

SCOPE

CFL PL4 Cable Fault Prelocator



Identify cable fault distance precisely with CFL PL Series

The Product

Cable Fault Prelocator

Underground cable faults cannot be avoided due to many factors such as ageing, moisture ingress, road widening, infrastructure improvement, digging carried out for repairs of other underground utilities etc.

These faults generally take long time to detect and hence long time to repair the damaged cables and restore the power supply. Long outages cause heavy production loss to industries, revenue loss to power distribution companies and inconvenience to consumers. This calls for quick fault location and restoration of power supply in minimum possible time.

An ordinary fault locating kit comprising of Surge Generator and Pinpointing Set can take long time to locate fault point. SCOPE offers Prelocator instruments that can give the fault distance to help the operator for reaching the spot quickly and pinpointing the fault in a short time.

The new generation CFL PL4 Cable Fault Prelocator from SCOPE is the ultimate solution for locating underground cable faults in minimum time. It uses advanced technology for fault distance measurement which helps even an unskilled operator to locate the fault accurately.

CFL PL4 portable Prelocator is used for identification of fault types in underground cables and the distance of fault. These products are designed to find out various types of faults in the cable such as Open Circuit, Short Circuit, Splice in Cable, High Resistance, Moisture Ingress, etc. Various modes of operation combined with advanced features offers user the most effective solution for the job.



1. Colour, TFT Display, 8 inch
2. Trigger Port
3. Signal Port
4. USB Port
5. Cursor Control Knob
6. Power ON/OFF Push Button
7. Battery Charging Socket

Measurement Modes

Low Voltage Pulse-echo / Time Domain Reflectometer (TDR)

Time Domain Reflectometer (TDR) works on the same basic principle as radar. In this mode of operation, the Prelocator sends a low voltage, high frequency wave / pulse periodically into the cable under test. If the cable has constant impedance and is properly terminated, all the sent energy will be equally dissipated across the cable. If there is any fault or, abnormality in the cable (like joint etc.) results in change of impedance at that point. As a result of the same, a part or all the pulse energy is reflected to the sending end of the instrument. Based on the velocity of propagation and the time difference between instant of transmitting the pulse and receiving back the reflected pulse, the distance to fault point from the sending end gets calculated.

TDR method is useful for identifying Open Circuit Faults, Short Circuit Faults, Low Resistance Faults, Cable Joints, and Ingress of Moisture. TDR mode can also be used to measure the length of a healthy cable and determination of VoP for a known length of healthy cable.

Secondary Impulse / Arc Reflection / Multiple Impulse Method (SIM/ARC/MIM)

Localization of the cable faults with a high fault resistance is usually difficult using low-voltage TDR method. To localize these types of faults, the Prelocator need to be used in conjunction with the CFL SG Series High Voltage Surge Generator (Thumper) and ARC / SIM filter. The essence of the Arc Reflection Method is that with the help of CFL SG Series High Voltage Surge Generator, a short-time electric arc is created in the place of cable damage and this arc time gets prolonged using ARC / SIM filter. Synchronously with the arc, the Prelocator performs the measurement. Thus, we can transform the high resistance fault into a low resistance fault or short circuit fault and the fault location can be identified easily with the simultaneous application of TDR by Prelocator. However, to achieve this, the Prelocator need to be coupled properly with the Surge generator and ARC / SIM filter in ARC / SIM mode. Multiple signatures of Arc Reflection Method (ARC) or, Secondary Impulse Method (SIM) are taken in quick succession and they are compared together to identify the fault location most clearly. This is known as Multiple Impulse Method (MIM).

Impulse Current Method (ICM/ICE)

In case of high resistance or flashing faults, the SIM/ARC/MIM method may not be able to give the result due to corroded cable sheath or damping of returned TDR signals. Hence, we use current transient method for Prelocation of fault. This is commonly known as Impulse Current Method (ICM or, ICE) and preferred for longer cables. In ICM / ICE mode, the Prelocator need to be used in conjunction with the CFL SG Series High Voltage Surge Generator (Thumper). The Prelocator and surge generator gets coupled to each other with the help of a current coupler. During momentarily breakdown or flash-over at the fault, current transients are generated and oscillates back to the source end, sensed through the current coupler, and displayed on Prelocator for further analysis of fault distance.

