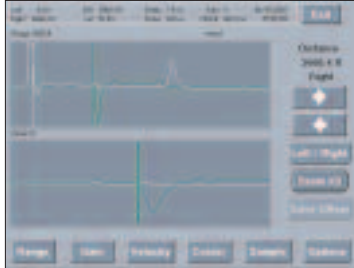


Power Cable Fault Locator Systems

PFL-4000 & DART Cable Analysis System



Typical arc reflection screen showing fault location on the DART® Cable Analysis System

The PFL-4000 shown with the DART® Cable Analysis System and wheel kit



- A complete cable fault locating solution
- Multiple test modes
 - Arc Reflection
 - Differential Arc Reflection
 - Surge Pulse Reflection
 - High-voltage Surge
 - Proof & Burn
- Integrated coupling for arc reflection and surge pulse reflection
- Simplified DART operation
 - Auto range
 - Auto fault distance
 - Operator assist mode

DESCRIPTION

The PFL-4000 Power Fault Locator System is specifically designed to meet power industry requirements in a compact, yet powerful solution for underground residential distribution (URD) topologies.

All important tools of cable fault locating are consolidated into one package: dc/tester burner, surge generator, and radar coupling. When utilized with the DART® Cable Analysis System, the combined instruments provide the following fault location techniques:

- Time Domain Reflectometry
- Digital Arc Reflection
- Surge Pulse Reflection
- Differential Arc Reflection

The PFL-4000 emphasizes portability, featuring all the basic fault locating tools within one rugged base package. It is a flexible stand-alone unit with an optional DART mounted in a hinged lid.

The PFL-4000 delivers a maximum energy surge of 1536 Joules at 16 kV, providing all necessary energy to condition and break down faults in cable, joints, and terminations. The system also includes a 20 kV proof tester and a 60 mA burner for testing and conditioning cable faults.

The collective system comprises the ideal tools for isolating a faulted cable section between transformers quickly, as well as measuring distance to the fault.

APPLICATIONS

The PFL-4000 provides advanced solutions for use in a powerful URD fault location system. The compact instruments pack maximum performance into an economy of space for ease of portability and transport.

FEATURES AND BENEFITS

- Multiple location techniques reduce fault location time and cable maintenance costs.
- DART fault pre-location extends cable life by minimizing stress.
- Rugged construction designed to endure years of daily use.
- Ease of use reduces training time and maximizes investment.
- Fast isolation of faulted cable sections between transformers reduces outage time.

Standard Safety Features

- Zero start voltage interlock.
- High voltage ON lamp.
- Automatic discharge and grounding upon instrument shut down.
- Redundant ground connections.
- Circuit breakers input power overload protection.
- External safety interlock.
- Manual grounding by mode selector ensures discharge of capacitor and cable under test.
- Analog meters remain active even when power is off.
- Visible mechanical internal grounding system confirms grounding of cable and capacitor.

SPECIFICATIONS**Available Modes****Mode Select Switch set to Arc Reflection****Mode Select Switch set to Surge**

These methods require the DART cable analyzer or equivalent

Mode Select Switch to Proof/Burn

dc burn or dc proof test

Mode Select Switch to Ground

Positive discharge of internal capacitor and the cable under test

Arc Reflection Filter/Surge Pulse Coupler

Internally integrated

Metering

Kilovoltmeter: 0 to 20 kV

Milliammeter: 0 to 60 mA

Input Voltage

Specify one of the following:

120 V ac, 50/60 Hz

220 V ac, 50/60 Hz

240 V ac, 50/60 Hz

Output Range

Impulse: 0 to 16 kV

Proof Test: 0 to 20 kV

Burn Current: 0 to 60 mA

Max. Energy Stored

1536 Joules

Storage Capacitance

12 μ F

Impulse Interval

Variable 2 to 10 s

Environment**Operating temperature range**

-4 to 120° F (-20 to +50° C)

Storage temperature range

-22 to +131° F (-30 to 55° C)

Elevation

6500 ft (2000 m) max

Derate voltage at higher altitude

Humidity

5 to 95% RH noncondensing

Dimensions

34 H x 16 W x 16 D in. (364 H x 406 W x 406 mm)

Weight

180 lb (81.8 kg)

SUGGESTED PURCHASE OPTIONS

If budgeting or other considerations prevents purchasing an entire system that includes the PFL-4000 and the DART, we recommend initially purchasing the PFL-4000 Power Fault Locator. The PFL unit is an outstanding surge generator for use in classic high-voltage surge method of fault locating. In this case, the cable is surged using the PFL and the cable route is inspected while listening for the thump. Since the necessary filter and coupler are already built in, the DART unit may be easily added any time in the future. This addition simply involves mounting the DART and connecting two cables.

