

- High-performance and RUGGED, 2k channels.
- Available as a complete package including integrated probe.
- DIGITALLY stable: consistent answers for long counts, changing count-rates and temperatures.
- Operates WITHOUT an attached PC.
- Built-in backlit LCD display and control keypad — Live display of acquiring data.
- Nuclide ID and activity calculation for nine Regions of Interest (ROI).
- Fits in the palm of your hand or hangs from your belt.
- Holds >150 2k channel spectra in internal memory.
- Battery life >9 hours.
- Only 860 grams, excluding batteries.

The ORTEC digiDART-LF is a high performance Multichannel Analyzer for use with NaI(Tl) detectors and modern scintillators such as lanthanum halides. It has been carefully engineered to perform the most demanding real world, PORTABLE gamma-ray spectroscopy applications. The digiDART-LF is an advanced, all-digital design, incorporating three ORTEC-held patents.<sup>1</sup>

### digIDART-LF. . . Tough, Yet Light

Weighing less than 860 grams, the digiDART-LF is an attractive, light-weight instrument; easy to handle, and RUGGED. The case is molded ABS — the same strong plastic used extensively in automobiles. The outside is coated with a shock-absorbing, easy-grip, stay-clean coating — just like your other tools. The display and keypad are recessed to protect them if the instrument is dropped. The connectors are all on one side and recessed for protection. The battery is inside — again for added protection and covered with a splash-proof door. It can be charged in place, even when the digiDART-LF is operating. The battery is truly integrated into the rugged digiDART-LF and not simply clipped on the back panel; exposed and easy to break. Changing the battery is simple: just open the door and replace.

### digIDART-LF Display and Keypad

Naturally, the digiDART-LF is entirely computer controllable; but with the built-in display and numeric keypad, it is a DRAMATIC advance from the current generation of portable MCAs. This high-quality display and easy to use keypad mean it can perform a variety of tasks without an attached PC.

For in-field applications, a PC is difficult to carry and operate, but without a display you can't see the spectrum or results. The digiDART-LF's built-in, backlit LCD display panel and keypad provide the confidence you need that your data is good. A clear spectral display is provided and start/stop control is accomplished simply by a single keypad entry.

The spectral display of the digiDART-LF is patterned after ORTEC's very successful MAESTRO-32 MCA Emulator (ask for the MAESTRO-32 brochure), in use on thousands of systems worldwide. A 240 x 160 pixel LCD display allows the user to monitor acquisitions and instrument settings status, with no attached PC. It features a live spectral display with region of interest, peak information and online activity calculations. ROIs are shown as a bar below the spectrum.

### Real Time Activity Calculations. . . NO PC Required!

DigiDART-LF can also perform nuclide ID and activity calculations using internally stored calibration information, at the touch of a button, and all without the use of an attached PC. Everything is user controlled: the library for analysis, displayed peak labels, unit labels and calibration parameters. They are all easily downloaded by MAESTRO-32 to the digiDART-LF, but they can be changed in-field to adapt to your changing needs. Activity is calculated for a list of up to 9 nuclides. The spectral data can be saved and later re-analyzed in more detail using a more sophisticated PC-based analysis package such as ScintiVision-32.



<sup>1</sup>U.S. Patents No's. 5,821,533; 5,872,363 and 5,912,825

# digiDART-LF™

## Portable “SMART” MCA for NaI(Tl), LaBr and other Scintillation Detectors

### Operator Menus

All of the digiDART-LF screens and operations are set using the keypad and the display. The operation is simple — select what you want from the displayed list by number and the Enter key. The main groups are: View Status, Enter ID, Nuclide ROI contents, Peak Info, Select ROIs, Select Status contents, Adjust controls, general settings and View memory contents. The complete list of all functions is given in the specification section.

Using the keypad and the display, the MCA settings can be verified or changed in the field without a host computer.

### Protection

Protection of the data is important, so the menus have password protection. The operations are separated into two groups: USER and ADMINISTRATOR. The USER password protects the instrument from unauthorized use. That is, you can protect your data stored in the internal memory. The ADMIN or Setup functions are protected by a different administrator password. The ADMIN functions can only be changed by the Administrator ensuring that your results are based on the correct parameters.

### System Specifications

**Display:** 240 x 160 pixel backlit LCD provides LIVE spectral display, status information and analysis results.

**Full Display and Zoom Modes:** Display of multiple ROIs.

**Status Line:** User-configurable parameter display. Choice of two from: cursor energy, location, live time, live time remaining, real time remaining, battery life remaining, Count rate, Count rate in ROI, counts.

The spectral display may be disabled from an attached computer using an administrator function.

**Energy Calibration:** Two point energy calibration of channel and FWHM.

**On Line Activity Calculation:** Activity and uncertainty are calculated and reported on screen, online for up to 9 user-defined regions. Activity is calculated as net count-rate divided by user supplied efficiency factor.

**Presets:** Live time, real time, integral peak count, peak count, uncertainty and Multi-Nuclide MDA. Up to 20 nuclide ROIs may be specified. Acquisition halts when all MDA requirements have been satisfied. Real/Live Time in multiples of 1 sec.

