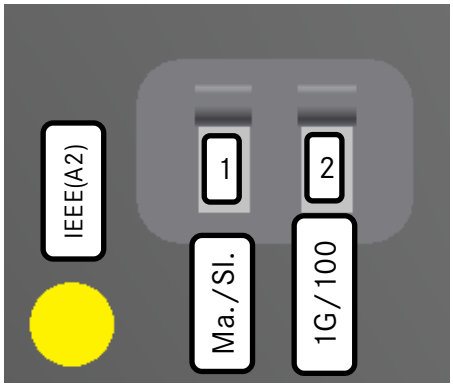


Figure 4: LED for IEEE(A2) (yellow) and the DIP-switches

3.4.4 1000BASE-T1 (D-Sub)

The FL3X Media 1000BASE-T1 support a 100/1000BASE-T1 interface.

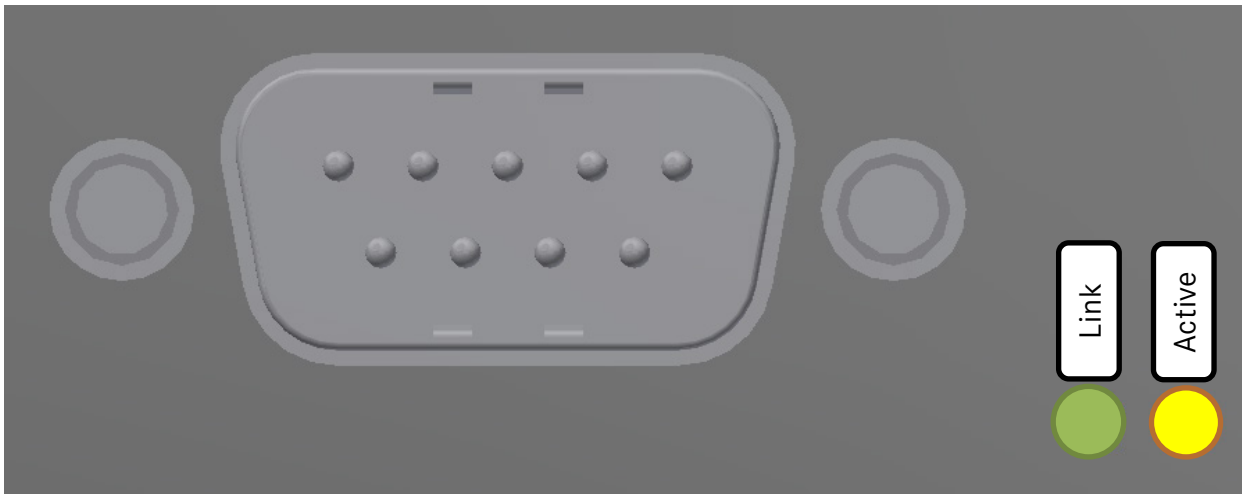


Figure 5: 1000BASE-T1 D-Sub connector with yellow and green LED

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 FL3X Media 1000BASE-T1:

NOTICE

Ensure that all signal lines connected to the FL3X Media 1000BASE-T1 are in the allowed range.

Be sure to connect all cables as described in this manual.

Never insert anything metallic into the openings of the FL3X Media 1000BASE-T1.

Ensure to grasp the plug and not the cable when disconnecting the FL3X Media 1000BASE-T1.

4.2 Configuration and Operation

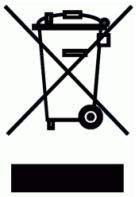
Use the power connector of the FL3X Media 1000BASE-T1 to connect with a power-supply within the correct voltage range.

Connect the 100/1000BASE-T1 and Ethernet (100BASE-TX or 1000BASE-T) 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

	Dispose off properly per regulations of the country where end-of-life occurs.

6 Troubleshooting

This chapter contains some frequently asked questions about the FL3X Media 1000BASE-T1.

1	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 on communication partner acts as ‘Master’ and one communication partner acts as ‘Slave’.

2	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 FL3X Media 1000BASE-T1

Product	Description	Ordering number
FL3X Media 1000BASE-T1	Media converter between 100/1000BASE-T1 and 100BASE-TX/1000BASE-T	3-V1000A01

7.2 Accessory Parts

Product	Description	Ordering number
Customer specific parts		Please contact *STAR ELECTRONICS GmbH & Co. KG*

7.3 Related Documents

Document	Description	Ordering number
-		

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 0.5MΩ/cm²), grounded through a ground cable (conductive cable from protected equipment to ground isolated through a 1MΩ 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 0.9MΩ and 1.5MΩ) 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

8.2.2 List of Tables

8.2.3 List of Figures

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