OPTIONAL CABLE REEL ASSEMBLIES

Megger offers two optional cable reel assemblies for use with the PFL Systems. The CBL125 and CBL125RM extend test lead length with an additional 125 ft (38.1 m) of both ground cable and high voltage cable.

The CBL125 is a portable configuration, with the CBL125RM rack mounted assembly typically used for vehicle mounting applications. The CBL125 and CBL125RM use non-metallic reels rated to 32 kV.



Optional 125 foot (38.1 m) high voltage/ground cable reel rack mounted assembly. Catalog No. CBL125RM



Optional 125 foot (38.1 m) high voltage/ground cable reel assemblies. Catalog No. CBL125



DART Stand Alone package, "SA" mounting option.



DART shown with "4K" mounting option.

DART[®] Cable Analysis System

DESCRIPTION

The DART Cable Analysis System works in conjunction with any of the Megger Power Cable Fault Locating Systems, and is perfect for those utilities tasked with regularly maintaining underground residential distribution systems.

The DART will locate short circuits (bolted faults), open circuits (blow-outs), splices, and high impedance faults on medium voltage distribution cables. To improve ease of use, the DART itself incorporates embedded Windows[®] XP plus other simplified control functions developed in collaboration with utility service crews.

APPLICATIONS

A Power Fault Locating System is used to locate high impedance cable faults using arc reflection, differential arc reflection and surge pulse reflection. During an arc reflection test, the analyzer acquires and captures a Time Domain Reflectometry (TDR) image of the cable under surge condition. This image is then displayed along with the TDR image of the cable without the surge condition. Using our patented differential arc reflection algorithm, unwanted and confusing reflections are eliminated, leaving only the fault location. The surge pulse reflection method is available when an arc cannot be sustained at the fault during a surge using the arc reflection method.

The value of the DART is improved fault locating efficiency and reduced cable stress incurred during the fault locating process. This is accomplished through the ability to determine approximate distance to a failure. Pre-location of the failure eliminates the tedious process of surging or thumping a cable while crews walk the line in search of the failure point.

COMLink communication software is provided to allow downloading or uploading of cable images from/to the DART and a personal computer. DARTView, included in the software, allows viewing of cable images on the personal computer and replicates DART operations.

DART MOUNTING OPTIONS

The DART Cable Analyzer is designed with the flexibility to select the mounting configuration which best fits your needs and is most appropriate for your service crews.

Option SA

Option SA provides a convenient stand-alone package for those customers who only require an analyzer. The stand-alone DART can be used with existing cable fault systems or to upgrade existing arc reflection systems.

Option 4K

Option 4K is for customers looking for a self contained, portable cable fault system. This mounting option integrates the DART analyzer into a convenient lid assembly mounted directly to the PFL-4000 chassis.

DART FEATURES AND BENEFITS

- **Operating software** — The DART features Windows[®] based operating software for ease of use.
- **Touchscreen interface** — unique touchscreen interface helps facilitate ease of use.
- **Streamlined user interface** — user friendly, simplified control functions were developed in collaboration with utility service crews.
- **Mounting options** — choose between Stand Alone (SA) or one integrated within the PFL-4000 (4K).
- **Transflective color display** — each trace is displayed in a different color on a liquid crystal display using both transmissive and reflective modes suited to lighting conditions. In dark conditions, a backlight is used and in bright light, reflected light is used.
- **Extended mode** — for the advanced user, the extended arc reflection mode allows manual adjustments of settings.
- **Auto-ranging** — the DART software recognizes the cable end and automatically selects the optimum range.
- **Auto-fault distance** — when the surge condition trace is captured, distance to the fault is displayed automatically without operator interpretation.
- **Built-in assist mode** — using the basic arc reflection mode, the user is led through the steps of operation by the software.

