



*Power system frequency supervision.*

#### Features and Benefits

- Compact 19" drawout case
- DDS system compatible

#### Applications

- Load shedding frequency schemes
- Protection of generators

#### Protection and Control

- Underfrequency protection
- Under and overvoltage protection
- 33 outputs (28 configurable) (DFF1000)
- 14 configurable inputs (DFF1000)
- 3 settings groups

#### Monitoring and Metering

- Event record, last 150 events
- Oscillography, 4 records
- Self diagnostics

#### User Interfaces

- Keypad and LCD
- 16 configurable LEDs
- Front RS232 port
- Rear RS232, RS485, or fiber optics
- Software provided
- 1200 to 115,200 bps



## Protection and Control

### Frequency Functions

Under normal conditions, the generated frequency of the power system must match with the load requirements. When abnormal conditions occur there are changes in the system frequency. If the changes are small the frequency can be corrected through the normal adjustment of the system generator. However, when the load is increased above the generator rating the generator can no longer correct the speed and the frequency begins to drop. The DFF is applied directly to the generator to protect against damage, and throughout the system to “shed” load in an attempt to regain frequency stability.

The DFF has 8 frequency units. Each unit can be configured as a rate of change unit or as an absolute frequency unit. These units are supervised by an undervoltage unit. The number of cycles needed to consider a trip condition can also be programmed.

If the frequency unit is programmed as an absolute unit the relay will trip when the frequency is under the programmed value during the time delay value. When the units are programmed as rate of change units the relay will trip when the frequency is under the programmed value and the instantaneous variation of the frequency with respect to time is greater than the programmed value. In this case the time delay value will be ignored.

### Voltage Functions

One overvoltage and one undervoltage unit is provided. The voltage functions are single phase units. The frequency units are supervised by an undervoltage unit.

### Multiple Settings Groups

Three separate groups of settings are stored in the DFF's non-volatile memory, with only one group active at a given time. This allows the relay to respond to changing conditions by selecting the appropriate settings group. The active settings group can be selected via a user command or through a digital input. Certain settings are common to all settings groups.

### Configurable Inputs and Outputs

There are 14 configurable inputs and 33 configurable outputs (DFP1000), providing the DFF with high flexibility in load shedding schemes. AND/OR/NOT logic can be applied to configure the outputs. GE-INTRO software is provided to configure the inputs and outputs.

## MONITORING AND METERING

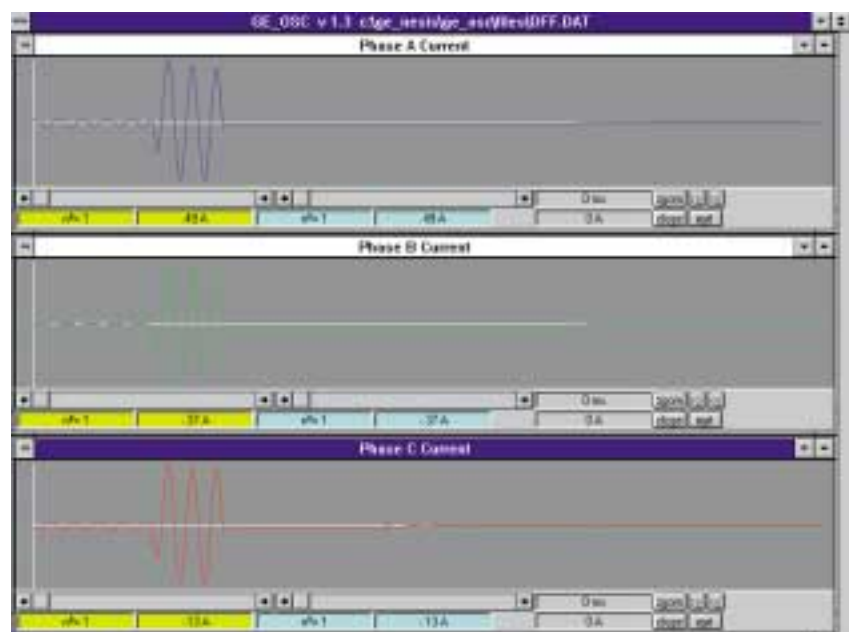
### Event Record

The DFF has an event record that can store up to 150 events with the date and time stamped to the nearest millisecond. This provides the information needed to determine the sequence of events, which helps the diagnosis of relay operation.