**Keypad:** 20 numeric and function keys. Many of the digiDART-LF function keys are multi-function. The precise function depends on the context at the time the key is pushed.

When the unit is connected to a computer via the USB, the keypad is locked out.

#### Menu Functions

Pressing the Menu button while a spectrum is displayed brings up the Main Menu.

#### Main Menu Options

**View Status:** Displays all of the major MCA settings, including: Live time, Real time, Dead time, Battery voltage, Bias voltage, Fine gain, Coarse gain, Rise time, Flat top, Baseline restore [BLR] setting.

**Enter ID:** Entry dialog for a numerical ID included with the spectrum.

**Nuclide ROIs:** View the nuclide report and the setup menu for the Nuclide Report. The following are entered for each of the 9

ROIs: ACTIVE/DISABLED, Label (text), Units (text), Start Channel, number of channels, area multiplier, Clear this ROI, Show these settings.

**Status Line:** Setup the Status Line at the top of the spectrum display to show any two of the following parameters: Cursor location (energy), Cursor location (channel), Live time, Real time, Live time remaining, Real time remaining, Battery time remaining, Count rate, Count rate in ROI, Counts in marker channel.

**Peak Info:** Displays the centroid, FWHM, net counts and gross counts for the region identified by the marker position. Access is denied when spectrum display is locked.

**Adjust Controls:** Displays dialog for the following:

HV Settings (DIM-POSNAI only): View and set the following: enable HV, Set Bias Voltage, and HV value.

Amplifier Settings: View and set the following: Coarse Gain, Fine Gain, Rise Time, Flat Top, Pole Zero, Baseline Restore, Optimize, Preamp Type, and Input Polarity.

Preset Settings: View and set the following: Live Time Preset, Real Time Preset, ROI Integral Preset, ROI Peak Preset, Uncertainty Preset, and MDA Presets.

ADC Settings: Set the Conversion Gain, LLD, ULD, and gate.

Stabilization Settings: Enable, view and setup the Gain and Zero stabilizers.

#### General Settings

Change User Password  
Change Admin Password  
Enter Password  
Lock Spectral Display  
Auto-Contrast: Enable or Disable  
Calibrate: Enter or view the Calibration  
Display

Adjust vertical scale to Auto, Log, or Normal  
Set Mode to PHA  
View Settings

**Spectrum Memory:** Retrieve, list or erase stored spectra.

# digiDART-LF™

## Portable “SMART” MCA for NaI(Tl), LaBr and other Scintillation Detectors

### MCA Specifications

Maximum system throughput >100,000 cps.

#### System Gain Settings

Coarse Gain: 1, 2, 4, 8, 16, or 32.

Fine Gain: 0.45 to 1.

**Preamplifiers:** INPUT accepts either positive or negative pulses with rise time of 10 to 650 ns and decay times of 40  $\mu$ s to  $\infty$ ;  $Z_{in} > 1000 \Omega$  dc-coupled; linear maximum 10 V; absolute maximum 20 V.

**System Conversion Gain:** Software controlled from 512 to 2k channels.

#### Digital Filter Shaping-Time Constants

Rise times: 0.8  $\mu$ s to 20  $\mu$ s in steps of 0.2  $\mu$ s.

Flat tops: 0.5 to 2.0 in steps of 0.1  $\mu$ s.

**Dead-Time Correction:** Extended live-time correction according to Gedcke-Hale method.

#### Linearity

Integral Nonlinearity:  $< \pm 0.025\%$  over top 99.5% of spectrum, measured with an ORTEC 448 pulser.

Differential Nonlinearity:  $< \pm 1\%$ .

Digital Spectrum Stabilizer: Controlled via computer, stabilizes gain and zero errors.

#### Temperature Coefficient

Gain:  $< 35$  ppm/ $^{\circ}$ C. [Typically 30 ppm/ $^{\circ}$ C.]

Offset:  $< 3$  ppm/ $^{\circ}$ C, with Rise and Fall times of 12  $\mu$ s, and Flat Top of 1  $\mu$ s. (Similar to analog 6  $\mu$ s shaping.)

**Pulse Pile-Up Rejector:** Automatically set threshold. Pulse-pair resolution typically 500 ns.

**Automatic Digital Pole-Zero Adjustment:** Computer controlled (U.S. Patent No. 5,872,363). Can be set automatically or manually.

**Digital Gated Baseline Restorer:** Computer controlled adjustment of the restorer rate (High, Low and Auto).

**LLD:** Digital lower level discriminator set in channels. Hard cutoff of data in channels below the LLD setting.

**ULD:** Digital upper level discriminator set in channels. Hard cutoff of data in channels above the ULD setting.

**Ratemeter:** Count-rate display on MCA and/or PC screen.

**Battery:** A single battery is inserted through door in case. The compartment is semi-sealed and designed to resist dirt and moisture. The battery may be changed without loss of data or charged in the field with no tools.

Battery Life: Up to 12 hours with fully charged Sony NP-F960 and standard ORTEC resistive feedback preamplifier.