DART SPECIFICATIONS

Test Modes

Arc Reflection
Differential Arc Reflection
Time Domain Reflectometry
Surge Pulse Reflection

Ranges

200, 500, 1000, 2000, 5000, 10,000, 20,000, 50,000, 100,000 ft
60, 150, 300, 600, 1500, 3000, 6000, 15,000, 30,000 m

TDR Pulse Widths

40, 80, 160, 320, 640 ns, 1, 2, 5, 10 μ s.

Cursors

Format selectable for feet, meters
Dual, independent cursors with both positions displayed
Differential cursor position displayed

Resolution

5 ft (1.50 m), depending on range and mode

Horizontal Zoom

Selectable from X1 to X8 in powers of 2

Velocity

Adjustable from 30% to 99%

TDR Pulse Amplitude

10 V nominal, into 50 Ω

Gain

Adjustable, X1 to X100

Inputs

INPUT #1: Channel one acquisition (TDR and Arc Reflection)

INPUT #2: Channel two acquisition (Surge Pulse Reflection)

Input Impedance

50 Ω , all inputs

Maximum Input

250 V peak for transients

Display

Transflective color LCD 10.4 in. diagonal with integral touchscreen

Operating System

Windows® XP Embedded

Memory

Internal Memory Storage: Up to 20 waveforms stored internally

External Interfaces

Serial Port (used with COMLink)

Parallel Port (used for printing)

Power

115 V (90 to 132 V) or 220 V (180 to 250 V) sinusoidal power source at 45 to 66 Hz, automatic switching, 200 VA max

Temperature

Operating: 32° to 122° F (0° to 50° C)

Storage: -4° to +158° F (-20° to +70° C)

Humidity

80%, non-condensing

Languages

English and French

ORDERING INFORMATION

Ordering Information for a Stand-alone PFL System or a PFL System Including the DART

Item (Qty)	Cat. No.
PFL-4000 Portable Power Fault Locator	
Without DART Cable Analysis System	657400-XXR
With DART Cable Analysis System	657400-XXRT5

Input Voltage Options

XX Codes: Enter **00** for 115/120 V ac, 50/60 Hz input voltage
Enter **47** for 220/240 V ac, 50/60 Hz input voltage

Included Accessories

25 ft (7.6 m) High-voltage, shielded output cable with vice-grip clamp [1]	34458-1
7.5 ft (2.29 m) 3-wire, No. 16 AWG, power input cord with standard cap (IEC 320) [1]	17032-7
25 ft (7.6 m) No. 8 AWG, flexible ground cable with vice-grip grounding clamp [2]	19265
4 ft (1.2 m) No. 8 AWG, flexible grounding cable [1]	19265-4
Ground rod [1]	23462-1
Interlock shorting plug [1]	10226-1
Wheel kit with 14 in. pneumatic tires, push bar and leveling foot for the 657400-XXRT4 only	35297
Instruction manual	AVTM657000

Optional Accessories

Stand-alone cable reel assembly	CBL125
Rack-mounted cable reel assembly	CBL125RM
Wheel kit with 14 in. pneumatic tires, push bar and leveling foot for the standard 657400-XXR	35297
Electromagnetic Impulse Detector	651113

Item (Qty)	Cat. No.
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Optional Accessories (continued)

High-voltage Cable Repair Kits	
Black jacketed BIW cable output and return connector	35946-1
Black jacketed BIW output connector	35946-2
Black jacketed BIW return connector	35946-3
White jacketed Okinite cable output and return connector	36158-1
White jacketed Okinite output connector	36158-2
White jacketed Okinite return connector	36158-3

Ordering Information for DART Cable Analyzer (Only) When Adding to Existing Equipment

Item (Qty)	Cat. No.
DART Cable Analyzer with Stand-Alone (SA) Mounting Option	654000-SAT5
DART Cable Analyzer with PFL-4000 (4K) Mounting Option	654000-4KT5

Included Accessories

Power cord, 6 ft (1.82 m) for 120 V ac grounded receptacle [1]	17032-9
Cable for connecting DART to arc reflection filter, 3 ft (0.91 m) [2]	19907-2
Ground cable, 18 in. (0.46 m) for connecting DART chassis ground to arc reflection filter ground [1]	19265-9
COMLink	35794-2
Instruction manual	AVTM654000XP

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