

# F6150



## F6150 OPTIONS

Doble provides several options for expanding your F6150 so you can configure it to fit your needs exactly:

### Internal Options

#### F6810 High-Power Low-Range Current Sources:

The testing of high impedance electro-mechanical relays is a challenge for any test instrument. This is especially true if an overcurrent electromechanical relay is being used to detect ground or earth faults, one of the most critical and sensitive protections in the system. The ground over-current relays are relied on the most when everything else fails to detect a high resistance fault in the system. Therefore it is imperative to ensure that the ground over current relay are working correctly. The F6150 is the only instrument that has the power to test ground over current relays correctly.

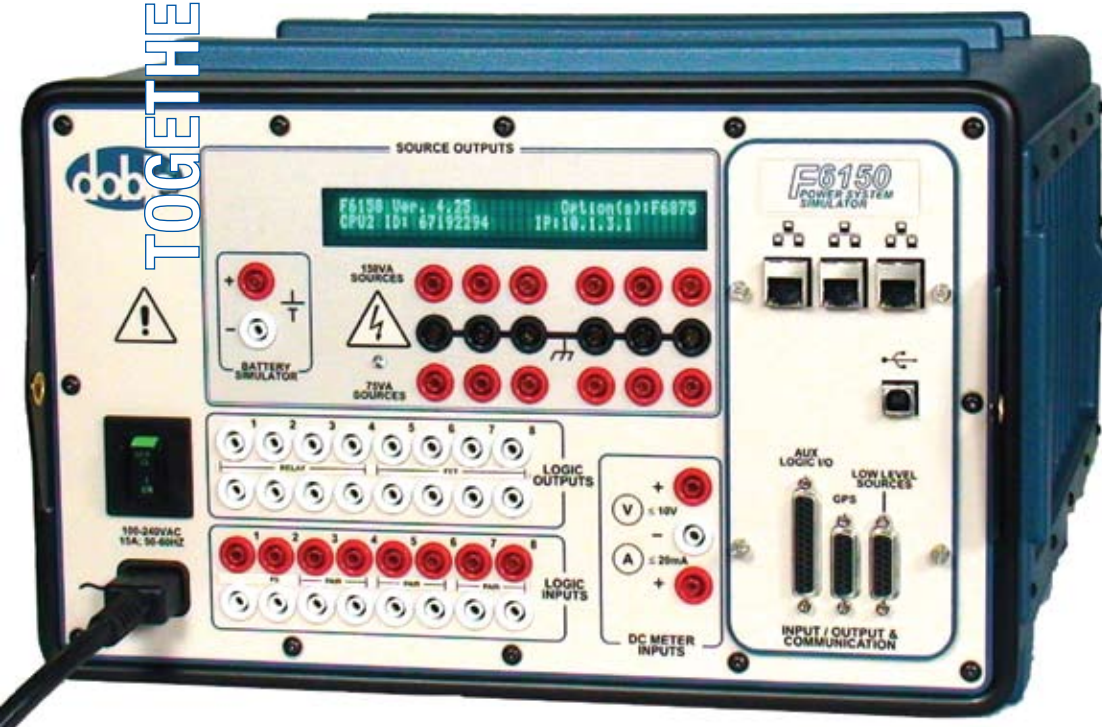
#### Benefits:

- The voltage amplifier can be used in a current mode, with the unique state-of-the-art direct coupled power amplified design.
- This amplifier design provides multiple ranges, each capable of delivering full power during testing.
- The F6810 Convertible Voltage/Current Sources provides the F6000 with high compliance voltages that can be used for high power testing at low current range.

When the voltage amplifier is used in a current mode, it delivers 1.5A, 3.0A or 6.0A at 450 VA in a single phase. When the amplifier is used in a 3 phase mode it provides 150 VA power at 0.5A, 1.0 A or 2A. No other instrument is capable of delivering such high power at a low current range. The F6150 is the only instrument capable of testing this high impedance over current relay. The table below indicates the available current ranges, power and compliance voltages.

Source Power	Range Amps	Compliance Voltage
150 VA	0.5	300
	1.0	150
	2.0	75
300 VA	1.0	300
	2.0	150
	4.0	75
450 VA	1.5	300
	3.0	150
	6.0	75

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## F6910 Advanced Automation and Communication:

The F6910 automates the testing of protections using an external PC. This option can be used to perform automated testing with the Doble's ProTesT software system, F6TesT visual protection testing software, or any third party software system.

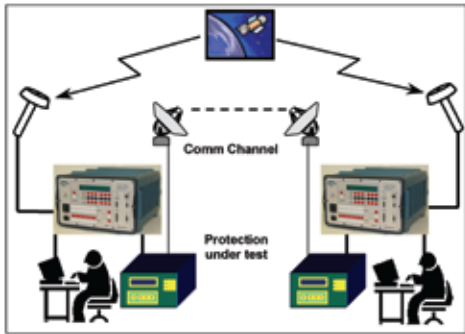
## F6800 Transducer Interface

The F6800 Transducer Interface enables the Instrument to test energy meters and transducers with highest accuracy. This includes meter measurement studio software.

