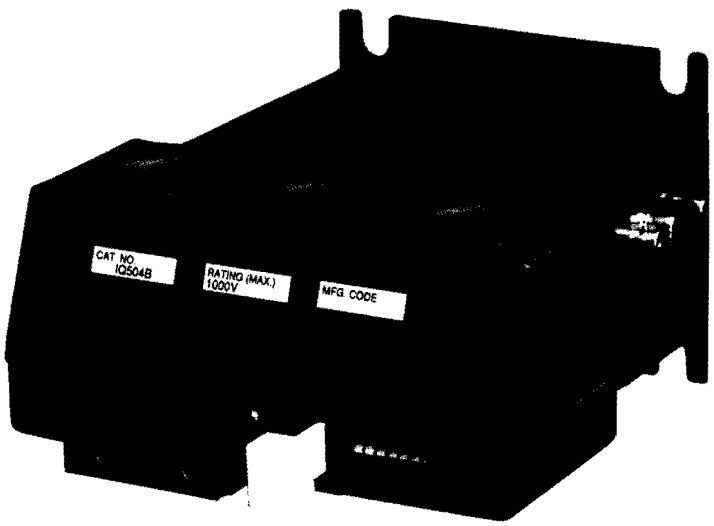
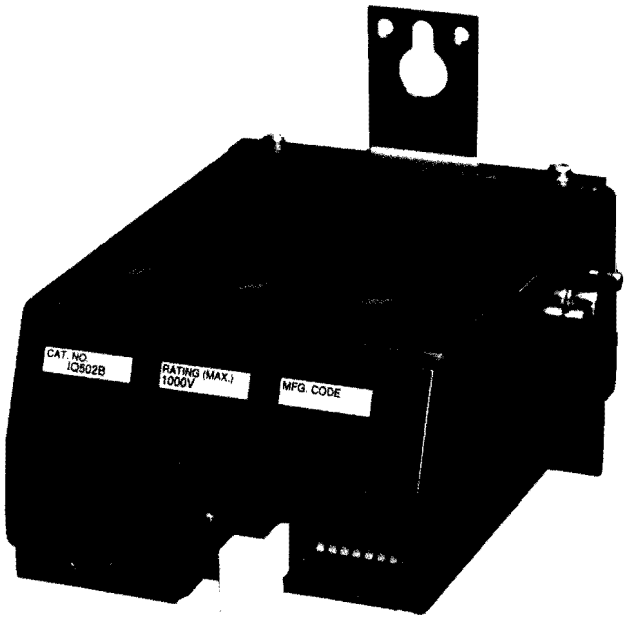
IQ-500 Modular Overload Relay





Application

The IQ-500 Current-Sensing Protective Relay is a multifunction adjustable (class 5, 10, 20, or 30) motor protective relay with optional communications capabilities. Several functions are incorporated into the base relay as standard:

- Overload (Overcurrent) Protection
- Phase-Unbalance Protection
- Phase-Loss Protection
- Ground-Fault Protection (Class II)

The base relay can serve as the initial building block for a Motor Protection System by adding the IQ500M Special Function Module. The module can address application-related motor load functions with the additional features:

- Underload Protection
- Long Acceleration
- Jam Protection
- Load Control

The IQ-500 can provide a cost effective alternative to several conventional protective relays. Used with the Westinghouse IMPACC system, a low-cost local area communication network, information such as current values, status, set-point values, and cause of trip can be displayed remotely. The IQ-500 relay is ideal for a variety of industrial applications such as mining, timber, material handling, air conditioning, compressors, waste-water treatment plants, and petrochemical industries.

