

Motor Protection Relay

Type SPAM 150 C



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In India, ABB serves customers with the complete range of power and automation technologies. The company has a vast installed base, extensive manufacturing facilities and a countrywide marketing and service presence.

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The product offering covers a wide spectrum of technologies across the entire voltage range including indoor and outdoor circuit breakers, air and gas insulated switchgear, disconnectors, capacitor banks, reactive power compensators, power transformers, distribution transformers, instrument transformers, Compact Secondary Substations (CSS) and Ring Main Units (RMU).

Advantage ABB

- ✓ 120 years of technology and innovation
- ✓ Unparalleled domain competence
- ✓ Global experience
- ✓ Complete solution capabilities
- ✓ Large installed base
- ✓ Environment-friendly technologies



Motor protection relay type SPAM 150 C

Features

- Versatile, multifunction motor protection relay for the protection of AC motors
- All-in-one relay featuring thermal overload protection, thermal start-up supervision, stall protection or time over current protection
- High-set over current protection, low-set earth fault protection, incorrect phase sequence and phase unbalance protection, loss-of-load protection and supervision of multiple start-ups
- 1A and 5A tapplings on all energizing inputs as standard and high over current withstand capability
- A whole set of measured fault parameters recorded in memory at relay operation
- Numerical readout of set values, measured values, recorded maximum fault current values, indications and status information
- Superior design flexibility for easy selection of appropriate relay operations for different applications
- Excellent accuracy and long-time stability of thermal curves due to complete software-based implementation
- High immunity to electrical interference, robust mechanical design and adequate IP 54 degree of protection by enclosure
- Continuous self-supervision of relay hardware and software for enhanced system reliability and availability
- Auto-diagnostic fault indication to facilitate repair after detection of a permanent internal relay fault
- Two-way data communication over optical-fibre serial bus between motor protection level and higher-level data acquisition, reporting and control system

Application

The motor protection relay type SPAM 150 C employs the latest microprocessor techniques to provide a complete solution for the protection of medium sized and large three-phase motors in all types of ordinary contactor controlled or circuit-breaker controlled motor drives.

The motor protection relay features extensive data communication capabilities via the fibre-optic SPA bus. This allows the relay to perform data acquisition tasks and metering functions including fault value recording. The information gathered by the relay facilitates in-depth post-fault analysis and on-line supervision of the motor drive.

The motor protection relay is a member of the SPACOM product family, which is part of PYRAMID®, ABB's co-ordinated protection and control concept of ABB.

Design and principle

The combined multifunction motor protection relay is a secondary relay device which is connected to the current transformers of the protected motor drive. The three phase currents and the neutral current of the protected device are continuously measured and on the basis of measurement, the thermal condition of the motor is calculated and the faults of the network are detected. In fault situations the protective units of the relay provide an alarm or trip the circuit-breaker.

By appropriate programming of the output relay matrix, various starting, prior alarm or restart inhibit signals are received as a contact function. This contact information is used e.g. for the blocking of co-operating protective relays located upstreams, for connection to annunciator units or for blocking motor restarts etc.

The motor protection relay contains one external logic control input, which is activated by a control signal on the auxiliary voltage level. The influence of the control input on the relay is determined by programming switches of the measuring module. The control input can be used either for blocking one or more of the protective stages, for carrying out an external trip order, for inhibiting a restart attempt or for resetting a latched output relay in the manual reset mode.

Technical data

Energizing quantities, rated values and limits

Phase current inputs	1-3,4-6,7-9	1-2,4-5,7-8
Neutral current inputs	25-27	25-26
Rated energizing current I_n	1 A	5 A
Thermal current withstand		
- continuously	4 A	20 A
- for one second	100 A	500 A
Dynamic current withstand		
half-wave value	250 A	1250 A
Input impedance	<100 mW	<20 mW
Phase current monitoring range	0...63 x I_n	
Residual current monitoring range	0...210% of I_n	
Rated frequency f_n , on request	50 Hz or 60 Hz	
Rated auxiliary voltage		
Type SPTU 240 R2 or power consumption		
SPTU 240 R3	80...265 V DC/AC	
Type SPTU 48 R2 or under quiescent / operating conditions	~4 W / ~6 W	
Specified service temperature range	-10°C...55°C	
Mass of relay	~3.5 kg	

