

# IPB Integrated Protection Relay

## MDA Ex (ia) 10035, AUS Ex 2067X

### 1. Description

The Ampcontrol IPB Integrated Protection Relay (Version IPB6V0.1) is an intelligent protection relay based on microprocessor technology.

The integrated relay provides the necessary functions required for protecting electrical outlets supplying underground mining machinery. All of the protection functions are combined into a compact, plug-in unit, which can be easily changed out to minimise down time in the event of a problem with the relay.

The IPB Relay can provide machine communication through the use of a Remote Termination Unit (RTU-2) connected between the pilot and earth at the machine end of the trailing cable. Through the use of the RTU-2 Remote Termination Unit the relay parameters are automatically up loaded from a remote machine when a cable is inserted into a power outlet.

The IPB Relay has 5 Digital inputs, which feed into a microprocessor unit. The microprocessor has been programmed to control three output relays. MCR for the main contactor and CBR for the circuit breaker. RL3 can be turned off or configured to follow the Fan Interlock Drive output of the IPB Relay. All of the tripping logic and outlet control is performed by the microprocessor, so that virtually no external control is required.

Extensive information display and monitoring features are included to facilitate fault finding and system trending. This information can be read locally on the IPB Remote Display Module (RDM-1K) or remotely via a communication link.

Opto Isolated Outputs are available for connection to optional LED or Relay Modules to provide additional "run" and "trip" indications. The Ampcontrol Relay Output Module (ROU) enables these indications to be interfaced with a PLC.

**See IPB User Manual E06509 for full details.**

### 2. Protection Functions

- Earth leakage
- Earth Fault Lockout
- Earth Continuity
- Overcurrent/Overload
- Short Circuit
- Contactor Fail



### 3. Features

- Machine Communications
- User friendly. Relay and Remote Termination Unit programmed from the Remote Display Module
- Microprocessor based
- Fail safe operation
- Diode or Remote Termination Unit operation
- IS Remote Display Module - Ex (ia)
- 120 Event Log
- Local or remote operation
- Sequencing and remote communication via PLC link
- Plug-in for quick change out
- Fan Interlocking provided on any outlet
- Thermal modelling
- 21 Status messages to indicate what is required to energise the outlet. This is the default page on power up.
- Functions normally for a period of two (2) seconds during extreme power dip or power loss.
- Relay & Digital Input Status to aid fault finding
- Mines Department Approved.

### 4. Application

The IPB Integrated Protection Relay is Mines Department Approved for use in mining operations. The relay also suitable for industry for the protection of motors.

For the protection of mining equipment in hazardous areas the relay is installed in a flameproof enclosure with the Remote Display Module being installed outside the closure. This is possible because of its intrinsically safe capability.

#### 4.1 Sequence Control

Through machine communication, the identity of the machine can be transferred via serial communications to a PLC. This allows the PLC to arrange sequencing particularly in longwall installations.

## 4.2 Fan Interlocking

A fan interlocking facility can be selected to prevent outlets from being energised until a mine ventilation fan is operational. This facility eliminates the need for dedicated outlets.

## 5. Specifications

### **Auxiliary Supply Volts:**

110vac  $\pm$  20% 10VA, 50Hz  $\pm$  2Hz

### **Earth Leakage Protection:**

Trip setting 100-500 mA in 50mA increments

Time Delay - Instantaneous (<80mS), 150mS - 470mS in 40mS increments

### **Earth Continuity Protection:**

Reset if resistance is <45 ohms

Trip if resistance is > 45 ohms

Shunt Leakage Trip if <1500 ohms

Operating Time 80, 120, 160, 200, 300, 400, 500 mS

Pilot cable parameters - C < 0.2 uF, L < 10mH

### **Earth Fault Lockout Protection:**

Lockout if resistance is:

415V < 4.15k ohms
1000V < 10k ohms
3.3kV < 33k ohms

Test time 1 second

### **Overcurrent / Overload Protection:**

Current Range: 7.5 to 464 Amps (60 to 116 A in 4A increments x multiplier)

Current Multiplier: 1/8, 1/4, 1/2, 1, 2, 4 times

Time Multiplier: 0.05, 0.075, 0.1, 0.15, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 1.0 times

Cooling Multiplier: 0.2, 0.3, 0.4, 0.5, 0.8, 1, 2, 5, 10, 20, 50 times

### **Current Balance:**

Trip Settings: 5%, 10%, 20%, 50% and off

### **Short Circuit Protection:**

Trip Setting: 3 to 10 times in 0.5 increments  
(times full load)

Trip Time: 20, 40, 60, 80, 100, 120, 160 mS

### **Back EMF Timer:**

Trip Delay Settings: 2, 5, 10 and 20 Seconds

**Machine Numbers:** Can be allocated from 1 to 40

### **Fan Current**

Threshold Level: 32% to 96% in 8% increments (% of full load current)

### **Undervoltage Protection:**

Selectable from 20% to 80% in 10% increments

Trip Delay 800 mS

### **Serial Communications:**

For information on Protocol and hardware requirements see DNET-IP2 Serial Communication System User Manual.

### **Relay Contacts:**

MCR, CBR, RL3

1 N/O 5A/190VAC 100VA max

1 C/O 5A/190VAC 100VA max

## 6. Equipment List

E06401	Integrated Protection Relay IPB6V01
E06452	IPB Remote Termination Unit RTU-2
E04909	IPB Base Plate
E06437	IPA/IPB Remote Display Module RDM-1K
E04705	Earth Fault Test Module - 415V
E04706	Earth Fault Test Module - 1kV
E04707	Earth Fault Test Module - 3.3kV
E04974	IPB Pilot Protection Fuse Holder
E04981	IPB Pilot Protection Fuse Holder c/w 3A Fuse
E04051	110V Cable Connection Module
E04049	415V Cable Connection Module
E04003	1000V Cable Connection Module
E04050	3.3kV Cable Connection Module
E04801	IPA/IPB Relay/LED Output Module
E04154	3A Fuse (Box of 10)
E06509	User Manual