Features – IQ-500

- Adjustable overload class; trip within 5, 10, 20, or 30 seconds at six times rating
- Designed for 1000 volt and less distribution systems
- Form C (NO/NC) contact on output relay
- Isolated alarm relay output contact
- Communications capability using Westinghouse IMPACC network
- Manual or automatic reset, selectable
- Overload, Class II ground-fault, phase-unbalance and single-phase protection are standard
- Bi-colored (red/green) LED indication for device status
- Special function module adds protection for underload and jam conditions, also provides for long acceleration
- Optional load control feature available with special function module

- Feed-through current transformer windows for contactors, NEMA sizes 1 through 4
- Fits mounting footprint of Westinghouse MORA relay
- Panel or starter mountable
- Cause of trip is held in memory through any power loss

Direct Customer Benefits

- The IQ-500 provides a cost effective alternative to current relays, ground-fault relays, and phase-loss or phase-unbalance relays. No external current transformers are required since they are internal to the IQ-500.
- LED indications allow for ease in determining device status, including overload, phase-unbalance, or ground-fault trip.
- DIP Switches used to select functions and settings on base relay are clearly marked and covered with screw-on plastic covers.
- Bell alarm contact is available for remote status indication.
- The IQ-500 can be reset automatically or manually (either a true manual or remote electrical reset).
- On an automatic reset, the reset times can be selected for long (90 seconds) or short (10 seconds) delay.
- Overload class is selectable using DIP Switches for 5, 10, 20, or 30 seconds, maximum trip times at six times rated current.
- Device can be set for different motor full-load currents without additional parts or modules.
- Connections to control power, trip relay, and bell alarm relay are made to the IQ-500 via a plug-in terminal block.
- Phase-unbalance, single-phase, and ground-fault protection provided as standard.
- Installer sets operating frequency at 50 or 60 hertz via a DIP Switch.
- For NEMA size 5 and larger controllers the IQ-500 can be used with external current transformers.

Optional Customer Benefits

- With the addition of the IQ500M Special Function Module the enhanced protection includes jam (overtorque) and underload, and provides long acceleration time (high inertia load).
- The underload and jam protection functions each have independent Form C output relays as part of the module. In addition, the underload and jam functions each have their own LED's for indication of their respective status.
- The underload and jam functions also have separate selectable trip levels and adjustable trip-delay and start-delay settings.
- The IQ500M can be used as a load control module that allows "shedding and restoring" a particular load that contributes to the load being monitored.
- The PONI (Product Operated Network Interface) card attaches directly to the base relay or special function module for interfacing with Westinghouse IMPACC Communications System.

List Prices and Catalog Numbers

IQ-500 relays have an insulation voltage rating of 1000 volts.

Relay	Ampere Range (A)	Maximum Horsepower at: 200 volts	230 volts	460/575 volts	Control: 110 V, 50 Hz or 120 V, 60 Hz	Control: 220 V, 50 Hz or 240 V, 60 Hz	List Price
IQ502	3.4-66	10	15	25	IQ502A	IQ502B	**$720**
IQ504	11-208	40	50	100	IQ504A	IQ504B	**$720**

Special Function Module (all sizes): IQ500M; **List Price $435 each.**

Devices should be ordered by catalog number.

Operation

The IQ-500 Modular Overload Relay utilizes built-in current transformers to translate motor currents into logic level signals. These signals are fed into a microprocessor network containing a thermal model of the motor. The thermal model is based on an I^2t function and the various overload class characteristics. The output signal to the starter is a Form C (S.P.D.T.) relay with a contact rating code of C300 per UL508, 1800 maximum volt-amperes on make and 180 maximum volt-amperes on break. The operating temperature range of the IQ-500 is from $-20°$ to $+60°C$.

Mounting

The IQ-500 can be either panel-mounted or starter-mounted, attached to a Westinghouse contactor using the universal mounting brackets that are supplied with the relay.

Base Relay (IQ502/IQ504)

Manual or Automatic Reset:
- Installer chooses manual or automatic reset.
- Manual reset can be local or remote (with a pushbutton).

Another option is manual reset from a remote terminal using a Westinghouse PONI card and the IMPACC network.

