

1000BASE-T1 MEDIACONVERTER

USER MANUAL

March 2021

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1 GENERAL INFORMATION

1.1 Functionality and Features of the 1000BASE-T1 MediaConverter



Figure 1-1: 1000BASE-T1 MediaConverter

The **Technica Engineering 1000Base-T1 MediaConverter** converts the Standard 1000Base-T1 to the widely known 1000Base-T and vice versa. Data Transfer is full-duplex in both directions.

Additional to this it has the option to convert 100Base-TX to 100Base-T1 and vice versa. The mode configuration can be done very easily by DIP Switch.

1.1.1 Features

- 1 Port Gigabit Ethernet 1000 BaseT/ Fast Ethernet 100BASE-TX
- 1 Port 100/1000Base-T1 full-duplex on a single unshielded twisted pair.
- Automotive Tyco Nano MQS Connectors for 100/1000Base-T1 and Power Supply
- Robust steel case
- DIP Switches for easy configuration

1.1.2 General Information

Voltage requirement:	6,5 to 16 Volt DC (nominal 12 Volt DC)
Power consumption:	2 Watt
Weight:	0,25 kg
Size:	92 x 63 x 25 mm
International Protection:	IP 2 0
Operating Temperature:	-40 to +80 °Celsius

1.1.3 LINKS

The User can download the latest firmware and documentation for the 1000BASE-T1 MediaConverter here:

<https://technica-engineering.de/en/produkt/mediaconverter/>

1.1.4 General operating and safety strategy of Technica Engineering's Products

Technica Engineering's products are designed for operation in automotive systems and for supply voltages of nominal 12 V or 24 V. The applicable limit, values adhere to the standard norms for 12 V or 24 V automotive onboard power systems correspondingly and can be found in the mentioned norms.

Should Technica Engineering's products be operated in voltage ranges beyond those specified in the norms, which represents a breach of the conditions of operation, then this will void the product warranty and Technica Engineering will assume no liability whatsoever for the results and/or consequences thereof.

This is especially valid whenever the voltage level reaches or exceeds the limits of the low-voltage directive. In this case, damage to the devices cannot be excluded. Due to the manufacturing characteristics of the devices, there is no imminent fire hazard from the device itself, if the devices are being operated in an environment according to the conditions of use. A secondary fire hazard cannot be excluded, should those conditions not be met. Protection against overvoltage cannot be provided in such a breach of the conditions of use.




1.1.5 General design rules for the power supply of Technica Engineering's products






The power supply circuit of Technica Engineering's products is equipped with self-protection components. This automatic function protects the devices against excessive temperature and too high supply-voltage by switching the device off. This automatic switch-off function is independent of any software function.

The root cause of excessive temperature in the power supply circuit can eventually be due to a too high environment temperature or due to an internal failure of the device. In both cases, the automatic switch-off function will switch off the power supply from the device to avoid further damage.

The protection against too high supply-voltage protects the device even in case of an internal failure of the Technica Engineering device.

1.2 Warranty and Safety Information

	<p>Before operating the device, read this manual thoroughly and retain it for your reference.</p> <p>The latest documentation for the 1000BASE-T1 Media Converter can be downloaded here: https://technica-engineering.de/en/produkt/mediaconverter/</p>
	<p>Use the device only as described in this manual.</p> <p>Use only in dry conditions.</p> <p>Do not insert any foreign object in the slots/openings of the housing.</p> <p>Do not apply power to a damaged device.</p> <p>The device may only be used by specialists.</p>
	<p>Do not open the device. Otherwise, the warranty will be lost.</p>

