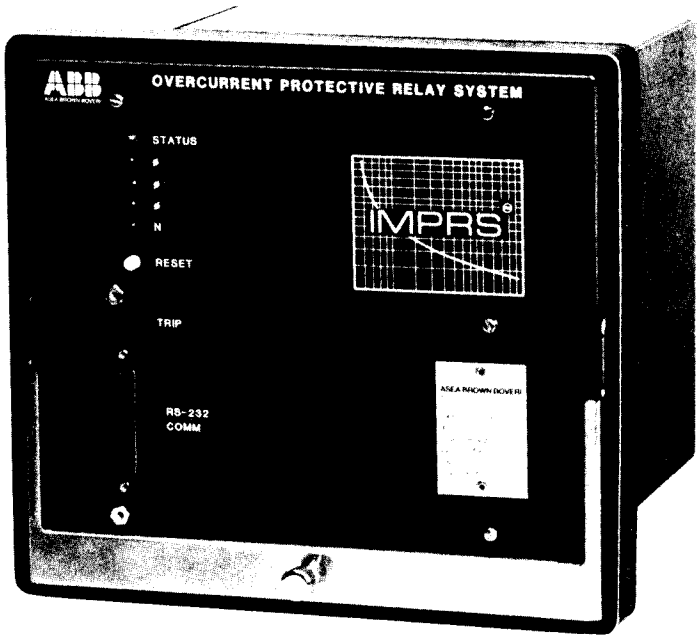
ABB Power T&D Company Inc.
Relay Division
Coral Springs, FL
Allentown, PA

July, 1991
Supersedes Bulletin 7.12.1-2,
pages 1-4, dated January, 1989
Mailed to: E, D, C/41-100C

Integrated Microprocessor-Based
Overcurrent Relay System
Drawout Construction
Device Number: 50/51, 50N/51N

IMPRS™ Overcurrent Relay



Features

- Phase and Ground Fault Protection
- Current Monitoring
- Accumulation of Breaker Interrupting Current
- Fault Event Recording
- Continuous Self-Diagnostics
- Communications Capability
- Non-Volatile Memory
- Drawout Construction
- Breaker Failure to Operate Alarm

Application

The IMPRS overcurrent relay is a multi-purpose microprocessor based protective relay system that is designed to provide phase and ground overcurrent protection in industrial, utility and commercial power systems.

The relay operates from standard 5A secondary current transformers. Models are available for use with either DC or AC control voltage sources.

Settings are programmable in the field by connecting a personal computer or hand-held programmer to the unit, or remotely through a communications systems. The software necessary for the personal computer to communicate with the relay system is provided at no additional cost with each order. This software also gives the user access to the advanced monitoring and event recording features of the IMPRS.

Phase Overcurrent Protection
Device Number: 50/51
The user has the choice of eight overcurrent characteristic curves: Inverse, Very Inverse, Extremely Inverse, Long Time Inverse, Long Time Very Inverse, Long Time Extremely Inverse, Short Time and Definite Time. Time dial selection for the definite time curve is 0-10 seconds in 0.05 second increments. Time dial selection for the other seven curves is 1 to 10 in 0.1 second increments. Pick-up current selection is from 1-15 amperes in 0.5 amp increments. A second model offers a current range of 0.2 to 0.3 amperes in 0.1 amp increments.

A three-phase instantaneous element adjustable 1-20 times the tap setting is provided for phase fault protection. The user may select one of three characteristic curves. The inverse instantaneous gives longer tripping times for low and moderate fault levels.

Ground Overcurrent Protection
Device Number: 50N/51N
The ground fault function provides an effective setting range of 0.4 to 3.0 amperes. Standard, inverse, and delayed instantaneous curves are provided for maximum flexibility in selecting the operating time.

Current Monitoring
Continuous three-phase and ground current monitoring is provided, including instantaneous currents, demand, and peak demand currents. An optional Current Display Unit may be mounted on the RS232 connector on the IMPRS front panel to give a continuous readout of the phase currents.

Fault Event Record
The fault event record stores the twenty most recent events that resulted in tripping the breaker. The stored data includes the protective function that operated, current in primary amperes for each phase and ground, the relay tripping time in seconds, and a date and time tag.

Self-Diagnostics
Equipment availability is enhanced by a self-diagnostic program that continuously tests the microprocessor, A/D converter, memory elements, and the internal power supply. Normal conditions are indicated by a green status light on the front panel. On a self-check failure the status light flashes, and an alarm contact transfers for annunciation of the condition.