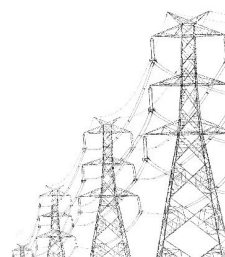
Voltage Decay Method

When Surge Generator is unable to break down the fault then a DC High voltage is applied gradually in the test cable, until the high resistance fault breaks down. During this, the cable stores the energy in the form of capacitance. At breakdown, the cable capacitance gets discharged through the fault and generates a voltage pulse that travels back to the test set where it gets reflected to the fault point. When the same pulse reaches back the fault point, its polarity gets reversed and it again travels back to the test set. This process continues till the cable completely gets discharged.

In the Voltage Decay Mode, the Prelocator does not send any pulse into the cable but, operates in passive mode, just like an oscilloscope and captures the back-and-forth voltage transient signals with the help of a Voltage Decay Coupler. To determine the location of the fault, cursors are positioned at consecutive peaks of the trace to get the fault distance.

Features







- Compact, Lightweight and Rugged
- User friendly operation
- Wide measurement range up to 64km
- Highest measurement accuracy of $\pm 1\%$ of selected range
- High speed sampling of 200MHz
- Automatic Cable End detection
- Automatic Fault Point detection
- Zoom function for detailed analysis of the waveform
- Asynchronous interference & noise suppression
- Adjustable Gain and Balance
- Inbuilt memory to store 300 waveforms with USB connectivity
- "Print-screen" function to save image in JPG
- PC Software for waveform analysis and report preparation
- High resolution 8" Colour Touchscreen display
- Mains as well as Inbuilt Rechargeable Battery operated
- Housed in weather proof molded case











Specification

Parameters	CFL PL4
Modes of Operation	TDR SIM / MIM / ARC (up to 8 Fault Traces) ICM / ICE Voltage Decay
Sampling Rate	200MHz
Measurement Range	Up to 64km
Measurement Accuracy	±1%
Best Resolution	1m
Pulse Amplitude (OCV)	30V
Pulse Width	40nS to 10µS
Output Impedance	5Ω to 87Ω
Velocity of Propagation (V)	90 - 300 m/µs
Memory	300 Waveforms
Connectivity	USB, Direct Download to Pen drive
Display	8" Colour Touchscreen LCD
Battery	Rechargeable Lithium Ion, Suitable for 8 hour operation
Power Supply	90V to 264V AC, 47 to 63 Hz, Single Phase
Environmental (Operation)	-10°C to +50°C, up to 95% RH (Non-Condensing)
Environmental (Storage)	-20°C to 70°C, up to 98% RH (Non-Condensing)
Dimension	339mm x 295mm x 152mm
Weight	4.5kg

Scope of Supply

Items	Test Lead Set Configuration			
	2m TLS	10m TLS	25m TLS	50m TLS
 CFL PL4 housed in molded case	1 No	1 No	1 No	1 No
 1 x TDR Cable	2m	10m	25m	50m
 2 x Trigger Cable	2m	2m	2m	2m
 Current Coupler	1 No	1 No	1 No	1 No
 1 x Coupler Earthing Cable	2m	2m	2m	2m
 Pen Drive: 16 GB	1 No	1 No	1 No	1 No

Items		Test Lead Set Configuration			
		2m TLS	10m TLS	25m TLS	50m TLS
	1 x Voltage Decay Coupler	Optional	Optional	Optional	Optional
	1 x 1-meter long HV Connection Cable to connect Voltage Decay Coupler and CUT	To be supplied with Voltage Decay Coupler			
	1 x Copper Strip	To be supplied with Voltage Decay Coupler			
	Mains Input / Battery Charger Cable	1 No	1 No	1 No	1 No
	1 x Cable Drum (Manual/Motorised)	Optional	Optional	Optional	Optional
	1 x Soft Carrying Bag Main Instrument and other accessories	1 No	1 No	1 No	1 No
	1 x Factory Test & Calibration Report	1 No	1 No	1 No	1 No
	1 x Operation Manual	1 No	1 No	1 No	1 No

Ordering Code

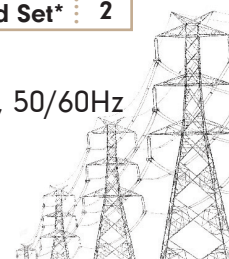
Example: CFL PL4 **F F F F F N N N 2 R I N** #

CFL PL4 **F F F F F**

F	Reserved													Customised	Z
F	Reserved													None*	N
F	Reserved													Universal Plug	U
F	Reserved													Indian Plug*	I
F	Reserved													110V ± 15%, 50/60Hz AC Input	Q
N	None*													230V ± 15%, 50/60Hz AC Input*	R
Z	Customised													Customised Length of Test Lead Set	Z
N	None*													50m Test Lead Set	G
D	Voltage Decay Coupler													35m Test Lead Set	D
N	None*													25m Test Lead Set	E
1	Manual Cable Drum													20m Test Lead Set	L
2	Motorised Cable Drum													15m Test Lead Set	R
														10m Test Lead Set	M
														2m Test Lead Set*	2