	<p>This product is intended for use in automotive-test environments. An automotive-test environment includes test setups or test benches in the office, laboratory and workshop areas. In the test setups, the same environmental conditions apply as in-vehicle electrical systems. Technica Engineering products are not intended to be used as standard IT equipment. The test systems and products from Technica Engineering are designed as customer and application-specific test modules that are only used by specialists for the development and test facilities.</p> <p>When integrating the modules in a vehicle or test set-up, the user must ensure appropriate ventilation or air convection. Technica Engineering products must not be considered as a safety element out of context when using safety-critical systems and must be included in the safety assessment when used. The development class in a safety system must be taken into account with standard QM referred to ISO26262.</p>
	<p> The device can get hot.</p> <p>Do not cover the device due to fire danger. Do not place the device near highly flammable materials due to fire danger. Do not use the device above the specified operating temperature. The operating temperature is the ambient temperature of the installation space.</p>
	<p>This symbol is only valid in the European Union. If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal. Technica Engineering GmbH is registered as a manufacturer of the brand "Technica Engineering" and the device type "Small devices of Information- and Telecommunications- technology for exclusive use in non-private Households". WEEE reg. No. DE 20776859</p>
	<p>Please refer to CHAPTER 11 for the EU Declaration of Conformity following Directive 2014/30/EU.</p>

1.3 RoHS Certificate of Compliance

Technica Engineering's 1000BASE-T1 MediaConverter complies with RoHS (Restriction of Hazardous Substances Directive) Certificate of Compliance.

1.4 Scope of delivery

The delivery includes:

- 1x 1000BASE-T1 MediaConverter
- 1x 1m Ethernet Cable
- 1x Cable-set:
 - 1m twisted pair red/black cable, 0.35mm² (power cable)
 - 1m 100BASE-T1 twisted-pair green/white cable, 0.35mm² (data cable)
 - Banana Connectors 4mm for power cable
 - nanoMQS connector
 - crimp contacts

2 HARDWARE INTERFACES

2.1 Connectors

On the label on top of the device, you can see an overview of all HW-Interfaces of the 1000BASE-T1 MediaConverter.

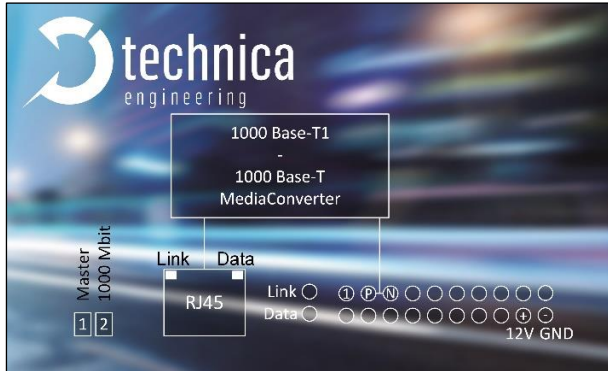


Figure 2-1: Label of 1000BASE-T1 MediaConverter with pinning information

2.1.1 nano-MQS Connector

The pinning of the ECU connectors is listed on the label on top of the device as well. (See [FIGURE 2-1](#)).

The Connector color is black.

The power supply for the device is supplied by pin 20 (Ground) and Pin 18 (12Volt). 100/1000Base T1 is connected to pin 3(positive) and pin 5 (negative)



If you apply a voltage higher than 18 Volts, the device will be damaged!

Pin	Function	Pin	Function
1	n.c.	11	n.c.
2	n.c.	12	n.c.
3	100/1000 BaseT1 Positive	13	n.c.
4	n.c.	14	n.c.
5	100/1000 BaseT1 Negative	15	n.c.
6	n.c.	16	n.c.
7	n.c.	17	n.c.
8	n.c.	18	Battery +12 Volt Input
9	n.c.	19	n.c.
10	n.c.	20	Battery Ground Input

Table 1: Pinning of black Nano MQS connector

The Tyco Electronics (TE) nano Micro Quad Lock System (nano-MQS) is used.