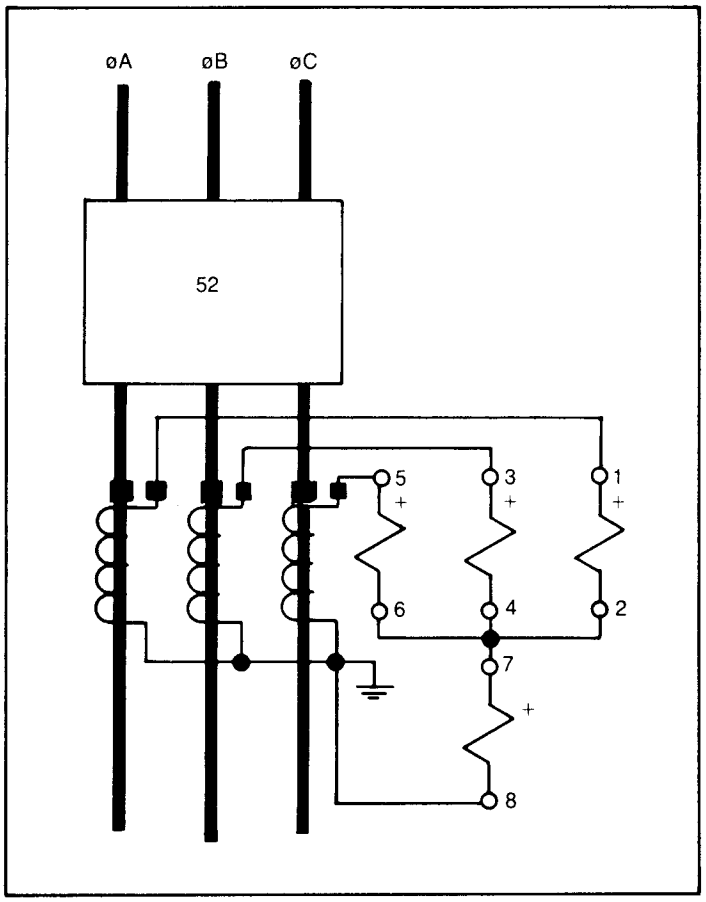
Output Contact Configuration
Internal switches are provided to program the function of the two output relays. A third output relay, the self-check failure alarm is not programmable in function.

Built-in Trip Test
A recessed trip-test pushbutton allows functional testing of the relay and breaker or starter. The pushbutton may be disabled by a software command.

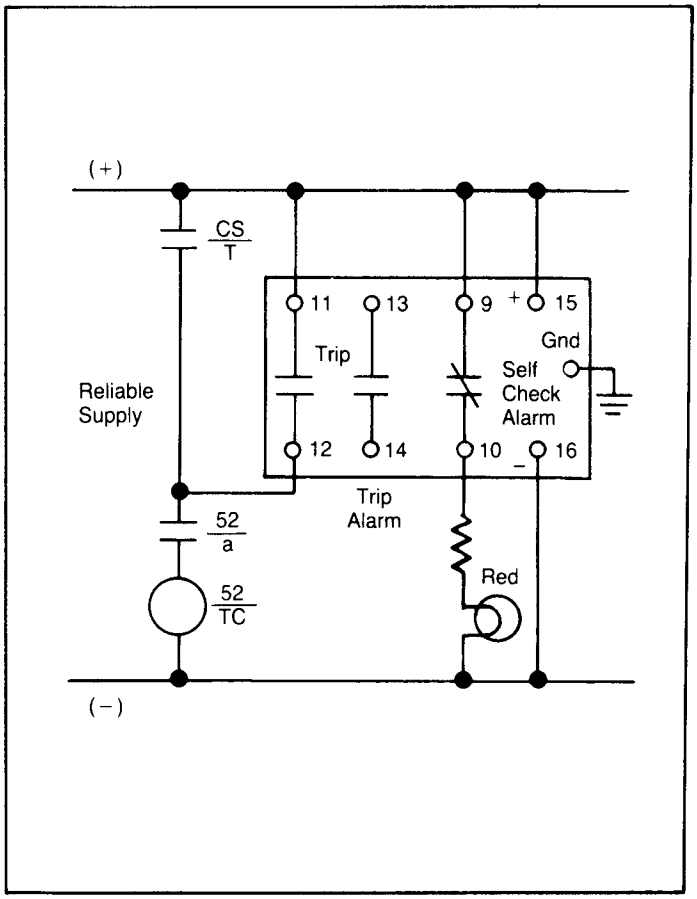
Drawout Construction
An automatic current transformer shorting feature and sequenced disconnects allow the relay to be totally withdrawn from its case. A unique rear circuit board accepts standard banana plug connectors and is clearly marked for convenient testing. A test plug unit is available for accessing the external wiring connected to the case.

