



Instruction and User Manual

WST.TE.HDTV

 **LEMO** 3K.93C SMPTE Hybrid Cable Checker Set



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INTRODUCTION

The WST.3K.93C TESTER set consists of SMPTE cable measuring unit and SMPTE loopback. The hybrid cable checker is designed for testing attenuation in optical fiber and the continuity of copper wires in hybrid cables. It combines an optical light source, an optical detector, and a copper wires checker.

It is ideal for testing the longest connection of SMPTE Hybrid connectivity for Broadcast Infrastructure Networks. The ruggedized aluminium case makes the unit ideal for field operation. The rechargeable lithium battery ensures long-term working.

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FEATURES

- Hybrid cables – fiber optic and Cu pairs checking
- Ruggedized aluminium case
- Available with display
- Automatic operation check of all fiber and wires
- Able to detect incorrect fiber and wire connection, disconnection, and short circuit connection
- Built-in charger, battery status indicator
- Equipped with necessary device connectors cleaning tools
- Easy to use

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APPLICATION

- Broadcast Infrastructure networks connectivity checking
- Camera Cable of HDTV system

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ACCESSORIES

- Carrying case
- Power charging adaptor
- USB Cable
- Manual
- Cleaning Instructions
- LEMO Fiber Optic One-Click Cleaner (DCS.F2.N02.PA)
- LEMO Alignment Device Tool (DCS.F2.035.PN)
- LEMO Cleaning Kit (WST.KI.125.34)

Optical Light Source:		Note:
Wavelength	1310 nm	typ. value
Output power	-6.0 dBm	typ. value
Optical Power Meter:		
Photodetector	1 mm InGaAs	
Working wavelengths	1310	can be customized
Resolution	0.01	
Dynamic range	-40 dBm to +5 dBm	
General specifications:		
Dimensions	150 x 45 x 45 mm 65 x 45 x 45 mm 330 x 250 95 mm	measuring unit loopback case without connectors without connectors
Weight	1.9 kg	complete set with case
Temperature operating storage Humidity (non-condensing)	-10 to +50 °C -40 to +70 °C 0 to 95%	
IP rating	IP 54	
Battery working time	> 20 hrs	between battery charging

Electrical wires checking:

- Electrical wires continuity
- Short circuit
- Isolation
- Electrical contacts – pins interconnection

The LEMO WST.TE.HDTV Light source complies with the following safety classifications:

- IEC825-1
- 21CFR1040: Class1

This applies to laser and LED options up to 1 mW, above 700 nm. Devices in this category are classified as safe for use by technicians under normal viewing, provided that magnifying devices are not used.

WARNING!

It is the responsibility of the user to acquire adequate training and familiarity with the relevant safety issues and work practices before using this equipment.

The LEMO WST.TE.HDTV hybrid cable checker does not emit optical power and does not create any hazards to the user.

To ensure a high level of operator safety during installation, commissioning and operating the equipment, as well as ensuring that the equipment remains undamaged, it is necessary to know the following general warnings and recommendations:

- Never use magnifying devices to inspect optical fiber ends unless you are certain that no optical power is being emitted.
- Only use magnifying devices with a built-in infra-red filter to ensure safety.
- During operation, testing or maintenance of a fiber optic system, never look into an active fiber optic cable. Infrared radiation may be present, which can result in permanent eye damage.
- Avoid direct exposure to the beam.
- Do not activate the laser when there is no fiber attached to the optical output connector.

- Optical connectors must be clean. If the connectors are not perfectly clean then clean them by following the procedure described in the technical specification for the relevant connectors.
- Use only the equivalent connector types to those built into the instrument to avoid damage to the instrument components.
- Under no circumstances should you look into the end of an optical cable attached to the optical output when the device is operational. Laser radiation can seriously damage your eyesight.
- Installation, commissioning, operation and service of equipment with high power levels must only be carried out by an authorised person.