### Oscillography

The DFF offers two types of oscillography records: voltage recording, at 16 samples per cycle, 66 cycles long (approximately 1 second), and network frequency recording, at 2 samples per cycle, with a storage capacity of 1586 cycles (approximately 30 seconds). The type of oscillography record is selectable by a setting. GE-OSC software is provided to allow the user to display and analyze the oscillography records.

*The DFF can store four oscillography records*



### Keypad and Display

A 20 button keypad and a 2 line by 16 character LCD is provided on the front panel for local user interface. This interface allows the user to assign and view protection settings, alarms, LEDs, measurements, and status.

### LED Indicators

The DFF has 1 LED to indicate the relay is in service, and 16 user configurable LEDs. AND/OR/NOT logic can be applied to configure the LEDs.

### Communication Ports

The DFF has 2 communications ports. The front mounted port is an RS232 port. The rear mounted port may be selected to be an RS232, RS485, plastic fiber optics, or glass fiber optics port. The baud rate is 1,200 to 115,200 bps.

### Software

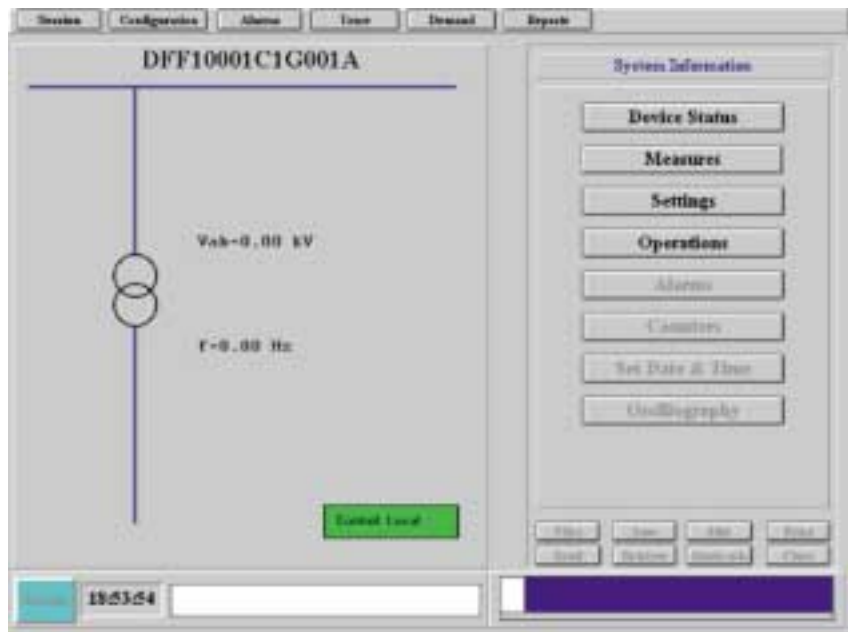
Three Windows® based software packages are included with the DFF:

- GE-LOCAL enables the user to visualize the protection settings, alarms, LEDs, measurements and status

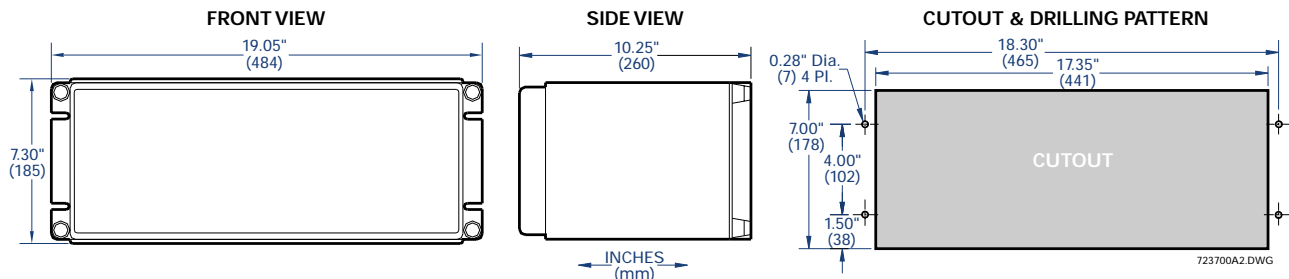
- GE-INTRO enables the user to configure the inputs, outputs and LEDs
- GE-OSC enables the user to study the oscillography records

These software packages are part of the GE-NESIS software (General Electric Network Substation Integration System) used by the DDS system.