Breaker Interruption Duty
The IMPRS relay system retains a summation by phase of the accumulated contact interruption duty for use as a guide to scheduling circuit-breaker or motor-starter maintenance.

Three-phase Connections



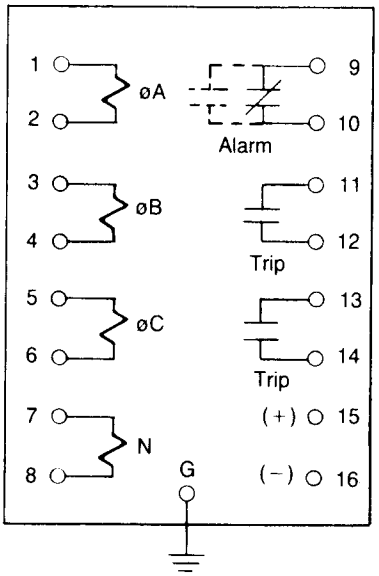
Typical Control Connections



IMPRS Relay System Fault Record

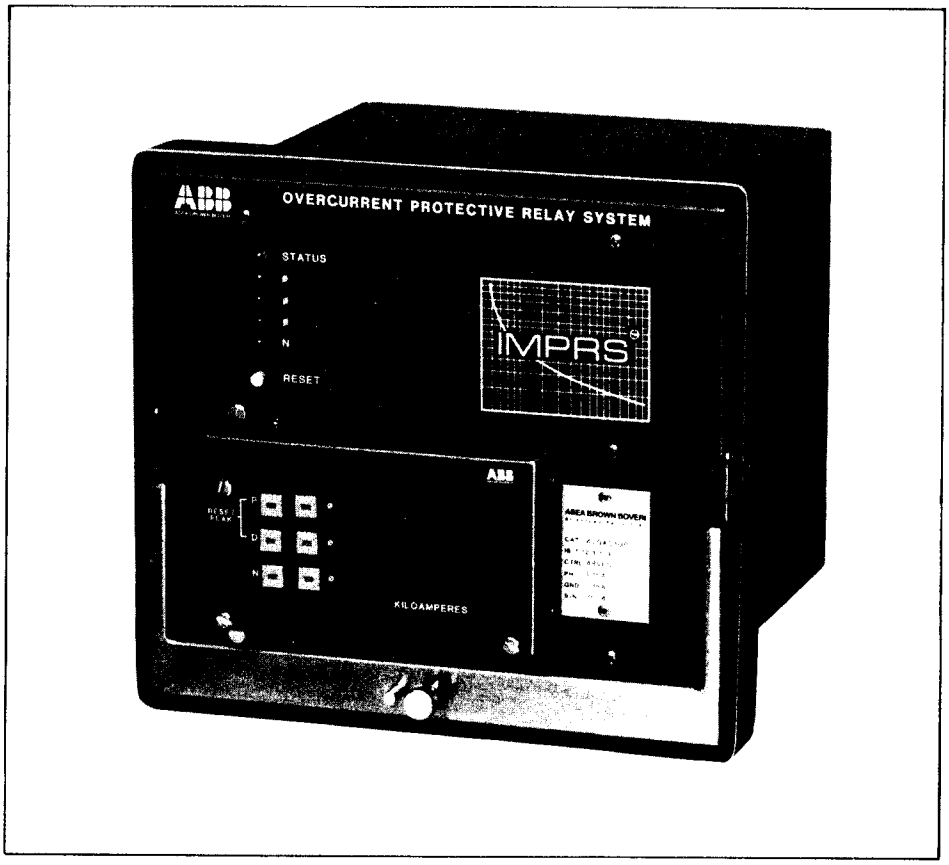
11-09-88 02:17:51							ABB Power T&D Co.
Fault #	Trip Element	Phase A	Phase B	Phase C	Neutral	Relay Trip Time (Sec)	Date/Time (DD-MMM-YY:HH:MM:SS)
30	50Neutral	1300	0	0	1300	00.05	10-JAN-88:10:42:03
31	51Neutral	1300	0	0	1300	00.55	10-JAN-88:10:43:12
32	51Neutral	1300	0	0	1300	00.55	10-JAN-88:10:44:02
33	50Phase	2300	2300	0	0	00.04	12-JAN-88:18:23:03
34	51Phase	2300	2300	0	0	00.74	12-JAN-88:18:23:18
35	BFO	2300	2300	0	0	00.74	12-JAN-88:18:24:09
36	50Phase	2413	0	2413	0	00.04	25-JAN-88:05:13:18
37	50Neutral	2413	0	0	2413	00.04	25-JAN-88:05:14:48
38	51Phase	1504	752	752	0	01.12	02-FEB-88:23:12:43
39	50Neutral	543	0	0	543	01.12	10-FEB-88:17:15:45
40	BFO	2205	2205	2205	0	00.04	12-FEB-88:13:05:32
41	BFO	2205	2205	2205	0	00.04	12-FEB-88:15:08:10
42	50Phase	2205	2205	2205	0	00.04	12-FEB-88:15:45:32
43	51Neutral	0	504	0	504	04.58	20-FEB-88:04:14:56
44	51Neutral	0	0	443	443	04.58	22-FEB-88:13:43:12
45	51Neutral	0	0	453	453	04.58	22-FEB-88:13:44:10
46	51Neutral	0	0	444	444	04.58	22-FEB-88:13:45:54
47	50Neutral	1042	54	54	934	00.05	04-MAR-88:01:05:55
48	50Neutral	1056	0	0	1056	00.05	04-MAR-88:01:06:15
49	50Neutral	1056	0	0	1056	00.05	04-MAR-88:01:06:55