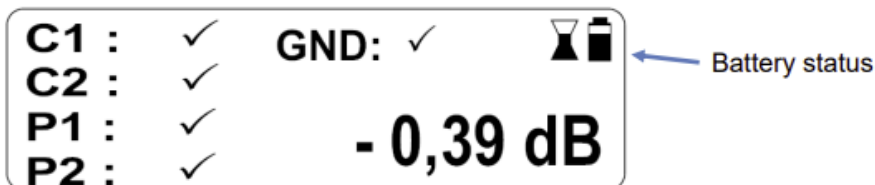
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MAINTENANCE

7.1 Battery Maintenance

The LEMO WST.TE.HDTV is equipped with a built-in charger and is powered by a Li-Pol battery.

- Charging – via USB port (PC) or by using an external USB power charging adaptor.
- Fully charge the batteries before using the LEMO WST.TE.HDTV for the first time.
- Use only the supplied USB power charging adapter.
- Charging is not recommended until the battery status indicator is 30% or less.
- Fully charge the batteries before storing the tester for a long period. The batteries will lose capacity during storage.
- If the LEMO WST.TE.HDTV will not be used for a long time, charge the batteries once every six months.
- The batteries are consumable. Repeated charging and discharging reduces the batteries' lifetime.
- To extend the batteries' lifetime it is recommended that they are completely drained before re-charging – battery refresh.



7.2 Instrument Maintenance

- During storage and transport keep the instrument in its carry case to protect against crushing, vibration, dust and moisture.
- Where possible, keep the instrument away from strong sunlight.
- Clean the instrument housing using alcohol or other cleaning agents. Acetone or other active solvents may damage the case.
- The instrument is resistant to normal dust and moisture; however, it is not waterproof. If moisture gets into the instrument, dry it out carefully before using it again.

7.3 Optical Connector Cleaning

- **All fiber optic connectors end faces must be cleaned before testing.**
- Clean all connectors, adapters, and attenuators before making any connections.
- Cleanliness will affect the performance of an optical fiber system.

Use appropriate optical cleaning supplies to keep connectors and adaptors free from contamination.

The following cleaning materials are recommended and should form part of your cleaning kit:

LEMO DCS.F2.N02.PA
LEMO DCS.F2.035.PN
LEMO WST.KI.125.34

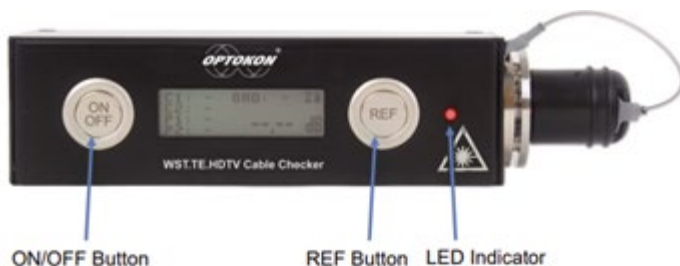
Fiber Optic One-Click Cleaner
Alignment Device Tool
Cleaning Kit for F2 Contact

All are included in the set; 3K.93C Connectors Cleaning Procedure on Page 15.



Hard case for LEMO WST.TE.HDTV Cable checker storage and transportation

8 INSTRUMENT AND BUTTON FUNCTION DESCRIPTION



LEMO WST.TE.HDTV SMPTE main unit, front view



LEMO WST.TE.HDTV SMPTE loopback



Top view, main unit

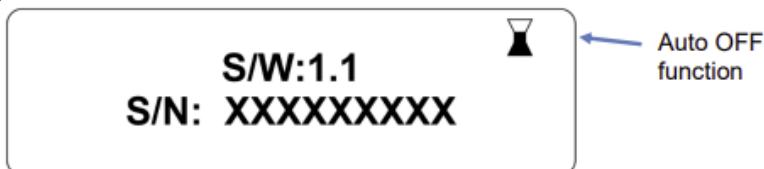


Top view, loopback

[ON/OFF]

Short press the ON/OFF button to turn the unit on.

After switching on, the type of device, serial number and firmware version will be displayed:



Long press the ON/OFF button during switching ON will cancel the Auto OFF function; the device stays in operation status until is switched OFF.

