Multifunction Overcurrent Relay

COOPER Power Systems

Electrical Apparatus

150-13

IM30AB Overcurrent Relay

The IM30AB Overcurrent relay is a member of Cooper Power Systems' **Edison**® Series of microprocessor based protective relays and provides comprehensive phase and ground overcurrent protection. The IM30AB relay offers the following functions:

- Three levels of phase time overcurrent, definite time, and instantaneous elements. (50I/50/51)
- Three levels of ground time overcurrent, definite time, and instantaneous elements. (50IN/50N/51N)
- Two setting groups.
- Automatic cold load pickup
- Time tagged event recording.
- Blocking inputs and outputs for pilot wire selectivity coordination and fast bus trip logic.
- Breaker Fail.
- Harmonic filtering on neutral input.

The IM30AB also shares the following features common to all Edison Series relays:

- Simple five button man machine interface (MMI) allows access to all functions, settings, and stored data without the need for a computer.
- Bright electroluminescent display easily visible even in brightly lit environments.
- Draw-out design permits relay testing without disturbing connections to case.
- Modbus communication protocol and RS485 terminal on rear.

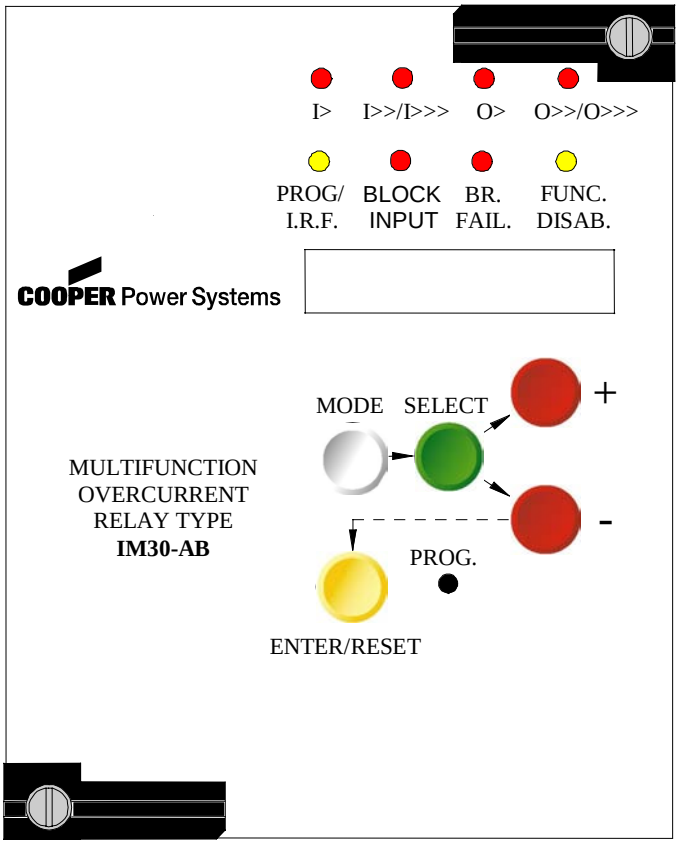


Figure 1
Front View of the IM30AB Overcurrent Relay

- Modular design allows the draw-out module to be fitted to a variety of space saving cabinet styles.
- Three programmable form c (SPDT) output contacts and one Form A/B contact.
- Pick-up (start-time) elements.
- Programmable reset characteristics.
- Dedicated power supply/relay fail output contacts.
- Event records.
- Cumulative trip counters.
- Auto-ranging power supplies.

APPLICATIONS

Any utility or industrial application requiring three phase and ground overcurrent protection. If only phase or ground protection is desired, the other elements may be disabled. Both time overcurrent and instantaneous elements are provided.

The programmable time current curves provide for coordination with practically any type of electromechanical or electronic overcurrent relay. The relay's first level overcurrent elements may also be set with definite time overcurrent elements, thereby acting as a one, two or three current level detector for phase or ground elements.

PHASE OVERCURRENT

The IM30AB offers low (I>), medium (I>>) and high set (I>>>) phase overcurrent elements. The low set element may be set to definite time or inverse time modes. When inverse mode is selected, the user may select from 8 inverse time curves. The medium set element operates in definite time mode only. The high set element operates instantaneously. Additional pick-up functions are available and may be assigned to output contacts. Any element may be separately disabled.

GROUND OVERCURRENT

The same elements as offered for phase overcurrent are also provided for ground overcurrent protection.