Name	Picture	Part Number
20POS NANOMQS REC HSG CODE A		2141404-1
NANOMQS RECEPTACLE TERMINAL		2-1703930-1

Table 2: Parts of nano-MQS connector

<http://www.te.com/usa-en/product-2141404-1.html>

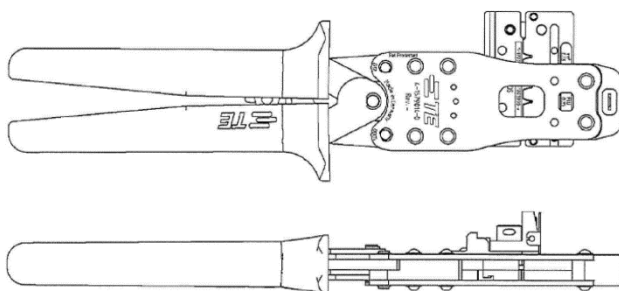
<http://www.te.com/usa-en/product-2-1703930-1.html>

<http://www.te.com/usa-en/product-4-1579014-0.html>

<http://de.farnell.com/te-connectivity/2-1703930-1/contact-socket-crimp/dp/2528666>

- i** You can use the official Tyco tool for these crimp contacts:
 TE CONNECTIVITY CS11K NANO-MQS, 0.13-0.35 SQ.M
 TE Internal Number: 4-1579014-0

Official Crimp Tool:



Name	TE CONNECTIVITY CS11K NANO-MQS, 0.13-0.35 SQ.M
TE Internal Number	4 -1579014 – 0
Distributor	Börsig GmbH www.boersig.com
Address	Siegmond-Loewe-Str. 5 74172 Neckarsulm

2.1.2 RJ45 Ethernet connectors

There is one RJ45 Standard Ethernet connector for Ethernet (BASE-T).

2.2 Other Interfaces

2.2.1 DIP-Switches

The 1000BASE-T1 MediaConverter has two DIP-Switches for configuration (see [CHAPTER 3](#)).

2.2.2 Status LEDs

The 1000BASE-T1 MediaConverter has two status LEDs at the front side of the case for the 1000BASE-T1 Port.

color	Description
Green	It is lit when there is a linkup on the BASE-T1 port.
Yellow	It is toggling if there is communication on the BASE-T1 port


Table 3: Status LEDs

3 CONFIGURATION OF THE DEVICE

The 1000BASE-T1 Media converter is configured by 2 DIP switches on the front of the device.

DIP-Switch	Status	Description
1	ON (up)	100/1000 BASE-T1 Port is set to Master
	OFF (down)	100/1000 BASE-T1 Port is set to Slave
2	ON (up)	The device is set to 1 Gbit Mode.
	OFF (down)	The device is set to 100 Mbit Mode.

Table 4: Configuration of DIP-Switches

-  In a 100/1000 BaseT1 System, one device must be set to Master, the other link partner must be set to Slave Mode.

4 1000BASE-T1 MediaConverter mode A0 and A2

Nowadays, when we speak about 1000BASE-T1 MediaConverter, we have to mention that there are two devices but with a small difference.

On one hand 1000BASE-T1 Media Converter HW 0.6 (TE- 1401). It works with a PHY A0 from Marvell (88Q2112) which is only compatible with PHY Z0, Z1 and A0 versions. However, when connecting to 1000BASE-T1 Transceivers of different vendors, no linkup is possible.

On the other hand, is 1000BASE-T1 Media Converter HW 0.7 (TE-1401-1). It is a “new” version of the TE-1401(TE-1401-1) and A2 PHY from Marvell, which has the following behavior:

- The device will always be initialized in “IEEE Compliant” mode after power-up (See [CHAPTER 7.1](#))
- If no link can be established within 40 ms, it will automatically change to “A0 Mode” (“Legacy Mode”)
- If within 40 ms no link can be established, it will switch back to “IEEE Compliant” mode (See [CHAPTER 7.1](#))
- This will repeat endlessly until Link-up can be established
- There is no need from the customer to make any configuration
- This will ensure, that the devices can work with new and existing 1000BASE-T1 devices

 Please see [CHAPTER 7.1](#) for disclaimer regarding Marvell IEEE Mode

5 COMPATIBILITY with other 1000BASE-T1 PHYs

5.1 HW variant 0.6 with Marvell A0 PHY

It works with all PHYs from Marvell which are older than A0. It is compatible with the following PHYs:

