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User Manual

# Auto-Link-SPE-M

## 100BASE-T1 Media Converter



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## 1 Introduction

The 100BASE-T1 Media Converter easily connects 100BASE-T1 and 100BASE-TX (Fast Ethernet) networks. Using the USB interface, it supports reading and writing of the PHY settings of both network links, diagnostic and status information, and firmware update. Power can be supplied via the USB connector or via the main connector. The power supply seamlessly switches between both sources. The 100BASE-T1 master and slave roles can be assigned using a DIP switch. Moreover, the Media Converter features software controlled automatic role switch on the 100BASE-T1 link.

## 2 Technical Data

### 2.1 Features:

- 100BASE-T1 Port (Molex Mini50)
- 100BASE-TX Port (RJ45)
- Mini-USB Port (Firmware Update & Host Interface)
- Link/Activity LEDs for both LAN Ports
- Master/Slave Role Selection via DIP Switch
- Automatic Master/Slave Detection (Software Controlled)
- Automotive Cable Diagnostics for the T1 connection
  
- Power Supply Main Conn: DC V1: 6V – 28V; V2: 4.5V – 28V
- Power Supply USB: DC 5V
- Current Consumption: < 90mA @ 12V
- Dimensions: 77 x 75 x 29 mm
- Environmental Temperature: -40°C - +80°C
- Robust Aluminum Housing
- Suitable for in-vehicle use
  
- 100BASE-T1 PHY: Broadcom BCM89811
- 100BASE-TX PHY: Microchip KSZ8081

### 2.2 Changes in V2

- Updated 100BASE-T1 Frontend
- Improved input range of main power supply to 4.5V – 28V
- Improved main connector latch access

## 3 Scope of Delivery

- 100BASE-T1 Media Converter
- Main Connector Receptacle (Molex Mini50 8Pos)
- Terminals for Main Connector Receptacle (4x AWG22 + 4x AWG24)

## 4 Intended Purpose and Disclaimer

The 100BASE-T1 Media Converter is intended to be used for development and testing purposes in automotive or industrial areas.

It is not allowed to use the 100BASE-T1 Media Converter in series products.

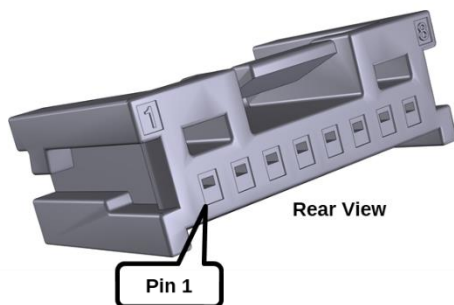
Warranty Exclusion: i-novative® GmbH does not take over any liability for damages resulting from the use of the 100BASE-T1 Media Converter.

## 5 Main Connector

### 5.1 Specification

	Description	Vendor	Part Number	Distributor	Distributor Number
<b>Connector</b>	MINI50 8Pos Receptacle	Molex	347910080	Digi-Key	WM9306-ND
<b>Terminals</b>	CTX50 Terminal L-Grip 22 AWG	Molex	5600230448	Digi-Key	WM16315CT-ND
	CTX50 Terminal M-Grip 24 AWG	Molex	5600230421	Digi-Key	WM8745CT-ND
	CTX50 Terminal S-Grip 26-30 AWG	Molex	5600230444	Digi-Key	WM25289CT-ND

### 5.2 Pin Assignment



Pin	Signal	Remark
1	Power	6V/4.5V-28V
2	Ground	
3		
4		
5	Data P	
6	Data N	
7		
8	Shield	

### 5.3 Cable Recommendation

	Description	Manufacturer	Structure	Jacket	Shield	AWG
<b>100BASE-T1</b>	Dacar 547	Leoni	2x0,13mm <sup>2</sup>	yes	no	AWG26
	Dacar 626	Leoni	2x0,14mm <sup>2</sup>	yes	no	AWG26
	Dacar 546	Leoni	2x0,35mm <sup>2</sup>	yes	no	AWG22
	Dacar 624	Leoni	2x0,35mm <sup>2</sup>	no	no	AWG22
	Dacar 617	Leoni	2x0,17mm <sup>2</sup>	no	no	AWG25
	FLR9Y-31Y	Kromberg & Schubert	2x0,35mm <sup>2</sup>	yes	no	AWG22
	FLKCUMgU9Y-9Y	Kromberg & Schubert	2x0,13mm <sup>2</sup>	yes	no	AWG26
	FLCUSNU9Y-31Y	Kromberg & Schubert	2x0,13mm <sup>2</sup>	yes	no	AWG26
<b>Power Supply</b>	FLRY 2x0,35-B RD/BL	Leoni	2x0,35mm <sup>2</sup>	no	no	AWG22
	FLRY-B 1x0,35 RD	Leoni	1x0,35mm <sup>2</sup>	no	no	AWG22
	FLRY-B 1x0,35 BL	Leoni	1x0,35mm <sup>2</sup>	no	no	AWG22