The F6800's graphical interface enables test engineers to quickly perform simple performance verification tests on all meters and transducers. It allows users to develop a library of automated tests based on their specific practices and test results.

## F6885 GPS Receiver Interface

The F6885 synchronizes multiple F6000 instruments with a GPS satellite system. It also stays synchronized to GPS after start. Users can schedule a simultaneous start time of the test for the protections from remote ends. This type of end-to-end testing offers complete protections scheme testing, including the testing of communication equipment. A typical test set up, shown below, gives users the ability to test line protection at each end of the line, including the communication equipment.



## F6895 GPS Receiver/Antenna

The F6895 option provides users with a GPS antenna/receiver with 100 ft. of cable. This option works with the F6885 and provides the GPS signal to the F6150.

User needs to purchase both the F6885 and F6895 options to ensure GPS synchronization capability. The receiver/antenna is provided separately from the F6150. When access to the open sky is not available, the F6050 GPS Simulator should be used.

## Hardware Options:

### F6820 Analog Input Measurement (AIM)

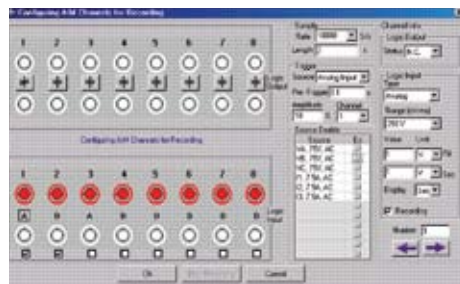
Doble's Analog Input Measurement (AIM) option gives users the ability to record external analog or digital signals using the F6150's logical inputs. This option also allows the internal analog signal generated by the F6150 to be recorded.

#### Benefits:

- A useful and convenient diagnostic tool for evaluating the performance of the protection scheme in the field or lab.
- Beneficial for the commissioning of the protection scheme.
- The logic-input connections can be used to record the transformer's output
- The logic-input connections can also be used to determine the correct polarity connection to the protection scheme.
- The record signal applied to the protection scheme can be used to analyze the performance of the protection system at a later time.

Doble's TransWin software application can be used to create, retrieve, analyze and playback the recording details of the F6150. The recording of the analog and digital signal is done at 10 kHz data rate. The recording can be stored on a PC with an industry compliant Comtrade standard format.

A sample screen of the set up for recording using the TransWin software application is shown below.



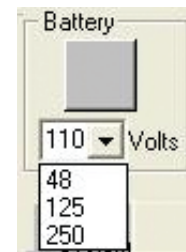
## F6875 Variable Output Battery Simulator (VOBS)

The Variable output battery simulator (VOBS) option allows the DC output from the F6150 instrument to be user defined. The earlier version of battery simulator option had selections for a fixed value of DC voltages of 48, 125 and 250 VDC. This new feature allows users to define a DC voltage value anywhere between 6-300 VDC with the F6150 that are installed with the VOBS.

The benefits of the Variable Output Battery Simulator (VOBS): F6875 include:

- Verification of the performance of the protection system at high and low ends of the DC voltage variations.
- Ability to define the values with a user-friendly interface.

The figure below shows a selection of the battery simulator output at 110 VDC.



F6150 instruments supplied prior to January 2004 may require the Power Supply module to be changed to implement the Variable Output Battery Simulator. Please contact our customer service or your local representative to confirm if the power supply module needs to be changed to use the VOBS feature with the F6150.

*Note: The F6875 is now a standard feature. You do not have to order this option when purchasing the F6150.*

## F6816 External Input/Output unit

The Doble F6816 External Input/Output unit is designed to work as an extension of the inputs and outputs that are provided on F6150. The user can utilize this add-on external unit to access 8 additional inputs and 8 additional outputs.

The access to a total of 16 inputs and 16 outputs will allow monitoring and controlling of a large number of relay contacts. This will prove beneficial in elaborate end-to-end tests and dynamic testing of protection schemes.



## F6860 Testing IEC 61850 Compliant Protection Testing

Modern protection test systems are designed to comply with the IEC 61850 GSE messaging system. The F6150 combined with F6860 option and the user friendliness of the Doble protection testing software package makes testing of protection schemes that use IEC61850-compliant IEDs (intelligent electronic devices) uncomplicated. Testing these protection systems only requires a simple cable connection between the Ethernet port of the F6150 and the IEC 61850 communication network, eliminating the need for connecting many test leads between the IEDs under test and the logic I/O of the test instrument. If required to test a hybrid system, consisting of IEC61850-enabled IED and conventional relays, the F6150 with F6860 module allows testing with both wired logic I/O connections and GSE messaging; it can handle 8 wired inputs, 8 wired outputs, 32 GSE input messages and simulate 32 GSE output messages simultaneously. The GSE messages can also be a combination of GOOSE and GSSE (compatible with UCA2) message types.

