Elegant Efficient e^3 Easy to Use

ERL

Feeder Protection Relay

F-PRO 116

Product Overview

F-PRO relays are a family of numerical multifunction protection relays which provide protection for a range of transmission, distribution and industrial applications. For ease of use, all F-PRO relays are designed on common hardware platforms and similar user software providing the same look and feel to the user. Draw-out construction of the relay case and user-friendly settings enable easy use and maintenance. The variants within this family of relays are provided with features required to address specific applications.

The F-PRO 116 provides current operated elements to suit the requirements for variety of utility distribution networks and industrial applications.

Application

F-PRO 116 provides multi functional overcurrent protection for distribution feeders, capacitor banks, AC motors and transformers. Integration to SCADA and substation Automation and Monitoring Systems are provided through serial communication protocols (IEC 60870-5-103, Modbus RTU/ASCII or DNP3).

10 Year WARRANTY

Features & Benefits

Measurement & Monitoring

- Phase currents
- Residual current
- Sequence currents
- Frequency and phase angles
- Percentage thermal state
- Monitoring - status of external inputs and relay Outputs

Communication Interface

Front: USB 2.0 port

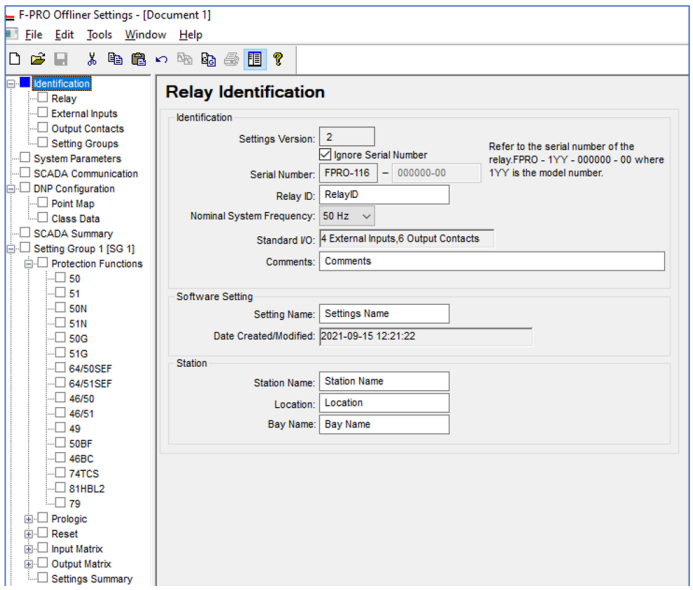
Rear: RS485

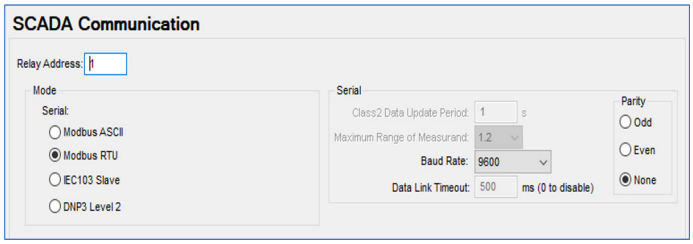
Communication Protocol

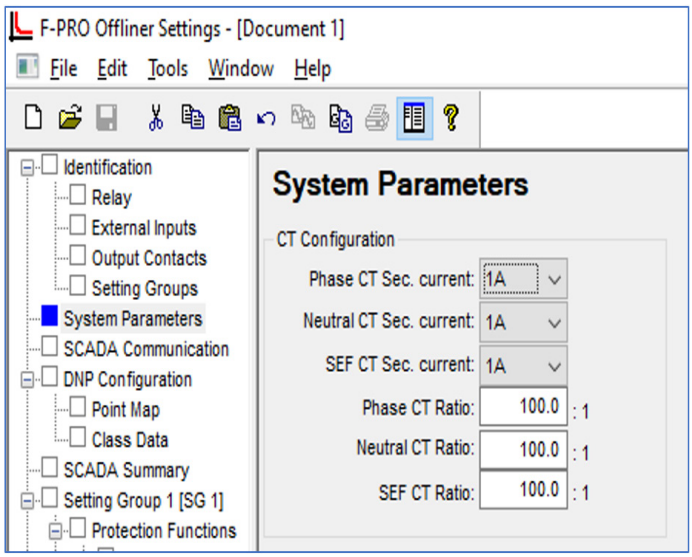
- Modbus RTU/ASCII
- IEC 60870-5-103 protocol
- DNP3 Level 2 serial (RS485)

Functional Overview

- Site selectable 1A and 5A CT secondary ratings
- Programmable IEC inverse, ANSI inverse, definite time and user defined curves
- Programmable self/hand reset output contacts
- Programmable self/hand reset LEDs
- 20 fault logs
- 200 event records with 1 ms time tag
- 2 setting groups
- Multilevel password protection
- 7 Programmable LEDs & 1 fixed LED for relay health status
- Programmable frequency (50Hz or 60 Hz)
- 2 X16 character alphanumeric LCD display
- 4 programmable external inputs
- 6 programmable output contacts