**Attention:** For proper operation of the 100BASE-T1 connection, only use cables an in-line connectors complying to "IEEE 802.3bw Clause 96.7" and OPEN ALLIANCE "IEEE 100BASE-T1 Definitions for Communication Channel".

## 6 Configuration

Using the DIP switches, you can configure the master / slave role and automatic role detection of the T1 port.



		DIP Switch			
		1	2	3	4
Setting	OFF	Slave	Fixed Role	not used	not used
	ON	Master	Auto Role	not used	not used

### 6.1 T1 Tole (DIP1)

DIP1 configures the T1 link role either to Master (ON) or Slave (OFF). If Auto Role Switch is active (DIP2=ON) it has no effect.

### 6.2 Auto Role Switch (DIP2)

DIP2 controls a proprietary Auto Role Switch function. When turned on, the Media Converter automatically determines the T1 link role (master or slave).

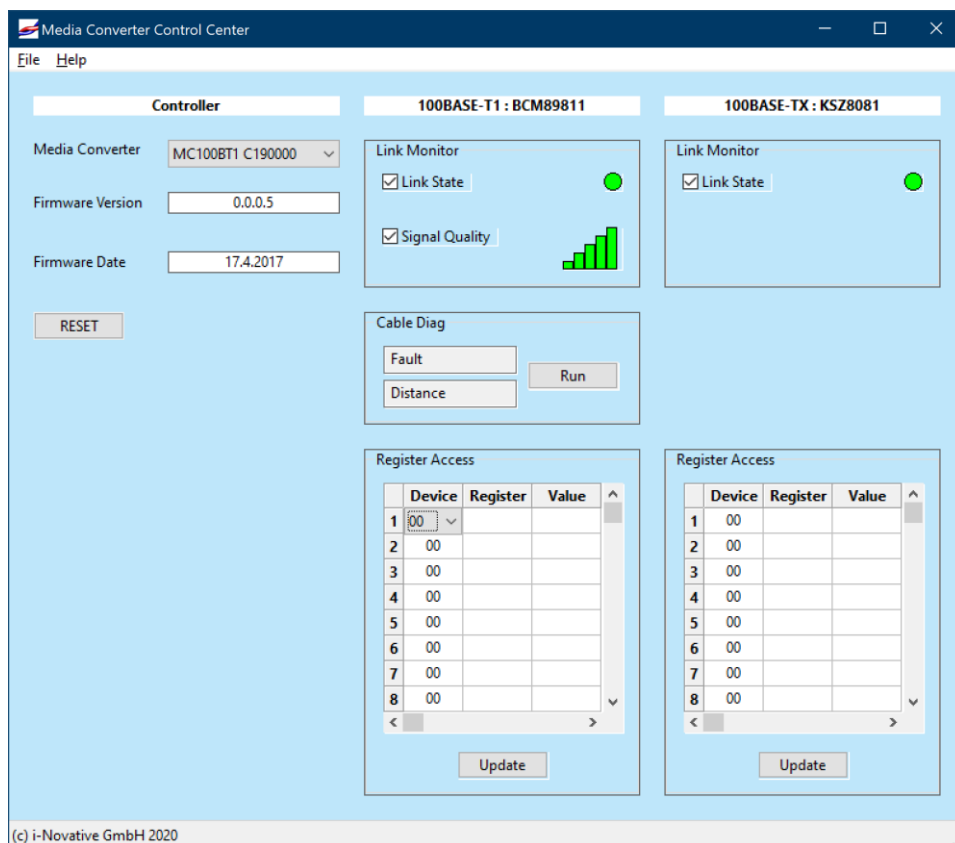
The Auto Role Switch feature can increase the link setup time.

Do not connect the T1 interfaces of two Media Converters with activated Auto Role Switch on both sides. This may prevent the link establishment.

