

# RHO 3 Factsheet

## Motor Protection Relay

### Features

- Advanced motor protection
  - for medium voltage motors
- Easily programmable settings and user interface
- Thermal overload and restart inhibit protection
- Stall and locked rotor protection
- Short circuit and earth fault protection
- Phase unbalance protection
- Undercurrent detection
- Limitation of number of starts
- Optional 8 thermistor or resistance temperature detector (RTD) inputs
- Circuit breaker fail
- Trip circuit supervision
- CT supervision
- Earth fault trip inhibit for contactor control application
- Stores 500 events and 10 waveform records that can be configured to record starting current
- Status inputs have programmable independent pickup and drop off timers
- Data communications using IEC60870-5-103 or MODBUS RTU protocol with fibre optic interface or RS485 multi-drop electrical bus

### Description

Rho 3 is a multi-function numerical Motor Protection relay suitable for all types of a.c. induction motors up to the highest ratings available.

Whilst medium voltage 3-phase motors are very reliable and robust, modern designs operate much closer to the limits of thermal margins and to give adequate protection, sophisticated protection relays are required. In addition, increased industrial use of power electronics leads to corruption of power systems and unless specific equipment is installed to eliminate the corruption it can cause considerable rotor overheating. The Rho 3 relay has been designed to protect the motor against these phenomena as well as known abuses such as mechanical overload, stalling, single phasing, terminal box and cabling failures, and too frequent starts.

The Rho 3 relay can be set to accurately mimic both the heating and cooling characteristics of the protected motor and consequently ensure that the thermal withstand of the machine is not exceeded, at the same time allowing full use of the motors thermal capability.



### TECHNICAL INFORMATION

#### Rating

1/5 Amp 50/60 Hz

#### Settings

Thermal (Iq)	0.5 to 2.0 x In D 0.05
NPS weight (k)	0.0 to 10.0 D 0.1
Heating time (t h)	0.5 to 100.0mins D 0.5
Starting constant (t s)	0.5 to 1.5 x t h D 0.05
Cooling constant (t c)	1 to 100 x t h D 1
Hot/cold ratio	OFF, 5 to 100% D 5
Start current	1.5 to 10.0 x In D 0.1
Stop current	0.05 to 0.2 x In D 0.05
Stall delay 1&2	1 to 250 secs D 1
Phase fault	0.5 to 20.0 x In D 0.1
Earth fault	0.01 to 1.00 x In D 0.01
Earth fault inhibit	4.0 to 10.0 x In D 0.1
Undercurrent	0.10 to 1.5 x In D 0.05
Phase unbalance	Phase difference, NPS, OFF
Phase difference	0.05 to 0.40 x Iq D 0.05
Negative seq	0.05 to 0.40 x Iq D 0.05
Time multiplier	0.025 to 2.0 D 0.025
Minimum op time	0.1 to 2.0 secs D 0.1
Max no. of starts	OFF, 1 to 20 D 1
Starts period	1 to 60 mins D 1
Start inhibit delay	1 to 60 mins D 1
Minimum time between starts	OFF, 1 to 60 mins D 1
Temperature (optional)	OFF, 0 to 250°C D 1 [1] 100 to 350W D 1 (2) 100 to 1000W D 10 (3) 1100 to 30000W D 100 [3] [1] named RTD setting range [2] other RTD setting range [3] thermistor setting range

#### DC status input

Basic relays contain 1 programmable status input, expanded variants provide 8 additional inputs. The status inputs have programmable pick-up and drop-off timers.

Source voltage	Operating range
30 VDC	18 - 37.5 V D C
48VDC	37.5 - 60 V D C
110/125VDC	87.5 - 137.5 V D C
220/250 VDC	175 - 280 V D C

For relays to ES148-4 standard and 110/125 or 220/250 volt DC working a 48 volt status input is supplied for use with external dropper resistors:

110/125V resistor 2K7 ± 5% 2.5W

270/250V resistor 8K2 ± 5% 6.0W

### Output relays

The Rho 3 relay controls 7 programmable output relays 3 of which have a c/o contact and the other 4 have a n/o contact.

### Contact ratings

Carry continuously -	5AAC or DC
Make and carry -	30AAC or DC for 0.2 sec
Resistive break -	75W DC, 1250VAA C

### DC Auxiliary supply

Nominal operating range	24, 30, 48V 18 - 60V
	110, 220V 88 - 280V

### Burdens

A C :	5 amp Phase < 0.2VA
1 amp Phase	< 0.05VA
5 amp Earth	< 0.4VA
1 amp Earth	< 0.2VA

Burdens measured at nominal current

rating In.

D C :	3W Quiescent (Typical), 10W maximum
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### Communications

Serial communications conforming to IEC60870-5-103 or MODBUS RTU protocol with fibre optic ST connections or RS485 electrical interface. Up to 254 relays may be connected in a ring network and addressed individually.

### Indication

LEDs for trip, motor starting, motor running, starter current pickup and protection healthy status indications. LCD - Alphanumeric display for settings, instruments and fault data.

### ENVIRONMENTAL

Temperature	IEC 68-2-1/2
Operating range	-10°C to +55°C
Storage range	-25°C to +70°C
Humidity	IEC 68-2-3
Vibration	IEC 255-21-1 class I

Shock and bump	IEC 255-21-2 class I
Seismic	IEC 255-21-3 class I
Insulation	IEC 255-5
	2kV rms for 1 min all terminals to earth.
	2kV rms for 1 min between independent circuits.
	1kV rms for 1 minute across NO contacts.

Transient overvoltage	IEC 255-4 class III
	5kV 1.2/50µs between all terminals and earth without damage or flashover.

High frequency disturbance	IEC 255-22-1 class III
	2.5kV common mode < 3% deviation
	1.0kV series mode < 3% deviation

Electrostatic Discharge	IEC 255-22-2 class III
	8kV direct without maloperation or damage

Radio frequency disturbance	IEC 255-22-3
	20MHz to 1GHz at 10V/m < 5% deviation

Fast transient	IEC 255-22-4 class IV
	4kV 5/50ns < 3% deviation

Weight Rho 3	4.7kg
Rho 3+RTD	6.7kg

### Case Size

Rho 3	- 6
Rho 3 + exp	- 6
Rho 3 + RTD	- 8
Rho 3 + RT D/exp	- 8

### ORDERING INFORMATION

Auxiliary and status input voltage  
Number of status inputs  
Fibre optic or RS485 communications

### QUALIFICATIONS

Siemens Protection Devices Limited operates a quality system accredited to ISO 9001

Siemens Protection Devices Limited  
PO Box 8  
North Farm Road  
Hebburn  
Tyne & Wear  
NE31 1TZ  
United Kingdom  
Tel: ++44 (0)191 401 7901  
Fax: ++44 (0)191 401 5575