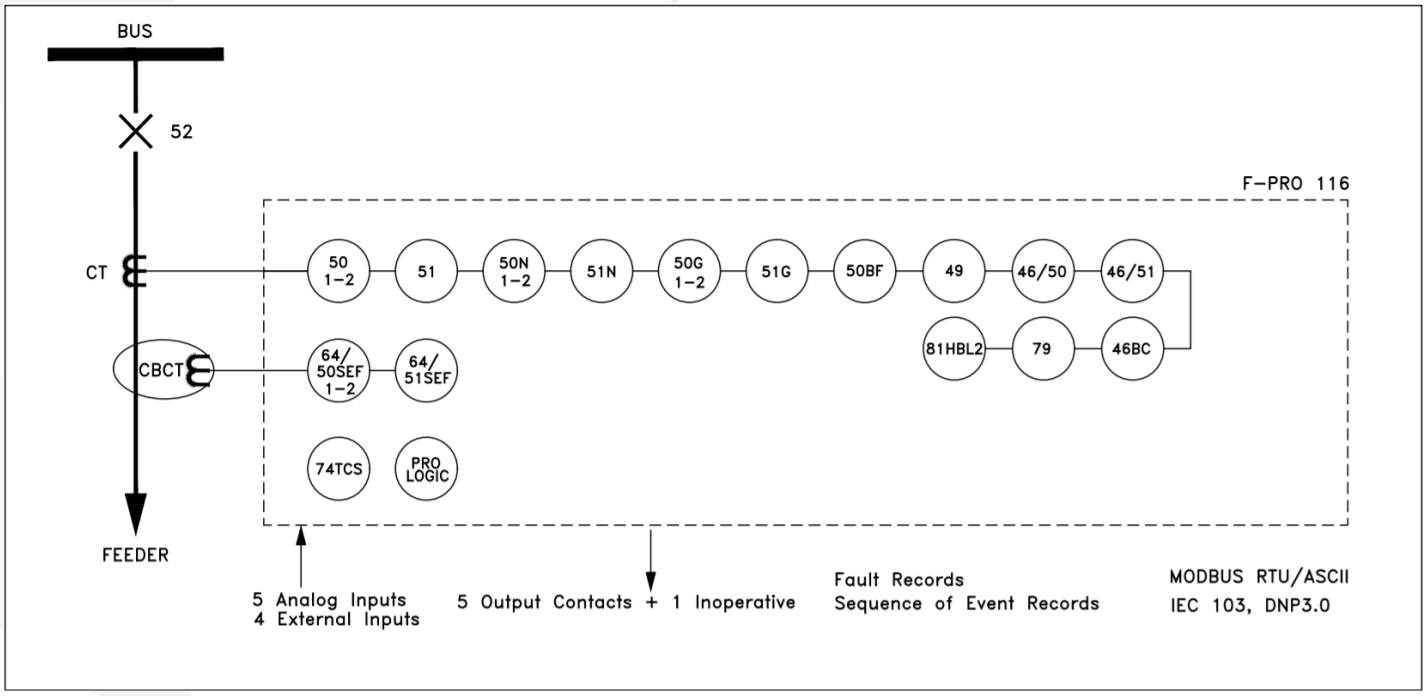


Protection Functions

SL.NO	ANSI NO.	PROTECTION FUNCTION DETAILS	F-PRO 116
1	50	Instantaneous Phase Over Current	✔ (2)
2	51	IDMTL Phase Over Current	✔ (1)
3	50N	Derived Instantaneous Neutral Over Current	✔ (2)
4	51N	Derived IDMTL Neutral Over Current	✔ (1)
5	50G	Measured Instantaneous Neutral Over Current	✔ (2)
6	51G	Measured IDMTL Neutral Over Current	✔ (1)
7	64/50SEF	Instantaneous SEF Protection	✔ (2)
8	64/51SEF	IDMTL SEF Protection	✔ (1)
9	46/50	Instantaneous Negative Sequence Over Current	✔ (1)
10	46/51	IDMTL Negative Sequence Over Current	✔ (1)
11	49	Thermal Overload	✔ (1)
12	50BF	Breaker Failure	✔ (2)
13	46BC	Broken Conductor (I2/I1)	✔ (1)
14	74TCS	Trip Circuit Supervision	✔ (2)
15	81HBL2	Inrush Detection	✔ (1)
16	79	Multishot Auto Reclose	✔ (1)
17	Hardware	No of CT's	5
18		No of LED's	8
19		No of Output Relays	6
20		No of External Inputs	4
21		Case Size	E4

Note: (✔) denotes number of stages.