Internal Connections



Self-check alarm contact (9-10) is convertible to normally-open or normally-closed.

Current Display Accessory



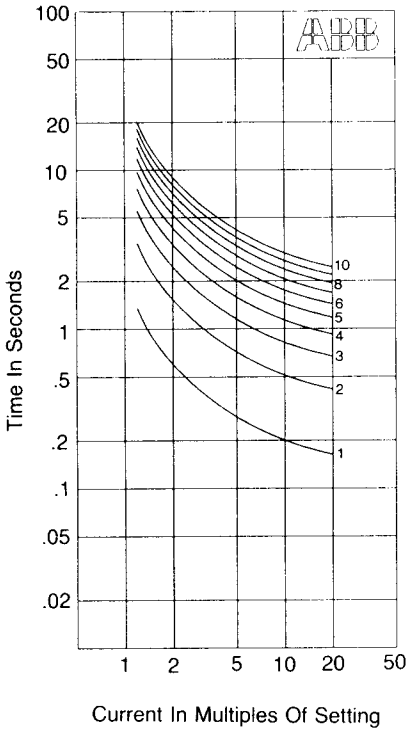
Output Relay Configurations

The chart shows the available output contact assignments.

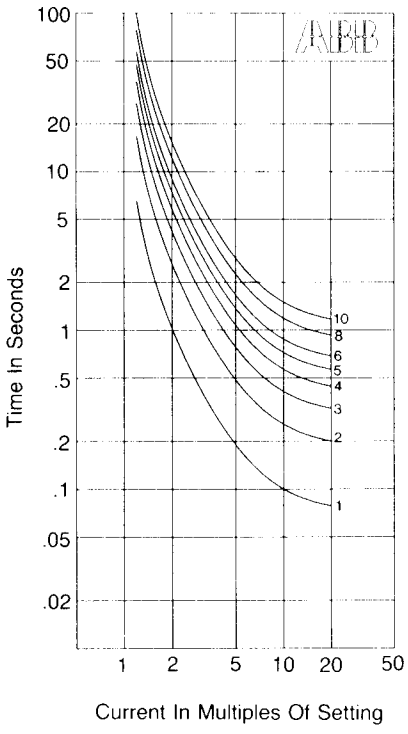
The third output (terminals 9-10) is always assigned to the self-check alarm function.