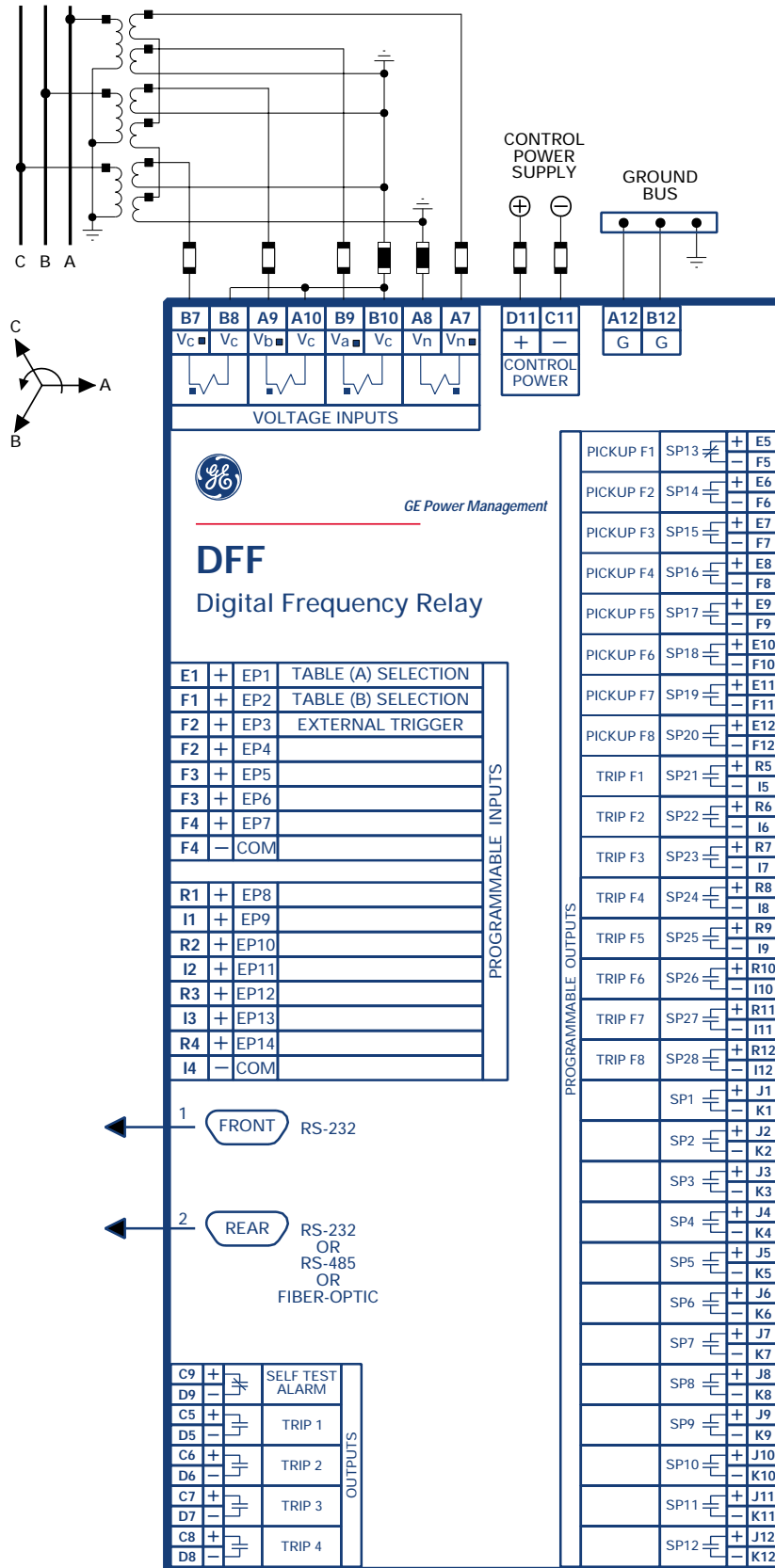
GE-LOCAL software is provided for DFF communication



## Dimensions



## Typical Wiring



723701A5.CDR

## DFF Technical Specifications

INPUTS	
Digital inputs voltage:	48, 125 or 220 VDC (depending on model)
Frequency:	50 or 60 Hz
Rated Voltage:	100/ $\sqrt{3}$ - 220/ $\sqrt{3}$ VAC
Thermal Capacity:	
Voltage circuits:	
Continuously:	$2 \times V_n$
During 1 min:	$3.5 \times V_n$
Burdens:	
Voltage circuits:	0.2 VA for $V_n = 63.5$ V