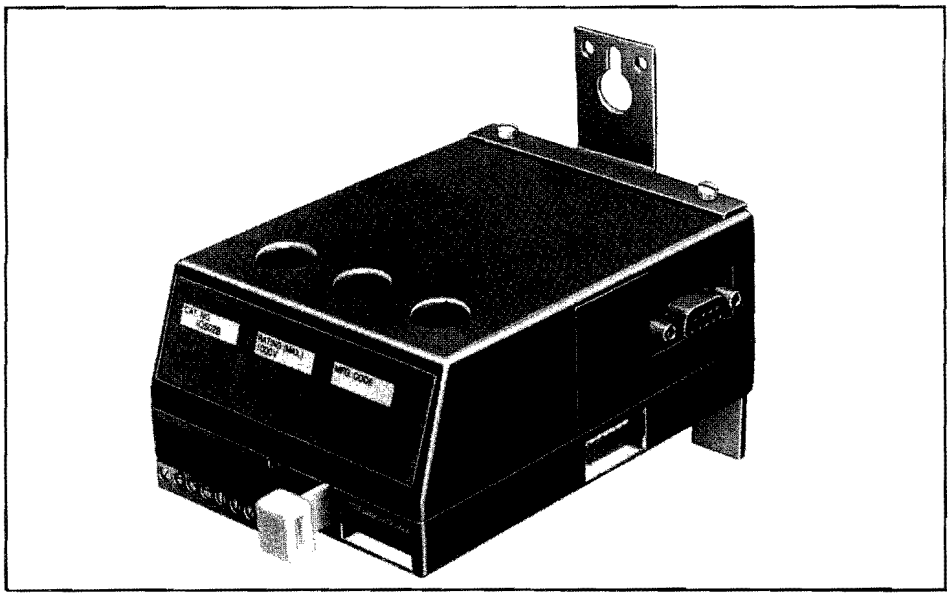


Fig. 1 IQ-500 Base Relay (IQ502 Shown)

Overload Class:
- DIP Switch selectable for overload class 5, 10, 20, or 30
- Allows selection to the closest desired time-current curve

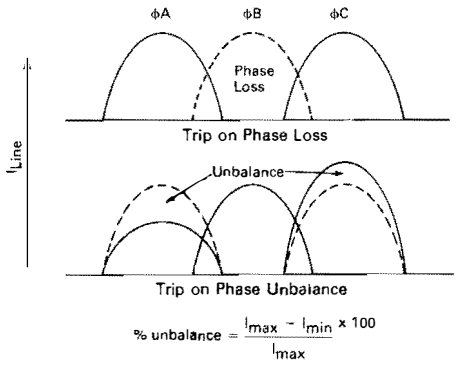
The class number represents the maximum tripping time (in seconds) when carrying 600% of rated (trip) current. The corresponding reset times are:
— class 5, reset = approximately 50 seconds
— class 10, reset = approximately 100 seconds
— class 20, reset = approximately 200 seconds
— class 30, reset = approximately 300 seconds

These are the reset times for an automatic reset. Where manual reset is chosen these are the minimum times which must elapse before a manual reset is allowed.

Overload Protection:
- Full selection from 3.4 to 66 amperes on IQ502 and from 10.8 to 208 amperes on IQ504
- Overload DIP Switches provided with cover to prevent tampering
- No separate heater modules required

Frequency:
- Selected via DIP Switch for 50 or 60 hertz
- Same product will operate at either frequency

Phase-Unbalance Protection:
- Trips relay under unbalanced line currents
- Phase-unbalance can be set for 10%, 20%, 50% or inhibit
- Not fooled by other motors supplied by the same feeder
- Relay will trip within 3 seconds on a complete phase loss



$$\% \text{ unbalance} = \frac{I_{max} - I_{min}}{I_{max}} \times 100$$

Phase-unbalance protection is an economical solution for applications such as pump panels or roof-top ventilators where the control is not manned and fuses in the distribution system create a possible phase-failure condition.