No.	Output No. 1 (11-12)	Output No. 2 (13-14)
1	51/51N	50/50N
2	All Faults	All Faults
3	50/51	50N/51N
4	51	50/51N, 50N

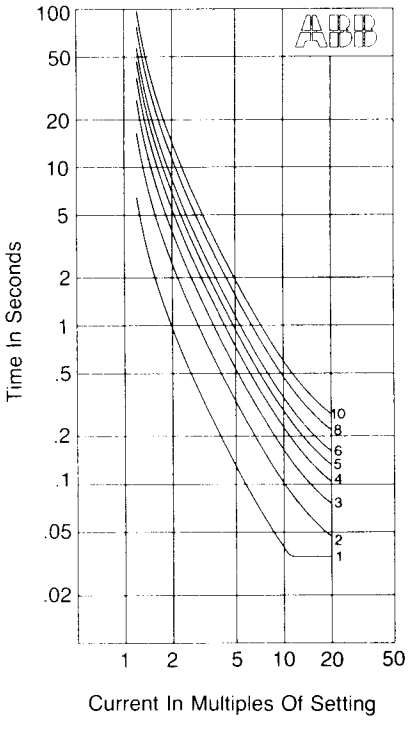
Time Characteristic Curves (Device Number: 51)



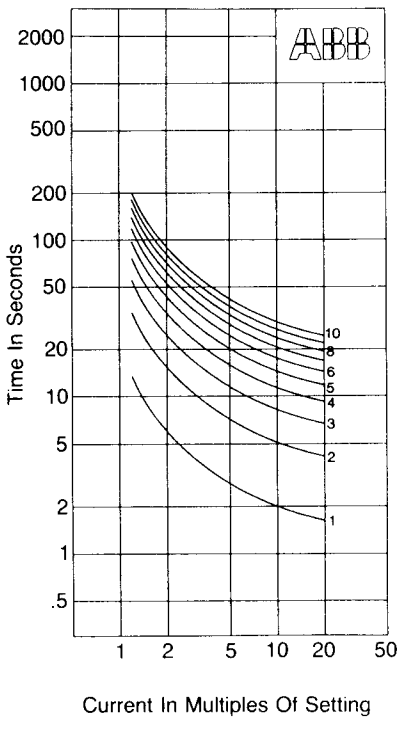
IMPRS Overcurrent
Inverse



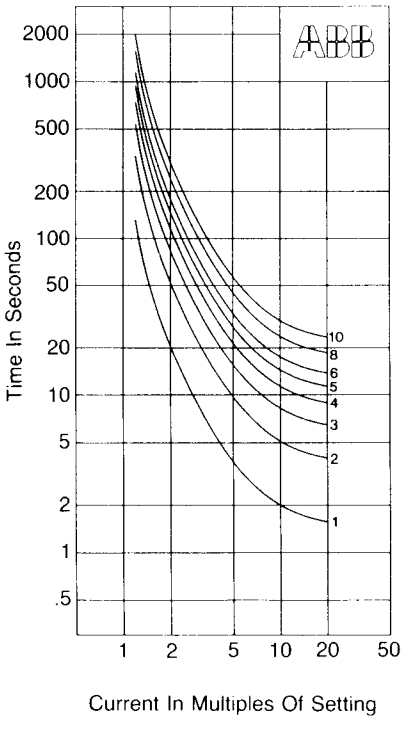
IMPRS Overcurrent
Very Inverse



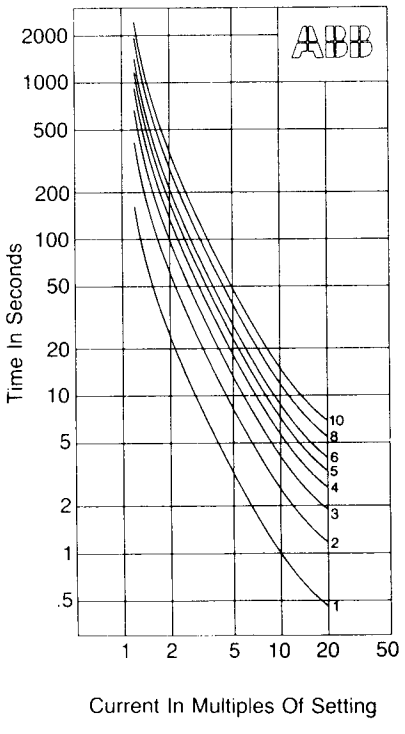
IMPRS Overcurrent
Extremely Inverse



IMPRS Overcurrent
Long Time Inverse

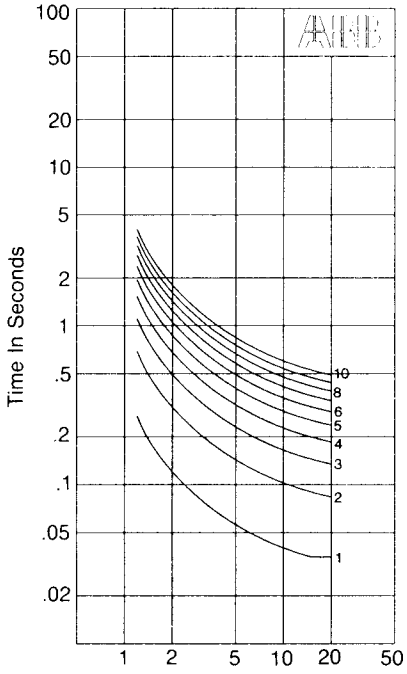


IMPRS Overcurrent
Long Time Very Inverse

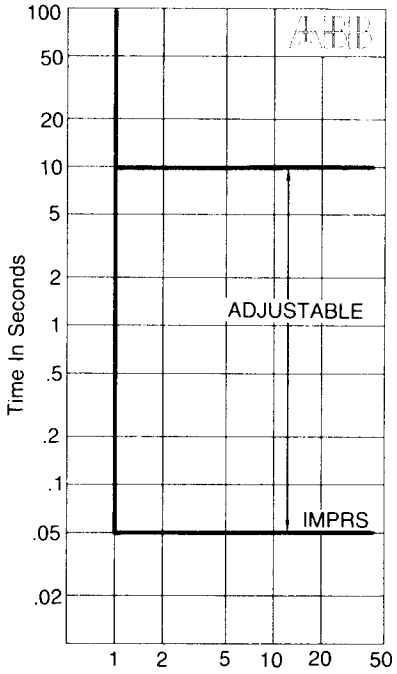


IMPRS Overcurrent
Long Time Extremely Inverse

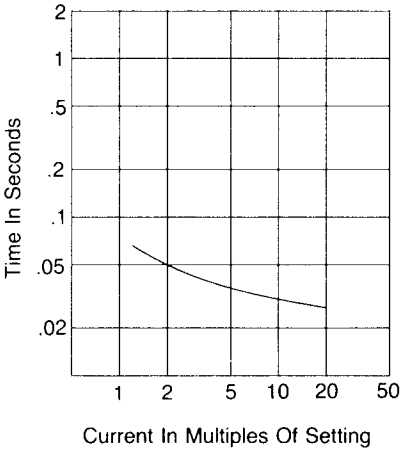
Time Characteristic Curves (Device Number: 51) Continued



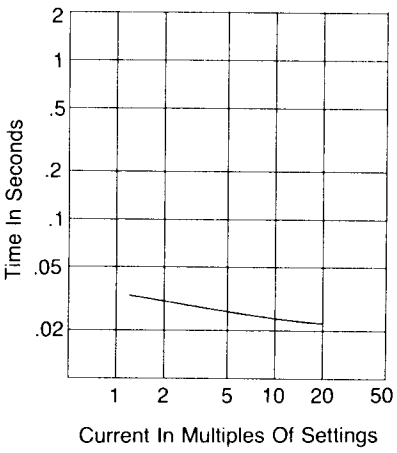
IMPRS Overcurrent
Short Time Inverse



IMPRS Overcurrent
Definite Time



IMPRS Overcurrent
Inverse Instantaneous



IMPRS Overcurrent
Standard Instantaneous

Specifications

Input Current Circuit:
Rating: 16A continuous, 450A for 1 second.
Burden: Less than 0.05VA at 5A.
Frequency: 50 or 60Hz nominal.

Overcurrent Functions:
Pickup: 1-15A in 0.5A steps and
0.2-3A in 0.1A steps.
Time Dial: 1-10 in 0.1 increments.
Definite Time: 1-10 sec. in 0.05 sec. increments.
Instantaneous: 0.5-20X pickup setting in steps of 0.1.
Curve Selection: Inverse, Very Inverse, Extremely Inverse, Long Time Inverse, Long Time Very Inverse, Long Time Extremely Inverse, Short Time, Definite Time.

Control Voltage:
Models available for:
125Vdc/120Vac nominal, 0.12A
48Vdc nominal, 0.32A
250Vdc nominal, 0.08A

Operating Temperature Range:
−20 to +70 degrees C.
For lower temperature rated models, consult factory.

Metering Accuracy:
+/−2% of pickup tap setting.

Communications:
Standard: RS-232-C port on front (25 pin).
Optional: Additional RS-232-C on rear (9 pin).
Data format: 8 data bits, 2 stop bits, no parity
Protocol: series of ASCII characters.
Baud Rate Selection: 300, 1200, 2400, 9600.