Motor protection relay module SPCJ 4D34		
Thermal overload unit		
Full load current I_{θ}	0.50...1.50 x I_n	
Safe stall time setting $t_{\delta x}$, i.e. Trip time at locked rotor from cold motor	2.0...120s	
Weighting factor for thermal unit curves p	20...100%	
Cooling time multiplier k_c , for motor at standstill	1...64 x t_h (t_h = heating time Constant)	
Thermal prior alarm level θ_a	50...100% of θ_t (θ_t = thermal trip level)	
Motor restart inhibit level θ_i	20...80% of θ_t	
Thermal initialization level on restoration of auxiliary supply	70% of θ_t , i.e. Hot motor	
Start-up supervision unit		
Start current I_s	1.00...10.0 x I_n	
Start-up time t_s	0.30...80.0 s	
Two operation principles: - definite time principle (I & t) - thermal stress principle ($I^2 \times t$)		
High-set phase over current unit		
Start current $I_{>>}$	0.5...20.0 x I_n or ∞	
Operate time $t_{>>}$	0.04...30.0 s	
Earth-fault unit		
Start current $I_{o>}$	1.00...100% of I_n	
Operate time $t_{o>}$	0.05...30.0 s	
Phase unbalance / incorrect phase sequence unit		
Start current ΔI	10...40% of I_L (I_L = Load current)	
Operate time t_{Δ} , at lowest		
Possible setting, i.e.10%	20...120 s	
Operation characteristic	Inverse time	
Operate time at 100% phase unbalance (single phasing)	1 s	
Operate time at incorrect phase sequence	600 ms	
Undercurrent unit		
Start current $I_{<}$	30...80% of I_{θ}	
Operation inhibit level	<12% of I_{θ}	
Operate time $t_{<}$	2...600 s	
Cumulative start-up time counter unit restart inhibit level of cumulative		
Start time counter Σt_{si}	5...500 s	
Countdown rate of start-up time counter $\Delta \Sigma t_s / \Delta t$	2...250 s/h	
External control inputs		
Blocking, reset or setting input 10-11		
External control voltage level	18...80 V DC or 80...265 V AC / DC	
Control current at activated input	2...20 mA	
Output contact ratings		
Trip contacts		
Contact type	NO contact	NC contact
Terminals	65-66,74-75	65-66
Rated voltage	250 V DC/AC	250 V DC/AC
Continuous carry	5 A	5 A
Make and carry for 0.5 s	30 A	10 A
Make and carry for 3.0 s	15 A	8 A
Breaking capacity for DC at the control circuit time-constant $L/R \leq 40$ ms and 48/110/220 V DC		
	5A / 3A / 1A	1A / 0.25A/ 0.15A
Breaking capacity for AC		
	5 A	5 A
Contact material	AgCdO ₂	AgCdO ₂
Signaling contacts		
Terminals	70-71-72, 68-69,77-78, 80-81	
Rated voltage	250 V DC/AC	
Rated current	5 A	
Make and carry for 0.5 s	10 A	
Make and carry for 3.0 s	8 A	
Breaking capacity for DC at the control circuit time- constant $L/R \leq 40$ ms and 48 / 110 / 220 V DC		
	1 A / 0.25 A / 0.15 A	
Contact material	AgCdO ₂	
Data transmission		
Transmission mode	Fibre-optical serial with optional bus connection module	
Data code	ASCII	
Data transfer rate	4800 Bd or 9600 Bd	

Electrical tests	
Insulation test according to IEC 60255-5	
Dielectric test	2 Kv, 50Hz, 1min
Impulse test	5 Kv, 1.2/50µs, 0.5J
Insulation resistance	>100 MΩ at 500 V DC
Power supply tests according to IEC 60255-11, IEC 61000-4-11	
Interruption of DC voltage	40 ms/80 V, 10 ms/18V
Interruption of AC voltage	70 ms / 80 V
Ripple in DC voltage	max. 12% of dc value
1 MHz burst disturbance test according to IEC 60255-22-1	
	class III
-common mode	2.5 kV, 1MHz, 400 pulses/sec.
-differential mode	1kV, 1MHz, 400 pulses/sec.
Electrostatic discharge test according to IEC 60255-22-2	
	class III
-contact discharge	6kV
-air discharge	8kV
Radiated, radio frequency, electromagnetic field immunity test according to IEC 60255-22-3, IEC 61000-4-3	
	10 V/m, f=80..1000MHz
Fast transient disturbance test according to IEC 60255-22-4, IEC 61000-4-4	
-Power supply ports	4 kV, 5/50 ns, 50 Ω
-I/O ports	2 kV, 5/50 ns, 50 Ω
Surge immunity test according to IEC 60255-22-5 IEC 61000-4-5	
-common mode	2 kV, 1.2/50 µs, 12 Ω
-differential mode	1 kV, 1.2/50 µs, 2 Ω
Immunity to conducted disturbances induced by radio frequency fields according to IEC 60255-22-6, IEC 61000-4-6	
	10 V, f=150kHz...80MHz
Conducted and Radiated Radio-frequency emission tests according to IEC 60255-25, EN55011-CISPR II	
-conducted emission (mains)	class A
-radiated emission	class A
Power frequency magnetic field immunity test according to IEC 61000-4-8	
-continuous	100 A/m
-short duration	300 A/m