OUTPUTS	
Tripping contacts:	
Continuous current:	16 A
Make and carry:	30 A according to ANSI C37-90
Operating time:	4 ms

POWER SUPPLY	
Power Supply:	48/125 VDC or 110/250 VDC $\pm 20\%$
DC Burden:	12 W
Per each activated input:	8 mA (1 W Vaux = 125 VCC)

COMMUNICATIONS	
Mode:	Half duplex
Speed:	1,200 to 115,200 bps
Physical media:	
RS232 (ports 1, 2)	
Plastic Fiber Optic (port 2 optional)	
Type of connector:	HFB-4516
Power supplied:	-8 dBm
Receptor's sensitivity:	-39 dBm
Wave length:	660 nm
Glass Fiber Optic (port 2 optional)	
Type of connector:	STA
Power supplied:	-17.5 dBm
Receptor's sensitivity:	-24.5 dBm
Wave length:	820 nm
RS485 (port 2 optional)	

PACKAGING	
Dimensions:	19" x 10.25" x 7.7" (484 mm x 260 mm x 185 mm)
Weight:	
Not Packaged:	26.4 lbs (12 kg)
Packaged:	28.6 lbs (13 kg)

APPROVALS	
CE Compliant	UL - UL listed for USA and Canada

TYPE TESTS	
Isolation Test Voltage:	2 kV, 50/60 Hz, 1 min
Surge Test Voltage:	5 kV peak, 0.5 J
Interference:	Class III according to IEC 255-22-1
Electrostatic Discharge:	Class IV according to IEC 255-22-2
Radiointerference:	Class III according to IEC 255-22-3
Fast Transient:	Class IV according to IEC 255-22-4
Sinusoidal Vibration:	Class II according to IEC 255-21-1
Shock:	Class I according to IEC 255-21-2
Radiofrequency Emission:	According to IEC 41B (Sec.) 81 and EN522 Class B
Emisivity:	According to EN50081-2
Susceptibility:	According to EN50082-2

ENVIRONMENTAL	
Temperature:	
Operation:	-20° C to +55° C
Storage:	-40° C to +70° C
Humidity:	Up to 95% without condensing

ACCURACY	
Accuracy:	$\pm 200$ PPM at 20° C
Repeatability:	$\pm 50$ PPM
Temperature error:	$\pm 35$ PPM from -20° C to +55° C
Aging:	$\pm 5$ PPM according to MIL-C3098F

\*Specifications subject to change without notice.

## Guideform Specifications

The relay shall be an integrated digital protection system including frequency and voltage protection, voltage monitoring and communication capabilities.

Protection functions shall include:

- 8 frequency units selecting the rate of change mode or the absolute mode
- One frequency undervoltage supervision unit
- One overvoltage unit (one phase)
- One undervoltage unit (one phase)

Monitoring functions shall include:

- Voltage metering
- Fault voltages and frequency for last trip
- Self diagnostics
- Pick up and trip status of each function
- Oscillography (voltages and digital flags)
- Sequence of events (up to 150 internal events)

User interface shall include:

- 1 LED to indicate the relay is in service
- 16 user configurable LEDs
- 33, 25 or 13 inputs (depending on the model)
- Man-machine interface (MMI) shall be in the form of a 2 line by 16 character backlit LCD alpha numeric display and keypad to accommodate programming and viewing of parameters
- RS232, RS485 and fiber optic ports shall be provided for remote or local access via a personal computer

## Ordering

To order select the basic model and the desired features from the Selection Guide below.

DFF 1 \* 0 \* \* C \* \* 00 2A \*

DFF	1	0	*	*	C	*	*	00	2A	*
DFF										
0										Base DFF digital frequency relay
2										P1, P2: M-Link protocol
										P1: M-Link protocol; P2: ModBus® RTU protocol
		0								14 inputs, 33 outputs
		1								7 inputs, 25 outputs
		2								7 inputs, 13 outputs
				0						RS232 rear communications port
				1						Fiber optic plastic 1mm rear communications port
				2						Fiber optic glass 62.5/125 rear communications port
				3						RS485 rear communications port
					0					48 VDC auxiliary voltage inputs
					1					125 VDC auxiliary voltage inputs
					2					220 VDC auxiliary voltage inputs
						G				48/125 VDC power supply
						H				100/250 VDC power supply
							-			Spanish language
							I			English language

Order online – save time

www.GEIndustrial.com/pm