Output Contact Ratings:

at 125Vdc	at 250Vdc	at 120Vac	
30A	30A	30A	tripping
5A	5A	5A	continuous
0.3A	0.1A	2A	break inductive

Dielectric:
1500 Vac, 60 seconds, all circuits to ground.

Transient Immunity:
2500V, 1Mhz. bursts at 60Hz repetition rate, Fast Transient Test (ANSI C37.90.1), RFI Test at 10V/m, 27 to 1000MHz.

Weight:
Net 9 lbs.; boxed for shipment 10 lbs. (4.6kg).

Further Information

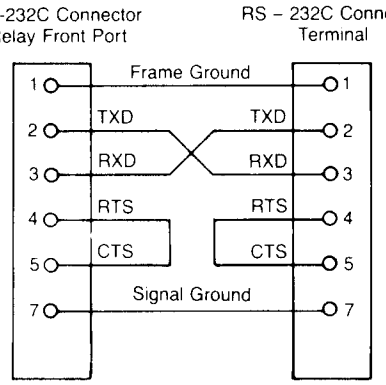
List Prices: PL 41-020
Technical Data: TD 41-025
Instruction Book: IB 7.12.1.7-1①
Set of Transparent Time-Current Curves available on request①
Other Protective Relays:
Application Selector Guide, TD 41-016

① Available upon request, only from Allentown Plant.

Communications Cable

Serial Port Cable Connection to a Terminal (Data Terminal Equipment). Cable Connectors Are Female, 25 Position, D – Subminiature.

See instruction book for other combinations.