Environmental tests	
Vibration response and endurance test as per IEC 60255-21-1	
	class 1, 10...150Hz
Shock response and endurance test as per IEC 60255-21-2	
	class 1, 11ms
Bump test as per IEC 60255-21-2	
	20 g, 1000 bumps/dir
Seismic tests as per ANSI/IEEE C37.98 1987	
-Operating basis	
Earth-quake	0.50...5.25 g
-safe shut-down	
earth-quake	0.50...7.5 g
Degree of protection by enclosure when panel mounted (front side) according to IEC 60529	
Protection	IP54
Dry heat test according to IEC 60068-2-2	
Temperature	+55°C / +70°C
Dry cold test according to IEC 60068-2-1	
Temperature	-10° C / -25°C
Storage temperature test according to IEC 60068-2-48	
Temperature	-40° C / +70°C
Damp heat test, cyclic (12+12 hour cycle) according to IEC 60068-2-30	
Condition	96% RH, 6 days
Corrosion test	Battelle-test

Block schematic diagram

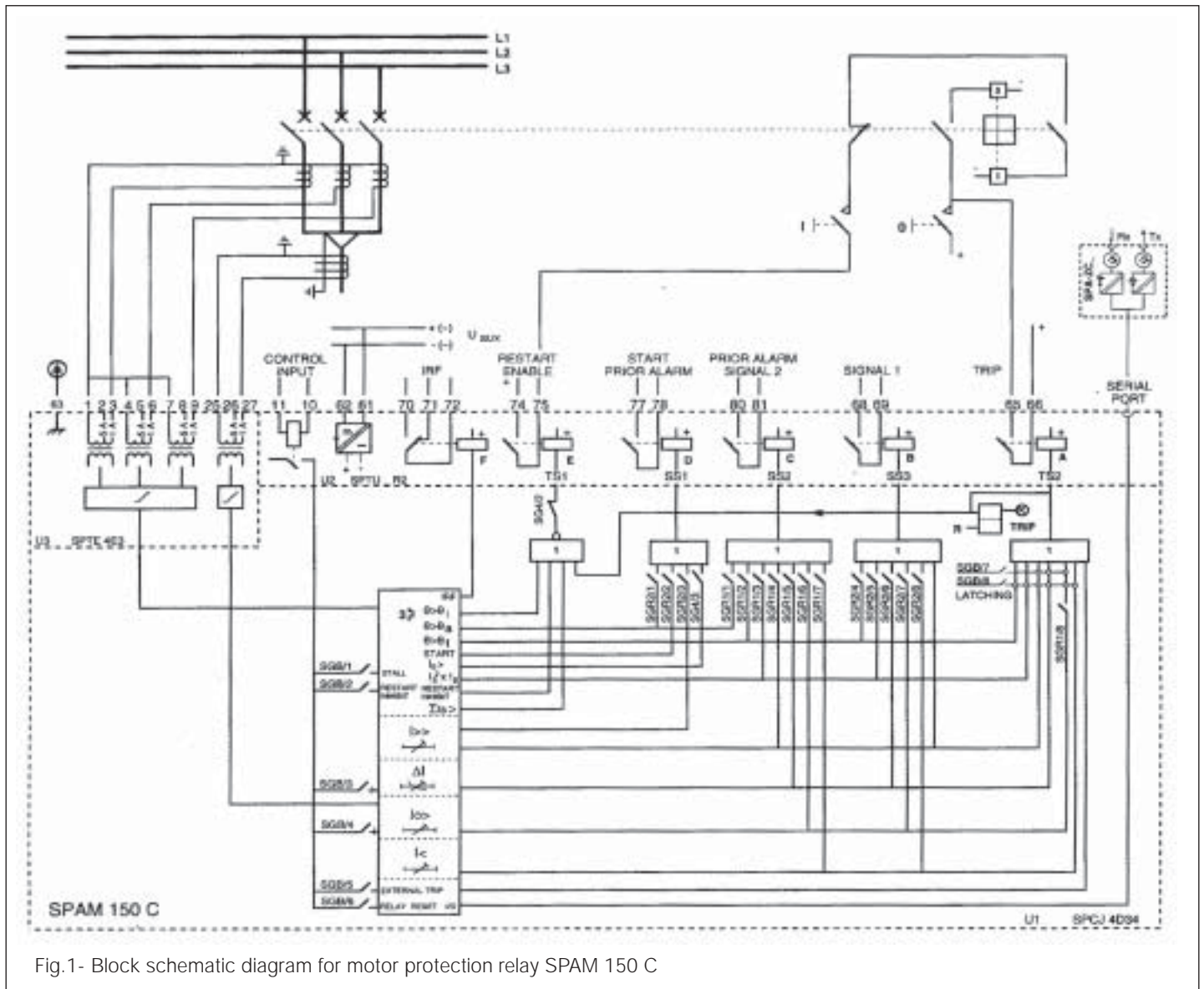