## 7 Software

The graphical user interface is intended for remote monitoring and diagnostics. It can also be used for testing and development purposes since it provides direct access to the register sets of the integrated PHYs. It provides the following functions:

Controller	100BASE-T1 connection	100BASE-TX connection
<ul style="list-style-type: none"> <li>Media Converter Selection</li> <li>Firmware Information</li> <li>Device Reset</li> </ul>	<ul style="list-style-type: none"> <li>Link Status Monitoring</li> <li>Signal Quality Indicator (SQI) Monitoring</li> <li>Cable Diagnostics</li> <li>Read/Write Access to PHY registers</li> </ul>	<ul style="list-style-type: none"> <li>Link Status Monitoring</li> <li>Read/Write Access to PHY registers</li> </ul>



### 7.1 Controller Functions

If you have attached multiple Media Converters to the same host via the USB configuration port, you can connect the UI to a specific one using the drop-down list. The Media Converters are distinguished by their type and USB serial number.

When a Media converter is selected, its firmware revision and firmware date are read out and displayed in the respective fields.

Using the RESET button, the Media Converter is re-initialized to its default state.

## 7.2 T1 Functions

### Link Monitoring

The UI provides continuous monitoring of T1 link state and SQI (Signal Quality Indicator). Using the checkboxes, you can enable and disable the respective functions.

The bars of the SQI bar-graph represent the exact SQI values ranging from SQI=1 to SQI=5. SQI needs to be 1 or higher for proper operation of the link.

### Cable Diagnostics

Using the T1 PHY Automotive Cable Diagnostics, cable faults and their distance from the device can be detected. During the measurement, the link is broken. The distance measurement has a tolerance of  $\pm 1.5\text{m}$ . ACD can detect broken wires (OPEN) and intra-pair shorts (SHORT). In case of an INVALID result, try to repeat the measurement. PAIR BUSY indicates traffic on the pair. Turn off the link partner in order to get a valid result.

### Register Access

The Register Table allows to read and write PHY registers directly. Modifying the register settings can impact the Media Converter functionality. All changes are transient and are lost after resetting or power cycling the device. Please use this function only if you do have the required knowledge. The software prevents write access to registers which can impact the hardware configuration. For a documentation of the PHY registers contact the PHY vendor.

The Register Table is laid out for Clause 45 MDIO access. Since the integrated BCM89811 PHY does not support Clause 45 addressing, the Device address is used here to ease access to registers that need a specific access procedure.

Device	The values are preconfigured and be selected by right-clicking a respective field. 00: BroadR-Reach Registers access 1F: RDB Register access
Register	Is the PHY Register address relative to the block selected in the Device field. Entering a value and pressing ENTER or TAB will read the respective register.
Value	Represents a PHY register value that has been read entering the address data in the Device and Register fields. Entering a value in this field will result in a write operation to the respective register. Written values are read back and displayed for a validation of the write operation.

All entries are expected to be hexadecimal numbers.

## 7.3 TX Functions

The “legacy” Ethernet PHY supports Link State Monitoring and Register Access like the T1 PHY. Please refer to the previous section for a description.

The used KSZ8081 PHY does not support Clause 45 MDIO addressing or indirect register addressing. The Device address is set permanently to 0x00 and can be ignored.

## 8 Important Information

### 8.1 Packaging Ordinance

„Basically, manufacturers as well as distributors are obliged to ensure that sales packaging are in principle taken back after use by the end user and recycled or reused.“ (according § 4 Satz 1 VerpackVO). If you as a customer have problems with the disposal of packaging and shipping materials, please write an email to [info@i-novative.de](mailto:info@i-novative.de).

### 8.2 Recycling Reference and RoHS Compliance



Please note that parts of the products of i-novative<sup>®</sup> GmbH should be submitted to recycle deposits not disposed of with household waste (i.e. circuit boards, power supply, etc.).

i-novative<sup>®</sup> products are RoHS compliant (RoHS = Restriction of the use of certain hazardous substances; dt. „Restriction of use certain dangerous substances“).

### 8.3 CE Marking

The i-novative 100BASE-T1 Media Converter has the CE mark.



This device complies with the requirements of EU Directive: 89/336 / EC Directive on electromagnetic compatibility and the mutual recognition of their conformity. Conformity with the o.a. directive is confirmed by the CE mark.

## 9 Manufacturer and Support

i-novative<sup>®</sup> is a registered trademark of i-novative<sup>®</sup> GmbH. If you have questions concerning our product, please contact us:

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## 10 Warranty

Within the warranty period, we eliminate manufacturing and material defects free of charge. For warranty issues please contact us via E-Mail: [support@i-novative.de](mailto:support@i-novative.de).