- Marvell PHY Z0
- Marvell PHY Z1
- Marvell PHY A0

i With 1000BASE-T1 transceivers from other vendors, no link-up will be possible. Because this PHY is not IEEE compliant (See [CHAPTER 7.1](#))

5.2 HW variant 0.7 with Marvell A2 PHY

5.2.1 And Marvell Script 1.10

The HW-Variant of our 1000BASE-T1 MediaConverter with A2 PHY and with serial numbers 19 at the beginning has the Marvell Script 1.10 integrated for the PHY. This script has the following behavior. It is a kind of auto-negotiation between IEEE Mode (See [CHAPTER 7.1](#)) and Legacy Mode:

- The device will always be initialized in “IEEE Compliant” mode after power-up (See [CHAPTER 7.1](#))
- If no link can be established within 40 ms, it will automatically change to “A0 Mode” (“Legacy Mode”)
- If within 40 ms no link can be established, it will switch back to IEEE Compliant mode (See [CHAPTER 7.1](#))
- This will be repeated endlessly until Link-up can be established
- There is no need from the customer to make any configuration
- This will ensure, that the devices can work with new and existing 1000BASE-T1 devices

i This behavior can cause a hangup. A power reset can solve the problem. An update to Script 1.20 for our device is possible.

i For communication with other Marvell PHYs also those PHYs need Script 1.10 or higher.

5.2.2 And Marvell Script 1.20

The HW-Variant of our 1000BASE-T1 MediaConverter with A2 PHY and with serial numbers 20 at the beginning has the Marvell Script 1.20 integrated for the PHY. This script has the following behavior:

- The device will always be initialized in “IEEE Compliant” mode after power-up (See [CHAPTER 7.1](#))
 - After startup, the script asks once the counterpart (by a request) if the counterpart PHY is set to Legacy Mode.
 - There is no need from the customer to make any configuration
 - This will ensure, that the devices can work with new and existing 1000BASE-T1 devices
-
- ❗ The response from a Marvell PHY to the request of legacy mode is working only if the script is at least 1.10 or higher. Older Scripts has no response implemented and the linkup will fail.

6 1000BASE-T1 Filter

The following 1000BASE-T1 Filter is used in the 1000BASE-T1 MediaConverter:
The Pulse AE5002 is used.

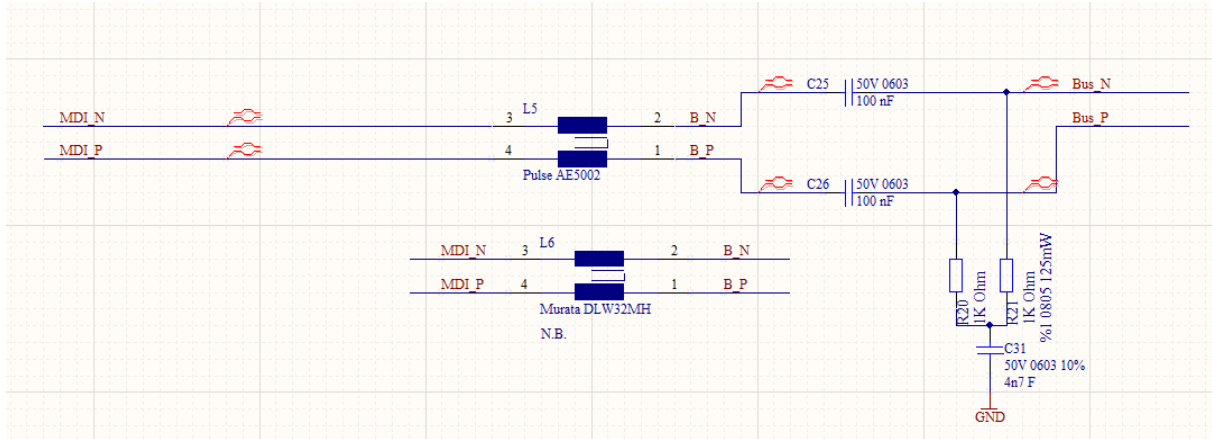


Figure 6-1: Used Filter in 1000BASE-T1 MediaConverter

7 ADDITIONAL INFORMATION

- ↻ The delay time is constant 2.0.us. of each byte.
- ↻ The 1000BASE-T1 MediaConverter_ is optimized for automotive use. The maximum cable length for 100/1000BASE-T1 segments is limited to 15 meters.