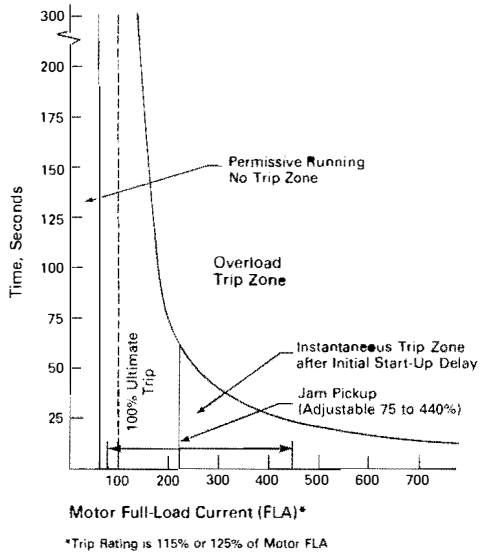
Ground Fault:
- Class II ground-fault protection
- Choice of 5, 7, or 12 amperes or inhibit
- Distinct LED pattern for trip indication

As defined in UL1053, Class II ground-fault protection means that there is a circuit incorporated that prevents the contactor from opening if the fault current exceeds the interrupting capability of the contactor (starter) with which it is intended to be used.

Special Function Module (IQ500M)

Jam (Overtorque) Protection:
- Relay built into the special function module will trip on overtorque condition
- Replaces conventional circuit that requires CT, timer, relay and other components
- Choice of motor starting lockout-time
- Trip current adjustable via DIP Switches
- Separate LED for status of jam condition
- Adjustable 75% to 440% of trip rating

The jam feature is particularly useful in material handling operations, where any current over a fixed amount usually indicates a load blockage problem. The jam feature can minimize the damage that would normally occur to both equipment and material in the time required for the overload relay to trip on a locked-rotor condition.



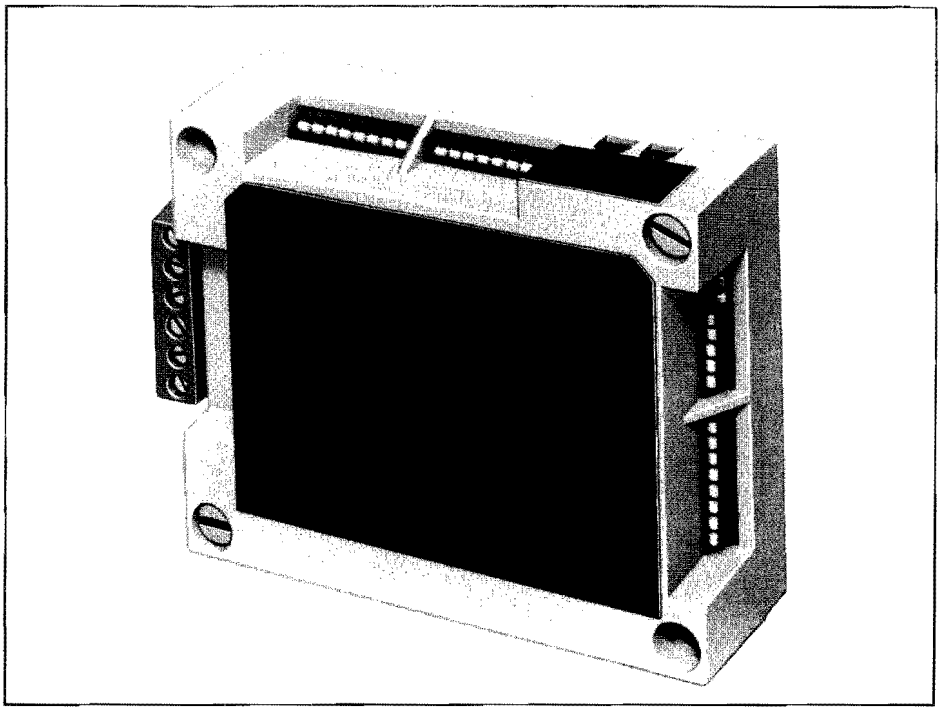


Fig. 2 IQ-500 Special Function Module (IQ500M)