Testing is easy with the user friendliness of the Doble software testing package. The IEC 61850 GSE Configurator discovers messages in the network and configures the F6150 to subscribe to and simulate GOOSE and GSSE messages. The test software ProTesT or F6TesT is then used in the normal way to perform the test. Typical screen shots showing the test information setting in a state simulation module is shown below.

## F6071 Infrared Optical Pickup/F6072 Visible Light Optical Pickup

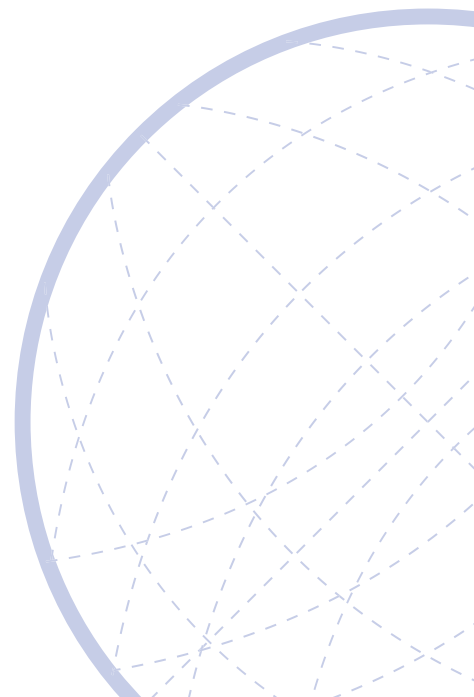
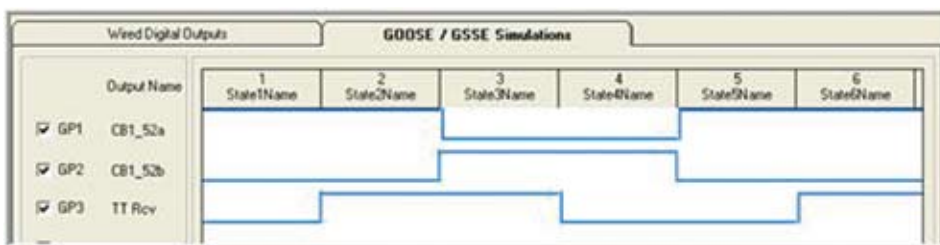
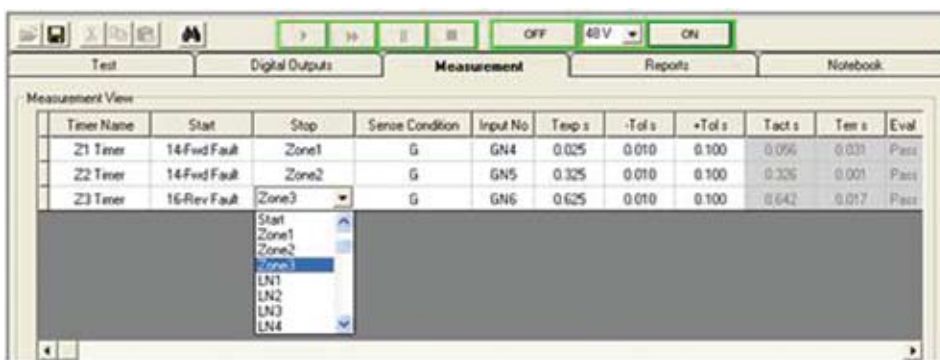
The F6071 Infrared Optical Pickup is used to sense the infrared pulses from the calibration LED that are found on most solid-state meters. The pulses from the F6071 are fed into a logic input of a F6150 Power System Simulator. With the F6071 and F6150 Power System Simulator, the testing of solid state watt-hour, var-hour and VA-hour meters is done automatically. The wide angular displacement of this sensor allows for fast, non-critical alignment. The automatic gain control circuitry of the F6071 also assures that it will operate in all ambient sunlight conditions. The F6072 Visible Light Optical Pickup is also available for those solid state meters that have a visible calibration LED. The kit number of the F6071 is kit 030-1610-01. The kit number of the F6072 is kit 030-1610-02.

## F6073 Meter Disk Sensor

The F6073 Meter Disk Sensor is a suction mount reflective pickup assembly used to sense the disk rotation of an induction type meter. The pulses generated by the F6073 are fed into a logic input of a F6150 Power System Simulator. With the F6073 and the F6150 Power System Simulator, the testing of induction type meters is done automatically and accurately. The kit number of the F6073 is kit 030-1610-03.

*Specifications are subject to change without notice.*

For more information, contact [fserieshelp@doble.com](mailto:fserieshelp@doble.com)



## Additional external F6150 options described in other Doble product brochures:

**F6010 Controller**



**F6300 High-Power Current Amplifier**



**F6080 Field Calibration Unit**



**F6050 Universal Time Synchronizer**



**F6816 External Input/Output Unit**



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