Protection & Control Function Diagram



Detailed Specifications

F-PRO 116 Feeder Protection Relay

Auxiliary Power Supply

Nominal	Operating Range
24/30 Vdc and 48/50 Vdc	20 to 60 Vdc
110/120 Vdc and 220/250 Vdc	80 to 300 Vdc 100 to 250 Vac

External Inputs

4 External Inputs	Pick-up level
24/30 Vdc	19 Vdc
48/50 Vdc	38 Vdc
110/120 Vdc	88 Vdc
220/250 Vdc	175 Vdc

Continuous Rating

CT Circuit	4 X In AC

Burden

AC Current Input	<0.1VA @ 1A; <0.5VA @ 5A
External Input	<0.1W @ 110V DC
Power Consumption	<3.5VA

Temperature Range

For Storage	-40°C to +85°C
For Operation	-10°C to +70°C

Analog Inputs

Rated current (In)	1A or 5A AC - (site selectable)
Frequency	50Hz / 60Hz (site selectable)

Digital Outputs

Carry Continuous	8A AC or DC
Make and Carry	30 AC or DC for 0.2 seconds 5000 VA AC resistive load
Break	1250 VA AC resistive load 50W DC inductive load @L/R <40 msec with 110V DC

Short-time Thermal Rating

CT Circuit	100A for 1 sec (1A CT)

Physical Dimensions

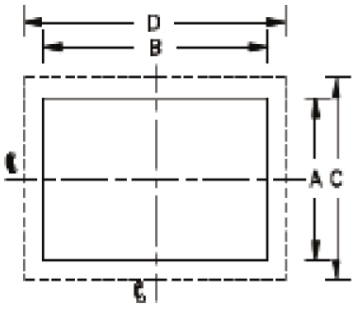
Weight

E4 case: 2.0 kg

Dimensions

E4 case: 177 mm (H) x 103.5 mm (W) x 175.0 mm (D)

CASE SIZE	CUT OUT		BEZEL	
E4	A	B	C	D
	159	97	177	103.5



Note:
1. All dimension are in mm and are measured equidistant from center line
2. Maximum depth of equipment inside the panel is 175.0 mm

Detailed Specifications

F-PRO 116 Feeder Protection Relay

Item	Quantity/Specs	Notes
General		
Operate Time	1.0 to 1.5 cycles	Including relay output operation
Memory	Settings and records are stored in non-volatile memory Records are stored in a circular buffer	
ProLogic™	5 statements per setting group	5 inputs per ProLogic™ statement
Recording		
Events	200 events with 1 ms resolution	

Overall F-PRO 116 Accuracies

Current	± 2.5% of inputs from 0.1 to 1.0 x nominal current (In) ± 1.0% of inputs from 1.0 to 2.0 x nominal current (In)
Timers	± 3 ms of set value
Inverse Overcurrent Timers	± 2.5% or ±1 cycle of selected curve
Definite Overcurrent Timers	± 2.5% or ±1 cycle non-directional

Detailed Environmental Tests

Test	Type Test Description	Test Points	Test Level
IEC 60255-26:2013 Cl.No.7.2.3	Electrostatic discharge	Enclosure air Enclosure contact	+/- 8 kV +/- 6 kV
IEC 60255-26:2013 Cl.No.7.2.4	Radiated interference (electromagnetic field immunity)	Enclosure ports	10 v/m: 80 -1000 MHz: 1.4 GHz - 2.7 GHz
IEC 60255-26:2013 Cl.No.7.2.5	Electrical fast transient	AC/DC power ports AC voltage and current ports External I/P and O/P ports	+/- 4 kV
IEC 60255-26:2013 Cl.No.7.2.6	Slow damped oscillatory / High frequency disturbance / 1 MHz burst disturbance	AC/DC power ports AC voltage and current ports External I/P and O/P ports	+/- 2.5 kV (CM) +/-1 kV (DM)
IEC 60255-1:2009	Ingress protection	Front Rear	IP 5X IP 1X
IEC 60068-2-1	Cold test - operational		-10°C for 16 hours
IEC 60068-2-1	Cold test - storage		-40°C for 16 hours

Test	Type Test Description	Test Points	Test Level
IEC 60068-2-2	Dry heat test - operational		+55°C for 16 hours
IEC 60068-2-2	Dry heat test - storage		+70°C for 16 hours
IEC 60068-2-14	Change of temperature		-25°C and +55°C for 5 cycles
IEC 60068-2-30	Cyclic temperature		+25°C and +55°C for 5 cycles
IEC 60068-2-78	Damp heat - steady state		at +40°C for 240 hours
IEC 60255-21-1 Class 1	Vibration		10 Hz to 150 Hz, 1.0 g, 1.0 octave/min, 20 sweep cycle/axis
IEC 60255-21-2 Class 1	Shock and bump		5 g and 15 g
IEC 60255-21-3 Class 1	Seismic		5 Hz to 35 Hz, 1.0 g, 1.0 octave/min, 1 sweep cycle/axis

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