Battery Type: Lithium-ion Camcorder Battery. Sony NP-F960 (7.2 V 38.8 W hr).

### Inputs and Outputs

**Detector:** Multipin connector with the following:

Preamp Power: 1 W max. (+12 V, -12 V, +24 V, -24 V, 2 GND).

Amp In: Normal amplifier input.

TRP Inhibit.

Battery Power: (5–12 V) for HV module.

**USB:** Universal serial bus for PC communications.

**Power:** Connection to supply power from a wall mounted DC supply. (+12 V DC  $< 1.25$  A) (Charging circuitry and battery management circuitry internal to digiDART-LF).

### Electrical and Mechanical

**Dimensions:** 8" x 5" x 3" (20 x 10 x 7.5 cm)

**Weights:**  $< 900$  gm (1.9 lb) excluding battery

**Operating Temperature Range:**  $-10$  to  $60^{\circ}$ C, including LCD Display.

### Flexible High-Voltage Detector Interface Modules

The digiDART-LF offers high-voltage supply flexibility in the form of modules that connect the detector to the MCA.

**DIM-POSNAI** for NaI and LaBr detectors which already have PMT bases with preamplifier.

Preamplifier Power: 9-PIN D female, 1 W maximum (+12 V, 12 V, +24 V, 24 V, 2 GND).

Analog In: BNC male.

Bias Out: SHV (HV) female. 0 +1800 V, 600  $\mu$ A maximum below 1000 V, 300  $\mu$ A maximum above 1000 V positive polarity only.

MCA Coincidence Gate In: BNC male. Includes leads with mating connectors for connecting to existing detector cabling.

**DIM-296** is an alternative to the DIM-POSNAI for Detectors incorporating 10 stage PMTs which have a standard 14-Pin base.

The DIM-296 is a 296 ScintiPack<sup>1</sup> Photomultiplier Base with Preamp and HV Supply with a single cable connection, ten feet in length for direct connection to the instrument.



<sup>1</sup>Separate data sheet available from [www.ortec-online.com](http://www.ortec-online.com)

## digIDART-LF™

### Portable “SMART” MCA for NaI(Tl), LaBr and other Scintillation Detectors

Convenient, single-cable connection direct to instrument.

Internal, adjustable, high-voltage bias supply eliminates high-voltage cables.

Active bias network minimizes peak shifts at high counting rates.

Low power consumption (240 mW).

#### Use of the digiDART-LF with Lanthanum Bromide (LaBr) Detectors

The digiDART-LF is compatible with the increasingly popular lanthanum bromide detectors. A separate brochure on these detectors and their use with ORTEC instrumentation is available on request.

**2BY2 and 3BY3** Integrated NaI Probes are everything that is required in one compact package. The models 2BY2 and 3BY3 are complete NaI(Tl) probes with single cable connection to the digiDART-LF, ready to go to work. They contain everything you need: a 2" x 2" ORTEC Model 905-3 or 3" x 3" 905-4 integral NaI(Tl) detector coupled to a DIM-296 securely mounted inside a compact aluminum housing.



### Ordering Information

Model	Description
DIGIDART-LF	DigiDART-LF, 2 cables, battery and charger, A65-B32 MAESTRO-32 MCA software, operator manual, and instruction card. NO Detector Interface Module (DIM). Requires DIGIDART-OPT6 if NOT used with DIM-296 or DIM-POSNAI.
DD-LF-POSNAI	DigiDART-LF with DIM-POSNAI detector interface module for positive bias NaI detector.
DD-LF-296	DigiDART-LF with DIM-296 detector interface module for NaI or LaBr detector.
DD-LF-2BY2	DigiDART-LF with rugged, integrated 2" x 2" NaI detector/DIM-296 assembly and carry case.
DD-LF-3BY3	DigiDART-LF with rugged, integrated 3" x 3" NaI detector/DIM-296 assembly and carry case.
DD-LF-A35-2BY2	DigiDART-LF with rugged, integrated 2" x 2" NaI detector/DIM-296 assembly, carry case and A35-B32 ScintiVision software.
DD-LF-A35-3BY3	DigiDART-LF with rugged, integrated 3" x 3" NaI detector/DIM-296 assembly, carry case and A35-B32 ScintiVision software.
DIGIDART-OPT1	Spare high capacity battery.
DIGIDART-OPT2	Battery charger 110–240 V 50/60 Hz.
DIGIDART-OPT2E	Battery charger 110–240 V 50/60 Hz, CE approved for Europe.
DIGIDART-OPT3	Field Kit: carry strap/belt strap, auto adapter, universal mains adapter; spare battery.
DIGIDART-OPT6	Fanout cable for use with detectors not including a DIM. Provides analog and gate input. (Requires conventional preamplifier output pulse.)

#### Software Prerequisites

Setup and spectrum recovery requires a suitable version of MAESTRO-32 (supplied with digiDART-LF) or other ORTEC CONNECTIONS applications.

MAESTRO-32 will support the digiDART-LF on any PC that will run Windows® with support for USB.



Specifications subject to change  
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