Long Acceleration:
- Permits extra acceleration time beyond the characteristic of the overload class
- Needed for high inertia loads
- Modifies lower portion of overload curve only so that overload protection is retained after motor reaches rated speed
- Range adjustable from 12 to 68 seconds

The long acceleration feature offers superior performance wherever locked-rotor times must be longer than usual. Some typical examples include motors with large inertia loads or a long motor acceleration time with reduced-voltage starting.

Underload Protection:
- Senses loss of motor load
- Trip level adjustable from 20% to 76% of selected trip rating
- Relay trips when motor current drops below setting
- Replace or supplements flow and pressure switches
- Ideal for conveyors, belt-driven equipment, liquid-cooled pumps

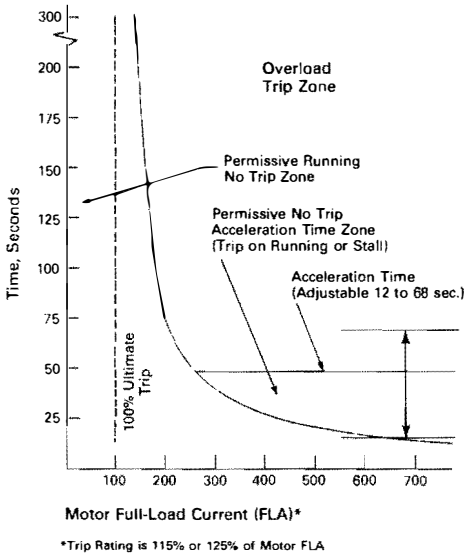
One application for underload protection is a material handling system where the underload feature replaces speed switches on idlers to detect a broken belt.

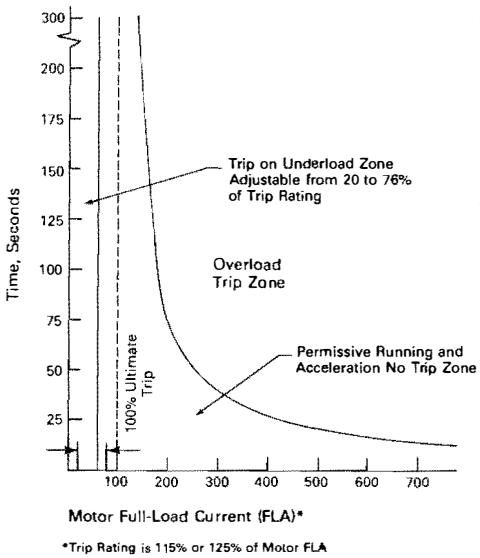
Module-Only or Both Trip:
- Special function trip signals can be merged or separated
- Allows tripping of the special function module only or the module and the base relay together

Load Control:
- Separate output relay for load control
- Controls the motor in a remote branch circuit
- Remote motor can be started or stopped based on a percentage of current being monitored
- Range of time-delays associated with load restore ("pickup") and load shed ("drop-out") from 0 to 63 seconds

NOTE: When the special function module is used for load control, jam and underload protection are not available.

Load control is ideal for certain conveyor system applications. If a main conveyor is being fed from a secondary conveyor the main conveyor may become overburdened. With an IQ500M special function module you can choose to stop the motor operating the feeder conveyor until the main conveyor can clear its load.





Further Information
Westinghouse IMPACC Network, see Catalog 25-000 (13th edition), pages 362 to 370.

Westinghouse Electric Corporation
Distribution and Control Business Unit
Electrical Components Division
Pittsburgh, Pennsylvania, U.S.A. 15220

Printed in U.S.A.

December 1990