

HPB INTEGRATED PROTECTION RELAY

Electrical Protection

Description

The Ampcontrol HPB Integrated Protection Relay (6.6kV, 11kV, or 22kV) is an intelligent protection relay based on microprocessor technology. The relay has been specifically designed to operate with very high interference to the pilot conductor that occurs on cables in open cut mining operations. This is more prevalent on a non-symmetric position of the pilot and earth conductors.

The integrated relay provides the necessary functions required for protecting electrical outlets supplying draglines, shovels, drills etc. 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 HPB Relay can provide machine communication through the use of a HPB Termination Unit (HTU-1) connected between the pilot and earth at the machine end of the trailing cable. Through the use of the HTU-1 Termination Unit the relay parameters are automatically up loaded from a remote machine when a cable is inserted into a power outlet.

The relay can perform an automatic “H.V. Insulation” test on the cable prior to the closure of the main contactor. The results of the test are displayed on the HPB Display Module (HDM-1) and can be remotely monitored.

The HPB Relay has 5 digital inputs, which feed into a microprocessor unit. The microprocessor has been programmed to control three output relays. Relay MCR for the main contactor and Relay CBR for the circuit breaker. RL3 is used to control the supply to the Cable Connection Module enabling it to perform the Earth Fault Lockout test. All of the tripping logic and outlet control is performed by the microprocessor, so that only minimal 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 HPB Display Module (HDM-1) 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 HPB User Manual 117829 for full details.

Features

- Machine Communications
- Insulation Test on the cable prior to closure of the main contactor
- User friendly. Relay and Remote Termination Unit programmed from the Remote Display Module
- Microprocessor based
- Fail safe operation
- Resistor or Remote Termination Unit operation
- 120 Event log
- Local or remote operation
- Remote communication via PLC link
- Plug-in for quick change out
- Nine Status messages to indicate what is required to energise the outlet
- Functions normally for a period of two (2) seconds during extreme power dip or power loss.
- Relay & Digital Input Status to aid fault finding.



Protection Functions

- Earth Leakage
- Earth Fault Lockout
- Earth Continuity
- Over-current/Overload
- Short Circuit
- Contactor Fail

Application

The HPB Integrated Protection Relay is normally installed in a mobile substation and provides protection for draglines, drills, shovels and other surface mining equipment connected to the substation.

Before an outlet can be energised the following conditions must apply:

- a) No protection faults present
- b) Local stop input open, remote stop loop closed
- c) Local start input closed

Once these conditions are met, a cable fault lock out test is performed automatically. The start button must remain closed during the test, which may take up to 25 seconds to complete due to the charging of the cable capacitance. If the result of this test is satisfactory, the HPB Relay goes into the run mode and the MCR Relay picks up and closes the main contactor.

NOTE



An 11kV system includes the HPB 22kV Relay

Specifications

Specifications	
Auxiliary Supply Volts	
HPB 6.6kV	110VAC ± 20% >20VA, 50Hz ± 2Hz
HPB 22kV	48VDC ± 20% >40W
Earth Leakage Protection	
HPB 6.6kV	Trip setting 200mA to 1000mA in 100mA increments
HPB 22kV	Trip setting 500mA to 2500mA in 250mA increments
Time Delay	Instantaneous, <80ms, and 150ms – 470ms (in 40ms increments)
Earth Continuity Protection	
Trip Setting	50Ω, 75Ω, and 100Ω
Shunt Leakage Trip if <200Ω (Resistor Mode)	
Operating Time	300ms, 400ms, 500ms, 1.0s, 1.2s, 1.5s and 2s
Earth Fault Lockout Protection	
HPB 6.6kV	Selectable at 2, 5, 10, 20 and 50 Meg ohm and off
HPB 22kV	Selectable at 15, 20, 30, 50 and 100 Meg ohm and off
Test time is selectable at 10, 15, 20 and 25 seconds	
Over-current Protection	
Current Range – HPB6.6kV	7.5 to 464 Amps (60 to 116 Amps in 4 Amp increments times multiplier)
Current Range – HPB22kV	15 to 928 Amps (60 to 116 Amps in 4 Amp increments times multiplier)
Current Multiplier – HPB6.6kV	1/8, 1/4, 1/2, 1, 2, 4 times
Current Multiplier – HPB22kV	1/4, 1/2, 1, 2, 4, 8 times
Current Balance	
Trip Settings	5%, 10%, 20%, 50% and off
Short Circuit Protection	
Trip Setting	3.0 to 10.0 times in 0.5 increments (times full load current)
Trip Time (ms)	20, 40, 60, 80, 100, 120, 160
Back EMF Timer	
Trip Delay Settings	2, 5, 10, 15, 20, 30, 35, and 40 Seconds
Machine Numbers	
Can be allocated from 1 to 40	
Under voltage Protection	
Selectable from 30% to 80% (in 10% increments), or disabled	
Trip Delay 800ms	

Serial Communications	
For information on data format and hardware see DNET-IP2 Serial Communication System User Manual 118626	
Relay Contacts	
MCR, CBR	1 N/O 5A/190VAC 100VA maximum 1 C/O 5A/190VAC 100VA maximum
RL3	1 N/O 5A/190VAC 100VA maximum
Find Out More	
For more information on this product, contact Ampcontrol Customer Service on +61 1300 267 373 or customerservice@ampcontrolgroup.com or visit the Ampcontrol website: www.ampcontrolgroup.com	

Ordering	
Part Number	Description
144069	HPB 6.6kV Integrated Protection Relay
162922	HPB 22kV 200mA EL Integrated Protection Relay
142842	HPB 22kV Integrated Protection Relay
118732	HTU-1 Termination Unit
142848	HPB Base
142845	HPB Base – 48V
118542	HDM Remote Display Module Flush Mount
117648	6.6kV Cable Connection Module
143369	22kV Cable Connection Kit
144371	11kV Cable Connection Kit
101503	IPA/IPB Relay/LED Output Module
117829	HPB User Manual
143911	48VDC, 120W Power Supply

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