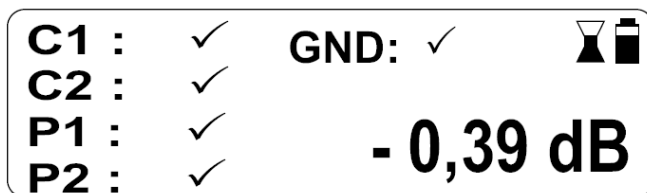
Short press to turn the unit off.

The screen shows the green LED value and goes down:


9.1 Initial Parameters Setting

Switch ON the checker

After 1 second the screen goes to Menu #1:



The checker is in relative mode measurement; relative optical power against the last reference value is displayed

New reference settings:

Connect the loopback to the Main unit as shown below.

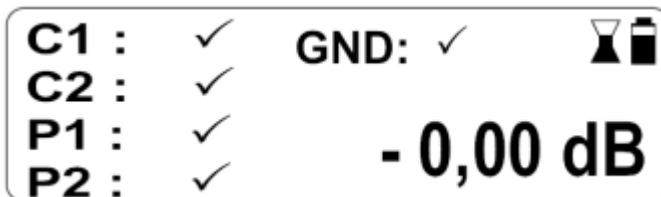


Press REF button:



Confirm the new reference value by pressing the REF button again.

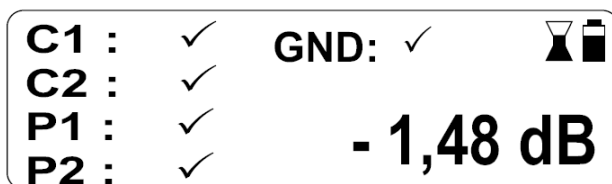
The new reference is set:



After the reference is set, disconnect the loopback from the main unit. The checker is then prepared for hybrid fiber optic and copper wires cable checking.

- Connect the main unit to one side and the loopback to the end of the cable for checking.
- The checker displays the optical fiber attenuation and the status of the copper wires.

Example of the results screen shown below.



9.2 Hybrid Cable Checking Evaluation

The measured Fiber Insertion Loss (IL) value is displayed on the checker screen and it includes fiber attenuation and loss at the fiber connectors.

Copper Wires Status Indicators	
Display	Remarks
✓	OK, normal operation status
!	Warning, parameters are close to the limits
X	Failure, wire is disconnected, short circuit or polarity problem

Summary Hybrid Cable Status	
Display	Remarks
Green Color	OK normal operational status
Orange Color	Warning: fiber out of limit, wires OK, copper wires problem, fiber OK
Red Color	Failure: copper wires problem or optical fiber Insertion Loss is out of limit

9.3 Insertion Loss Recommended Limit Setting for SMPTE Camera Cables

To assure the correct operation of SMPTE Hybrid camera cables, the recommended insertion loss value is up to 2 dB.

To set the insertion loss limit for LEMO WST.TE.HDTV, please follow the following.

1. Switch ON the checker with the ON/OFF button.
2. Short press the ON/OFF button to switch the checker into the mode.



**LEMO.COM
GREEN LED 39dB**

The display is showing the last set value.

3. Within 1 second, press the ON/OFF button again.

To set the tens value, press the REF button; recommended tens value is 0 for LEMO SMPTE Hybrid camera cables.



GREEN LED 39dB

The arrow shows the value of tens dB to be changed.

4. Press the ON/OFF button again, the arrow moves to units dB; change it again by pressing the REF button recommended tens value is 2 for LEMO SMPTE Hybrid camera cables.



The arrow shows the value of units dB to be changed.

5. After the required dB value is set, press the ON/OFF button to move to the operational status.

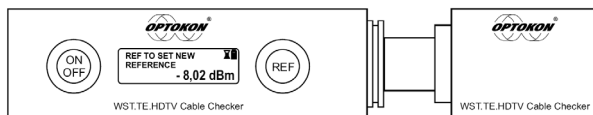
Important

- All connectors' fiber end faces for the measured camera cable assembly and the cable checker itself should be cleaned before testing. (refer to Item 11, Page 15).
- It is essential that the connections are not disturbed after the reference value is established.