BREAKER FAIL

A programmable time delay relay is set equal to the breaker's clearing time. If the fault is not cleared (i.e., the element has not dropped out) before this timer expires, a breaker fail is indicated. This element may be programmed to one or more of the output relays.

TWO SETTING GROUPS

Two separate setting groups are provided. Switching between the two setting groups may be accomplished from the front panel, a contact input, or by Modbus communications.

COLD LOAD PICKUP

When enabled, the pickup settings of the low and medium set phase overcurrent elements are doubled whenever the inrush current during the first 60msec after breaker closing exceeds 1.5x the rated input current (1A or 5A). The normal pickup levels are restored when the phase current drops below 1.25x rated input current.

TARGETS

Eight bright LED targets are provided as follows:

- Phase inverse overcurrent
- Phase medium or high set overcurrent
- Ground inverse overcurrent
- Ground medium or high set overcurrent
- One red LED illuminates if any functions are blocked.
- One red LED illuminates in the event any protective function is disabled.

In addition, a separate LED flashes when the relay is in programming mode, and illuminates constantly upon relay or power supply failure.

RESET CHARACTERISTICS

The output relays may be programmed to reset in one of two manners.

- Instantaneously upon the input or calculated quantities dropping below the pickup value.
- Manual reset (by front panel or computer command) only.

MEASUREMENTS

Each of the three phase currents and the ground current are measured and displayed.

In addition the relay stores the maximum phase and ground inrush currents since the last energization.

EVENT RECORDS

The IM30AB records the values of all metered quantities at the time of the last five trip events. The event records are time stamped.

OUTPUT ELEMENTS

The following functions may be programmed to one or more of the output relays. The only limitation is that pick-up and time delay functions may not be assigned to operate the same output relay(s).

- Pick-up function of low set phase overcurrent element.
- Time delayed function of low set phase overcurrent element.
- Pick-up function of medium set phase overcurrent element.
- Time delayed function of medium set phase overcurrent element.
- Pick-up function of high set phase overcurrent element.
- Time delayed function of high set phase overcurrent element.
- Pick-up function of low set ground overcurrent element.
- Time delayed function of low set ground overcurrent element.
- Pick-up function of medium set ground overcurrent element.
- Time delayed function of medium set ground overcurrent element.
- Pick-up function of high set ground overcurrent element.
- Time delayed function of high set ground overcurrent element.
- Breaker fail.

BLOCKING LOGIC

The IM30AB includes programmable input contacts which may be used in conjunction with internal blocking timers to implement fast bus trip logic (see R150-10-1 for more information) or pilot wire relay selectivity coordination.