7.1 Disclaimer

The “**IEEE Compliant mode**” is defined by the chip vendor. Technica Engineering cannot be held responsible for the interoperability of this chip and hence the complete product with other devices if the interoperability issues are caused by the “**IEEE Compliant mode**”.

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9 CHANGELOG

Version	Chapter	Description	Date
	All	First release	
2.0	All	Second release	09.2018
2.1	4	New Chapter	07.2019
2.2	All	Bug Fixes and Chapter 4 reworked	03.2020
2.3	1.1.4	Added information on General Operating and Safety Strategy of Technica Engineering's Products	July 2020
	1.1.5	Added information on General Design Rules for the Power Supply of Technica Engineering's Products	
	1.2	Warranty and Safety Information updated	
	1.3	RoHS Certificate of Compliance added	
	11	Declaration of conformity added	
2.4	7.1	Disclaimer for Marvell IEEE Mode added	March 2021

10 CONTACT

If you have any questions regarding this product, please feel free to contact us:

Technica Engineering GmbH
Leopoldstr. 236
80807 München
Germany

Technical support:
support@technica-engineering.de

General information:
Info@technica-engineering.de

Most current user manuals and product information:
<https://technica-engineering.de/en/>

11 DECLARATION OF CONFORMITY

Български

С настоящото Technica Engineering GmbH декларира, че продуктът Модул за улавяне 1000BASE-T1 MediaConverter (TE-1401-1), е в съответствие с Директива 2014/30/ЕС. Цялостният текст на ЕС декларацията за съответствие може да се намери на следния интернет адрес:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Čeština

Tímto Technica Engineering GmbH prohlašuje, že produkt 1000BASE-T1 MediaConverter (TE-1401-1), je v souladu se směrnicí 2014/30/EU. Úplné znění EU prohlášení o shodě je k dispozici na této internetové adrese:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Dansk

Hermed erklærer Technica Engineering GmbH, at produktet 1000BASE-T1 MediaConverter (TE-1401-1), er i overensstemmelse med Direktiv 2014/30/EU. EU-overensstemmelseserklæringens fulde tekst kan findes på følgende internetadresse:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Deutsch

Hiermit erklärt Technica Engineering GmbH, dass das Produkt 1000BASE-T1 MediaConverter (TE-1401-1) die Richtlinie 2014/30/EU entspricht. Der vollständige Text der EU-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Eesti

Käesolevaga deklareerib Technica Engineering GmbH, et toode hõivamismoodul 1000BASE-T1 MediaConverter (TE-1401-1), vastab direktiivi 2014/30/EL nõuetele. ELi vastavusdeklaratsiooni tšilik tekst on kttesaadav järgmisel internetiaadressil:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

English

Hereby, Technica Engineering GmbH declares that the product 1000BASE-T1 MediaConverter (TE-1401-1), complies with Directive 2014/30/EU. The full text of the EU declaration of conformity is available at the following internet address:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Español

Por la presente, Technica Engineering GmbH declara que el producto 1000BASE-T1 MediaConverter (TE-1401-1), es conforme con la Directiva 2014/30/UE. El texto completo de la declaración UE de conformidad está disponible en la página web siguiente:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Ελληνικά

Με την παρούσα ο/η Technica Engineering GmbH, ότι το προϊόν 1000BASE-T1 MediaConverter (TE-1401-1), πληροί την οδηγία 2014/30/ΕΕ. Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Français