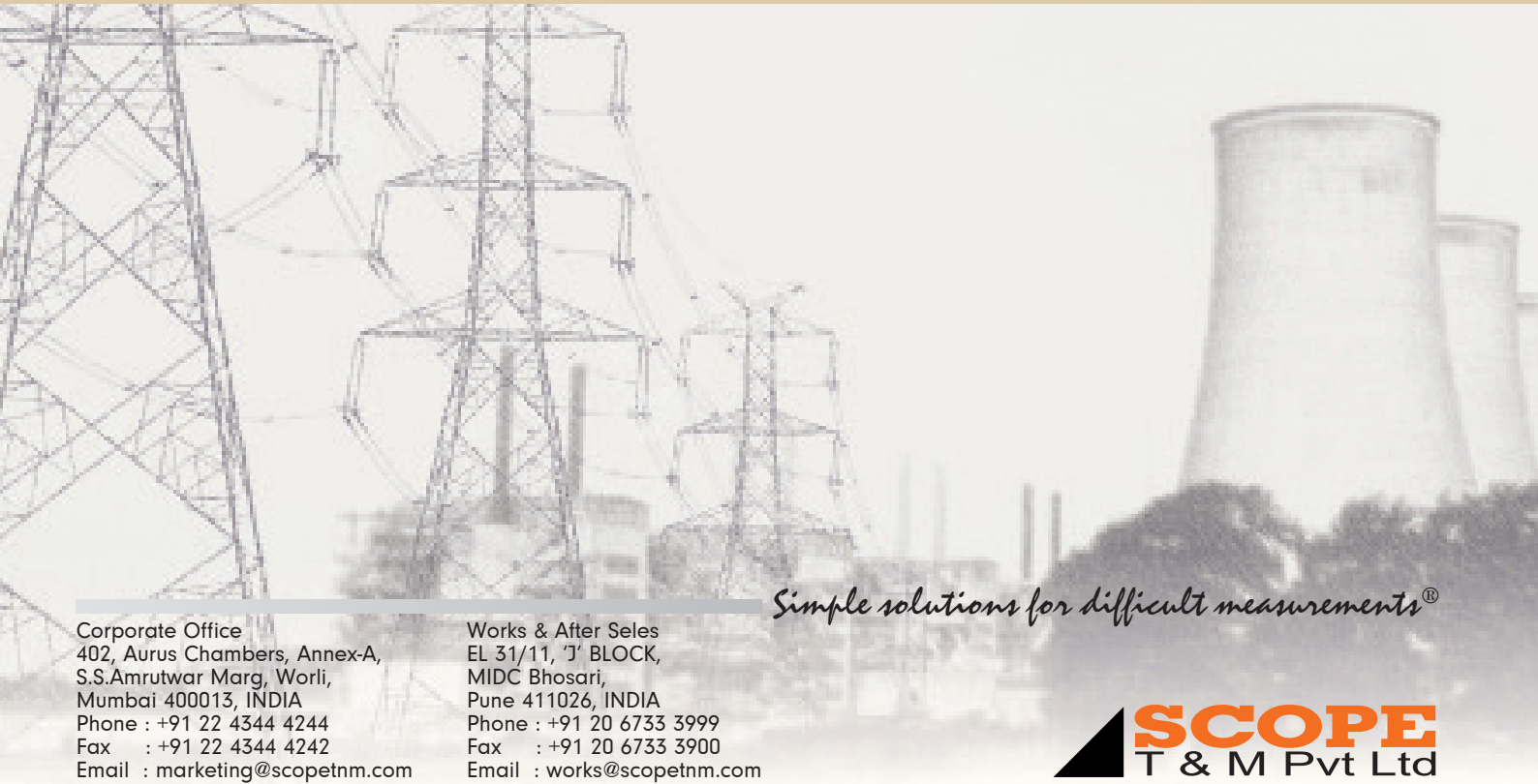
Note: * Standard accessory / feature

#CFL PL4 (Order Code: FFFFNNN2RIN)- Cable Fault Prelocator, 2m Test Lead Set, 230V ± 15%, 50/60Hz AC Input, Indian Plug.



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Distribution, Industry ...

... there is **SCOPE**
always!



Simple solutions for difficult measurements®

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