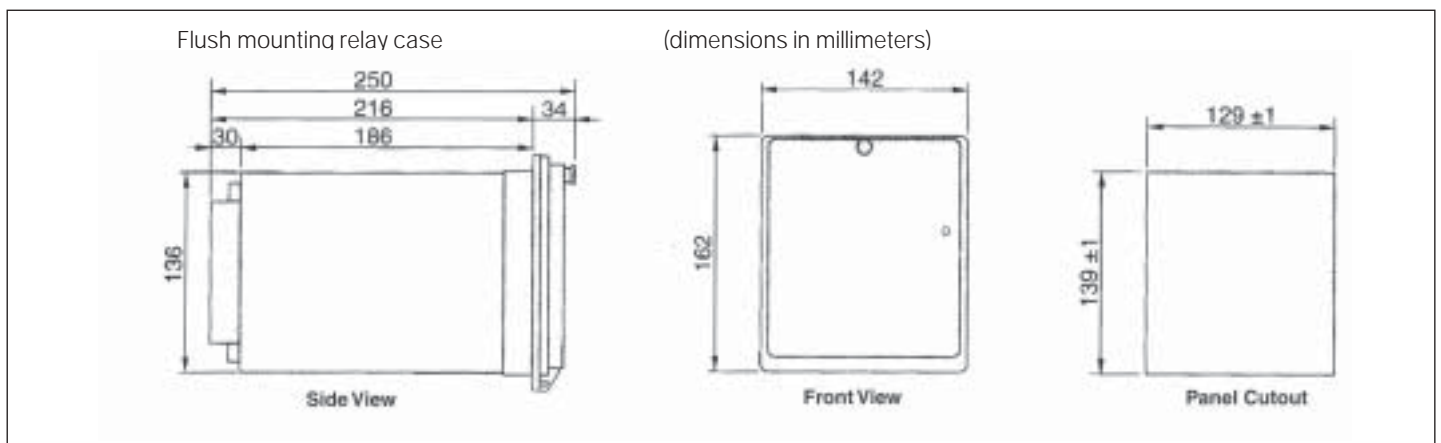


Fig.1- Block schematic diagram for motor protection relay SPAM 150 C

Mounting and dimensional details



Ordering details

Item No.	Qty.....		
Type	: SPAM150C	Case size	: 100
Application	: Protection of medium / large size AC motors.	Mounting	: Flush
Aux Votage	: 18 - 80 V DC <input type="checkbox"/>	Type designation	
	80 - 265 V AC/DC <input type="checkbox"/>	explanation:	
		SFA...Substation Protection	
		apparatus	
Trip Contact	: Normally open (NO) <input type="checkbox"/>	M...Motor Protection	
	: Normally closed (NC) <input type="checkbox"/>	1...100 size case	
Other contacts	: 1 for restart enable	50...Mechanical Design	
	3 N/O (Light Duty)		
	1 C/O (for IRF)	C...Communicable	
* Kindly furnish above mentioned details alongwith your order by ticking (✓) appropriate boxes			



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