Le soussigné, Technica Engineering GmbH, déclare que le produit 1000BASE-T1 MediaConverter (TE-1401-1), est conforme la directive 2014/30/UE. Le texte complet de la déclaration UE de conformité est disponible l'adresse internet suivante:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Hrvatski

Technica Engineering GmbH ovime izjavljuje da je proizvod 1000BASE-T1 MediaConverter (TE-1401-1) u skladu s Direktivom 2014/30/EU. Cjeloviti tekst EU izjave o sukladnosti dostupan je na sljedećoj internetskoj adresi:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Italiano

Il fabbricante, Technica Engineering GmbH, dichiara che il prodotto 1000BASE-T1 MediaConverter (TE-1401-1), conforme alla direttiva 2014/30/UE. Il testo completo della dichiarazione di conformità UE disponibile al seguente indirizzo Internet:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Latviešu

Ar šo Technica Engineering GmbH deklarē, ka produkts 1000BASE-T1 MediaConverter (TE-1401-1), atbilst Direktīvai 2014/30/ES. Pilns ES atbilstības deklarācijas teksts ir pieejams šādā interneta vietnē:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Lietuvių

Aš, Technica Engineering GmbH, patvirtinu, kad produktas sugavimo modulis 1000BASE-T1 MediaConverter (TE-1401-1), atitinka Direktyvą 2014/30/ES. Visas ES atitikties deklaracijos tekstas prieinamas šiuo internet adresu:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Magyar

Technica Engineering GmbH igazolja, hogy a termék 1000BASE-T1 MediaConverter (TE-1401-1) a 2014/30/EU irányelvnek. Az EUMegfelelőségi nyilatkozat teljes szövege elérhető a következő internetes címen:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Malti

B'dan, Technica Engineering GmbH, niddikjara li l-prodott 1000BASE-T1 MediaConverter (TE-1401-1), huwa konformi madDirettiva 2014/30/UE. It-test kollu tad-dikjarazzjoni ta' konformit tal-UE huwa disponibbli f'dan l-indirizz talInternet li ġej:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Nederlands

Hierbij verklaar ik, Technica Engineering GmbH, dat het 1000BASE-T1 MediaConverter (TE-1401-1) product voldoet aan richtlijn 2014/30/EU. De volledige tekst van de

EUconformiteitsverklaring kan worden geraadpleegd op het volgende internetadres:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Polski

Technica Engineering GmbH niniejszym oświadcza, że produkt 1000BASE-T1 MediaConverter (TE-1401-1), jest zgodny z dyrektywą 2014/30/UE. Pełny tekst deklaracji zgodności I UE jest dostępny pod następującym adresem internetowym:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Português

O(a) abaixo assinado(a) Technica Engineering GmbH declara que o produto 1000BASE-T1 MediaConverter (TE-1401-1), está em conformidade com a Diretiva 2014/30/UE. O texto integral da declaração de conformidade está disponível no seguinte endereço de Internet:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Română

Prin prezenta Technica Engineering GmbH declară ca produsul 1000BASE-T1 MediaConverter (TE-1401-1), este în conformitate cu Directiva 2014/30/UE. Textul integral al declarației UE de conformitate este disponibil la următoarea adresă internet:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Slovensko

Technica Engineering GmbH potrjuje, da je izdelek 1000BASE-T1 MediaConverter (TE-1401-1), skladen z irektivo 2014/30/EU. Celotno besedilo izjave EU o skladnosti je na voljo na naslednjem spletnem naslovu:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>

Slovensky

Technica Engineering GmbH týmto vyhlasuje, že produkt 1000BASE-T1 MediaConverter (TE-1401-1), je v slade so smernicou 2014/30/EÚ. Úplné EÚ vyhlásenie o zhode je k dispozícii na tejto internetovej adrese:

<https://technica-engineering.de/wp-content/uploads/2018/06/1000base-t1-mediaconverter-1401-1-eu-declaration-of-conformity.pdf>