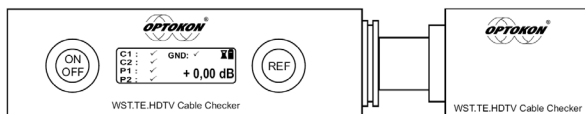
10.1 LEMO SMPTE Cable Checking

Step 1. Reference setting

Connect the main unit to the loopback unit
Use the buttons according to the description in 9.1.2

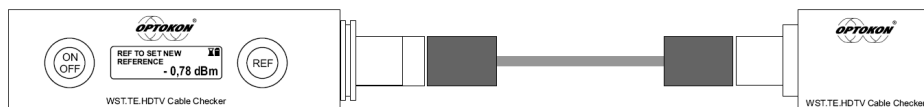


and set the display to the 0.00 dB



Step 2. Cable Checki

Disconnect the loopback unit from the main unit.
Connect the camera cable you want to check between the main unit and the loopback.

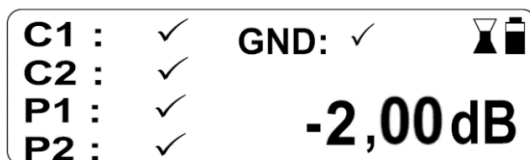


The display will indicate the relative optical power value at optical fiber loop and the status of the Cu wires.

LED color enables quick check of both, fiber and copper wires, see description in 9.2.

The fiber limits might be set according to the procedure in 9.3

If the display gives check indicators in all parameters and insertion loss value displayed is less than or equal to 2 dB - as shown below, then, your cable assembly is ready for operation.



Else, you are advised to check with the LEMO Video Inspector (WST.FB.CI1.10US2) and clean the contacts, as necessary. Then, perform the measurement steps, again.

11 LEMO 3K.93C CONNECTORS CLEANING PROCEDURE

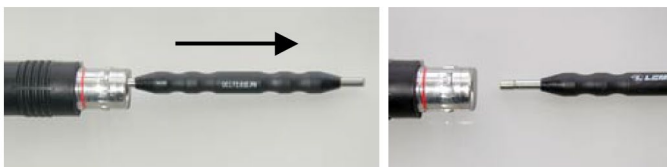
The FXW, FUW, FMW are LEMO SMPTE Male connectors having female F2 fiber optic contacts.

The EDW, PUW, PMW are LEMO SMPTE female connectors having male F2 fiber optic contacts.

Step 1. **Expose the Ferrule.**

For Male F2 contact cleaning,

- First, using the LEMO Alignment Device Tool DCS.F2.035.PN (A special tool provided by LEMO), remove the alignment sleeve to properly expose the ferrule.
- Working from the front of the connector, screw one of the internally threaded ends of the Alignment Device Tool onto one of the F2 alignment devices and, with a firm pulling action, remove it from the contact.



Pulling motion for alignment device

It exposes the end faces of the connector and the ferrule itself.
And it is now ready for inspection.

Step 2. **Inspect the Ferrule.**

Use the LEMO Video Inspector (WST.FB.CI1.10US2). the LCD will display the image of the inside ferrule for you to know if it needs cleaning before checking its operability.



Video Image of Clean and Dirty Ferrules

If as seen in the monitor, your contacts are unclean,

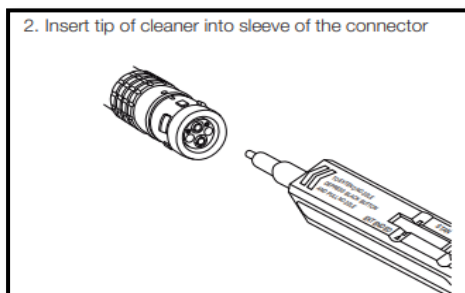
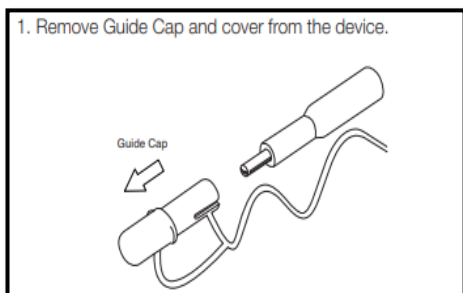
Step 3. **Contact Cleaning**

