FRACTURE TECHNOLOGY

DV-EN2 | DV-40K

DCPD Amplifier System

User Manual

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Fracture Technology | Hatfield, PA

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LABORATORY TESTING INC.
An LTI owned and operated company

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Technical Support

This manual is written and supplied by Fracture Technology. For any questions or comments please contact Fracture Technology via e-mail at FTAsupport@labtesting.com. Additional information may also be obtained via the Fracture Technology website at www.fracturetech.com.

Be Vigilant About Safety

Before you use your Fracture Technology product please read and understand the safety information provided with your system. Improper installation, operation or maintenance can result in damaging the system, cause severe personal injury or death and/or damage your equipment or test specimen(s). Before applying power, verify that the power input is in the range 110 - 240V and all safety precautions are taken. It is very important that you understand the safety hazards of your system, especially when dealing with live electrical current.

The power cable shall be inserted only in a power outlet socket that is provided with a protective earth contact. Any interruptions or disconnection from the protective earth terminal may cause a potential shock hazard that could result in personal injury or death.

Ensure that the power is turned off before connecting cables to the system; connecting cables with the power applied can cause damage to the system.

Warranty

The DV-EN2 | DV-40K DCPD amplifier system is provided with a 1-year warranty. Please contact FTAsupport@labtesting.com for any warranty claims. When contacting Fracture Technology, please provide the serial number of the hardware, and the specific issue. Any return shipping is the responsibility of the customer.

User Serviceable Parts

There are no user serviceable parts within this equipment and opening the system will void the warranty. Only qualified service personnel from Fracture Technology can replace components or perform any internal testing or adjustments. Operating personnel are not allowed to remove or modify parts of the instrument. Do not attempt internal service or adjustment. Never attempt to modify or replace components with the power cable connected. In case of a malfunction please contact Fracture Technology for service and repair. For cleaning the system use a dry cloth on the outside of the enclosure. Any use of chemicals or alcohols can damage the surface or the system finish. Should there be any dust inside the system, use only low air pressure for removing the dust.

Airflow

It is very important that the system has adequate ventilation in order to maintain the system in the operating temperature range. For proper ventilation, allow 2 inches of clear space on all sides of the chassis.

Introduction and Layout

The DV-EN2 | DV-40K DCPD Amplifier System is a low-noise floating differential amplifier system for use with DCPD systems for crack length measurement with user selectable gains of 500, 1k, 2k, 5k, 10k, 20k, and 40k. The amplifier system was specifically designed as an extremely stable amplifier for direct current potential difference (DCPD) systems used for measuring crack length in metallic test specimens tested for fatigue crack growth or fracture toughness tests. The system consists of an DV-EN2 amplifier enclosure and ships standard with two (2) DV-40K amplifier modules. The system is compact at only 8.9 inches wide by 9.5 inches deep and can be mounted into a half-rack mount. The layout of the amplifier system is straightforward and intuitive for DCPD testing, as shown in the following component identification diagrams.

DV-EN2 | DV-40K Component Identification (Front View)

DV-EN2 | DV-40K Component Identification (Rear View)

Basic Setup Procedure

To avoid any ground loops, the chassis ground on the rear of the system should be connected to the DCPD power supply chassis ground and ADwin chassis ground (if utilized in the system). Turn on the amplifier by switching on the main switch at the back of the instrument. The blue LED on the front will indicate the system is powered on. During the set-up phase a boot screen with be momentarily displayed with the firmware version and then the amplifier will go into standby mode. Pressing the ADJ button once for a given amplifier will activate the amplifier. This need to be performed for each amplifier module that is desired to be used.

The DV-EN2 | DV-40K system provides for a very straightforward setup and operation. On the rear panel, simply connect the supplied M12 PD input signal cable to the test specimen. It is highly recommended that only the PD signal cable shipped with the system or otherwise sold by Fracture Technology be used as the cable is specifically designed and shielded for sensitive PD measurements.

The ADJ knob is rotated to select the desired gain, either 500, 1k, 2k, 5k, 10k, 20k, 40k, or 60k. The primary display will provide the Low-Pass Filter setting, the Gain setting, and the instantaneous output. This output value may be utilized to verify the input signals on the data acquisition system, and to troubleshoot setup issues.

The amplifiers can be auto-zeroed individually or all at the same time. This eliminates any offset that may be inherent to the amplifier prior to utilizing the amplifier for crack length measurements. The Auto-Zero should be activated with all of the current and PD leads connected to the full system, but with the current output turned off.

There rear of the system has two connections for each amplifier module: one M12 connection for the raw PD signal input and one standard BNC connection for the amplified signal output. The amplifier system is actively amplifying the signal at all times unless the amplifier is placed into sleep mode.

System Locking and Sleep Mode

A system lock mode is available by pressing and holding the ADJ button on the front panel for three seconds. When this is done, an options menu is available that allows the operator to place the system into Lock Mode or Sleep Mode. The Lock Mode will prevent accidentally changing values during a test. When the system is locked,

the user will see LOCKED on the main display. The Sleep Mode is useful for when the given amplifier channel is not being used for a test, and the user wishes to deactivate the display.

Overrange

If the output signal exceeds 9.5V, the user is provided a warning of signal overload on the main system display, and the screen will turn red. This warning is provided at 9.5V so that the user has some opportunity to adjust the gain prior to reaching 10V, which is the typical limit of 0 - 10V data acquisition systems (such as the ADwin) used in DCPD testing. The amplifier will work up to 10V output signal without damage.

Low-Pass Filter (LPF)

An analog low-pass filter (LPF) is provided on the output signal. To enable the LPF, simply rotate the designated knob on the back of the system. The settings for the filter are OFF, 50, 300 and 1000 Hz. It is recommended to set the filter to 50Hz for most DCPD applications. An oscilloscope or other data acquisition device can be utilized to determine the optimum filter setting for the given testing application. The LPF setting will be displayed on the main display.

PD Signal Input

Pin 1 – Signal Input (+)
Pin 2 – Signal Input (-)
Pin 4 - Cable Shield Ground Connection

The signal is floating and are not connected to any ground. In case the user has not connected an input signal then the amplifier can go into overload.

Manufacturing and IP

The DV-EN2 | DV-40K amplifier system utilizes technology from VectorForce Technologies (VFT) on behalf of Fracture Technology. All equipment is manufactured in Germany by VFT.

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