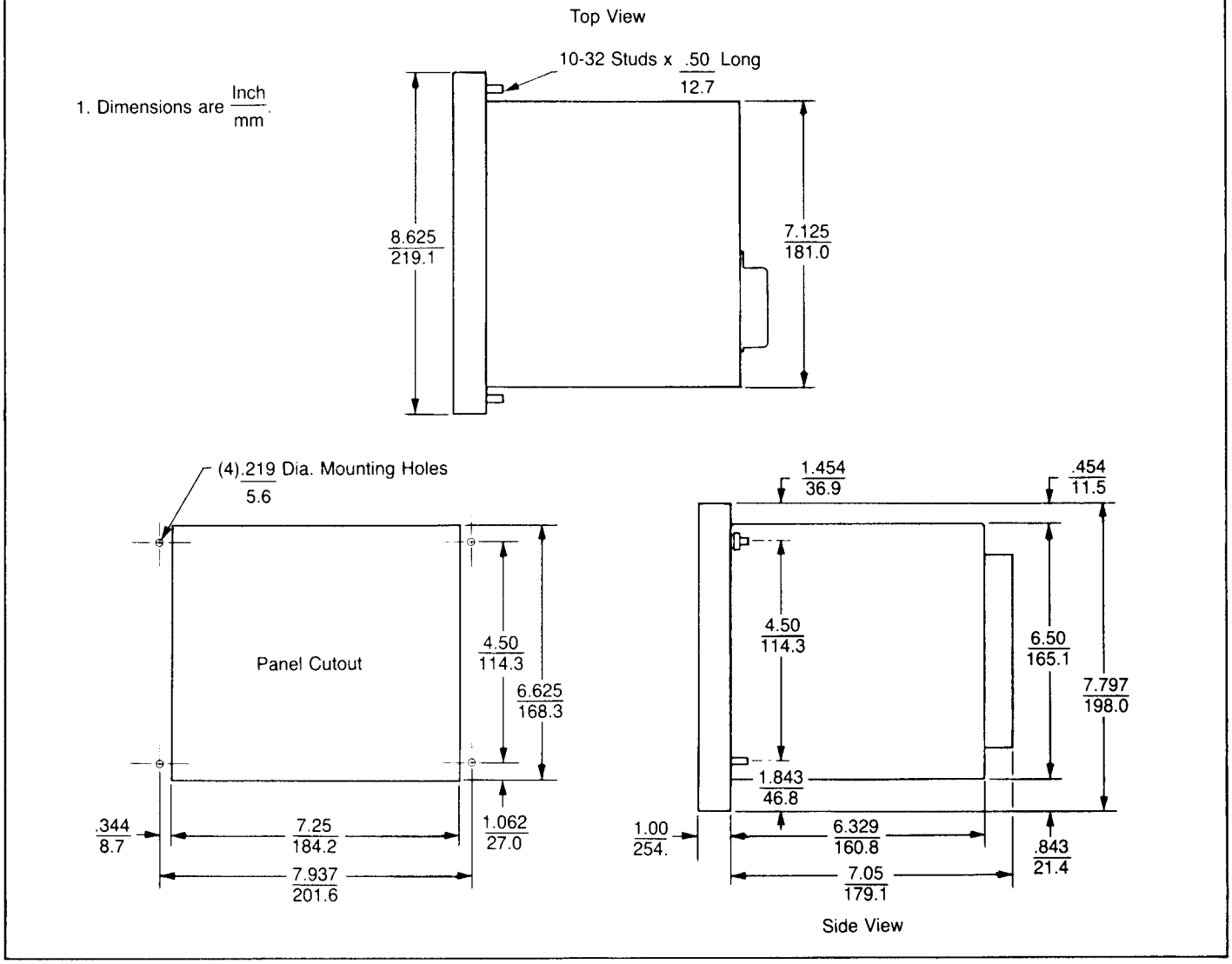


Communications Systems

IMPRS relays can be networked up to eight units using RS-232C and a multiplexer unit. Larger numbers can be networked using other communications protocols such as RS-485. Contact your sales representative or the factory for details.

Case Outline and Drilling

1. Dimensions are $\frac{\text{Inch}}{\text{mm}}$.



July, 1991
Supersedes Section 7.12.0.3, IMPRS on pages 1-2, dated January 1, 1990.
Mailed to: E, D, C/41-000C

Integrated Microprocessor-Based
Overcurrent Relay System
Drawout Construction

IMPRS™ Overcurrent Relay

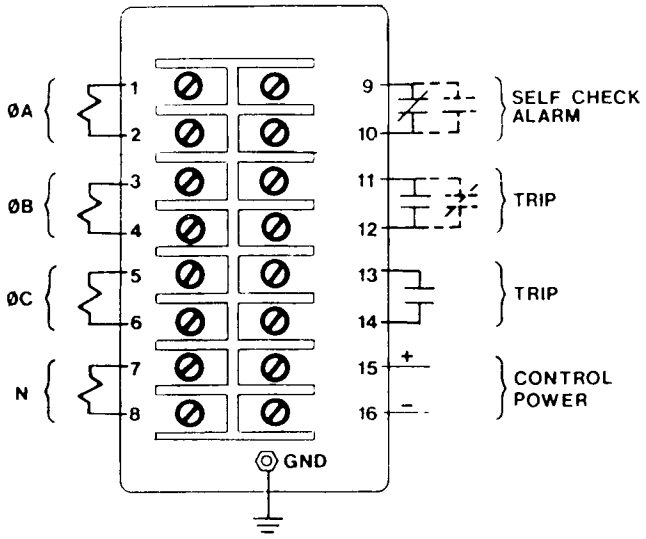
Overcurrent, IMPRS Protective Relay System (Device Number: 50/51, 50N/51N)

Time Unit Pickup Range		Curves, PH & GRD		Cont. Rating	Int. Conn.	Control* Voltage	Catalog Number
Phase	Ground	51	50				
1-15A	1-15A	Ext. Inv., Very Inv., Inverse, Short, Definite	STD, Inverse, Delayed	16A	612974	48 Vdc	470A0300
						125 Vdc/120 Vac	470A0400
						250 Vdc	470A0500
	0.2-3A					48 Vdc	470A1300
						125 Vdc/120 Vac	470A1400
						250 Vdc	470A1500
0.2-3A						48 Vdc	470A2300
						125 Vdc/120 Vac	470A2400
						250 Vdc	470A2500

Notes: 1. IMPRS is provided with front mounted RS-232 Communications Port. For additional rear RS-232 port change last digit of catalog number from 0 to 1. For additional RS-485 rear port change last digit of catalog number from 0 to 2.

Connection Diagram

612974
IMPRS
Protective Relay System



IMPRS Current Display Unit

Scale	Display	Mounting	Modes	Catalog Number
3 digits in Kiloamps	Ø1, Ø2, Ø3, neutral in load, demand or peak currents	Front mounted on RS-232 of IMPRS Relay	Stationary or Cycling	470X5000

IMPRS Hand Operated Terminal

Functions	Catalog Number
1. Scan Metering Quantities 2. Display/Edit relay settings 3. Determine the self-check status of the IMPRS	470X4000

Note: The Hand Operated Terminal is used as a portable hand held PC complete with carrying case, communication link, software program and AC adapter.