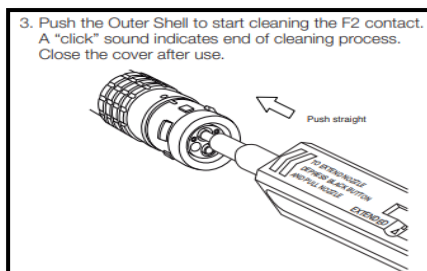
Get LEMO Fiber Optic One Click Cleaner (DCS.F2.N02.PA) to clean the ferrule end faces of LEMO's fiber optic F2 contacts.

Note:

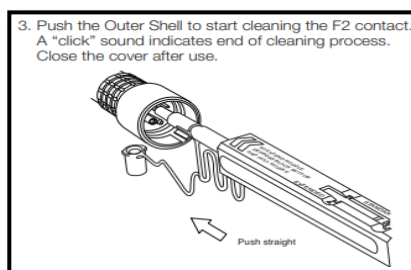
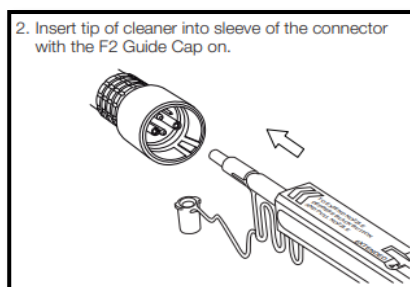
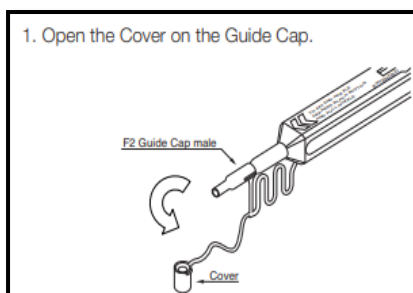
Be careful not to slant the DCS.F2.N02.PA while inserting into the adapter. Do not overly exert force during insertion as this may cause damage to both the connector and the DCS.F2.N02.PA Cleaner. If pushing Outer Shell is inhibited, remove DCS.F2.N02.PA from adapter and ensure that there is no sizeable debris inhibiting the cleaning process.

The FXW, FUW, FMW are LEMO SMPTE Male connectors having female F2 fiber optic contacts.



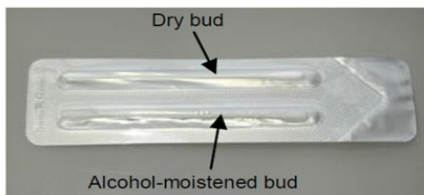


The EDW, PUW, PMW are LEMO SMPTE female connectors having male F2 fiber optic contacts.



Step 7 Cleaning with the wet and dry buds.

Get ready the LEMO Cleaning kit F2 contact (WST.KI.125.34).



Peel open the backing foil from the blister pack to release the two cotton buds inside. Select the alcohol-moistened bud.



Clean the ceramic ferrule by applying the alcohol damped end of the cotton bud to the ferrule end face and gently wiping it across the end face.

Select the dry cotton bud and using one end of it, apply to the ferrule face and gently wipe across it. This will thoroughly dry the ferrule. Use a cotton bud end once only as they are quickly contaminated.



Step 8 **Putting back alignment sleeve.**

Refit the alignment device tool by positioning it over the ferrule with a firm push engage it onto the ferrule body with an audible “click”, then unscrew the tool.



*Finally, be sure to clean all fiber optic contact in every connector.
Then, reperform inspection through the LEMO Video Inspector
(WST.FB.CI1.10US2) The LCD will display the image of the inside ferrule.*

*Be sure that all the F2 contacts of your connector is displaying the below
shown results.*



*Now, the SMPTE Hybrid Fiber Optic connector/cable assembly is now ready to
be evaluated through the LEMO SMPTE Cable Checker set.*