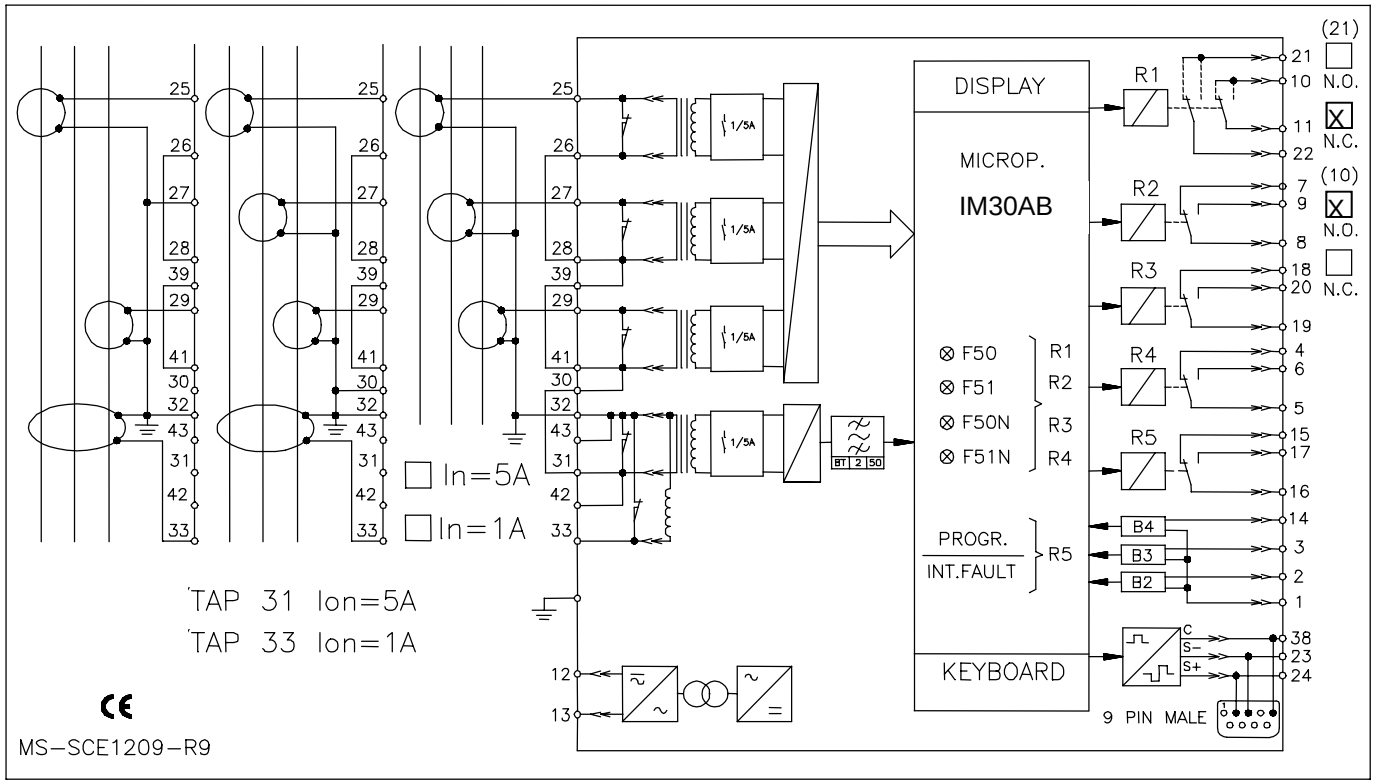
MODBUS COMMUNICATIONS

Modbus RTU protocol is included which provides access to metering, settings and event data.

Table 1 : Functional Specifications

Nominal frequency setting range	50 or 60 Hz
Phase CT Primary current rating	1 to 9999A in 1A steps
Grond CT Primary current rating	1 to 9999A in 1A steps
Phase Overcurrent Elements	
Low Set (may be disabled)	
Characteristic	Inverse or definite time. When in Inverse mode, may be selected between IEC A, B and C curves, or IEEE moderately inverse, very inverse, inverse, extremely inverse, or standard inverse curves
Pick up level	0.25 to 4 pu of rated input current in 0.01pu steps
Time delay	0.05 to 30.0 seconds in 0.01 second steps
Medium Set (may be disabled)	
Characteristic	Definite time
Pick up level	0.5 to 40.0 pu of rated input current in 0.1 pu steps
Time delay	0.05 to 3.00 seconds in 0.01 second steps
High Set (may be disabled)	
Characteristic	Instantaneous
Pick up level	0.5 to 40.0 pu of rated input current in 0.1 pu steps
Ground Overcurrent Elements	
Low Set (may be disabled)	
Characteristic	Inverse or definite time. When in Inverse mode, may be selected between IEC A, B and C curves, or IEEE moderately inverse, very inverse, inverse, extremely inverse, or standard inverse curves
Pick up level	0.25 to 4 pu of rated input current in 0.01pu steps
Time delay	0.05 to 30.0 seconds in 0.01 second steps
Medium Set (may be disabled)	
Characteristic	Definite time
Pick up level	0.5 to 40.0 pu of rated input current in 0.1 pu steps
Time delay	0.05 to 3.00 seconds in 0.01 second steps
High Set (may be disabled)	
Characteristic	Instantaneous
Pick up level	0.5 to 40.0 pu of rated input current in 0.1 pu steps
Breaker Fail Timer	0.05 to 0.75 seconds in 0.01 second increments
Cold Load Pickup Threshold	Fixed at 1.5pu rated CT current for ON, turns OFF when current drops below 1.25pu

Figure 2 - Wiring Diagram for the IM30AB Relay



ORDERING INFORMATION

Construct the catalog number from the following table:

Base Relay Model	Power Supply[1]		Rated CT Input[2]		Case Style	
	Code	Description	Code	Description	Code	Description
PRIM30ABJ	L	24-110V AC/DC	1	1A	S	Single case
	H	90-220V AC/DC	5	5A		

Example: PRIM30ABJL5S is an IM30AB with low range power supply, 5A CT inputs, in a single relay case.

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[1] The power supplies are user replaceable and interchangeable. See catalog section 150-99.

[2] The rated CT input is jumper selectable. If ordered incorrectly, the user may draw the relay out of its case and change the jumper setting.