

MiCOM P124

Self and Dual Powered Overcurrent Relays



MiCOM P124S
self-powered model

MiCOM P124D
dual-powered model

MiCOM P124 are numerical relays designed to offer complete overcurrent protection without requiring any external auxiliary supply. They can be applied to a wide variety of high and medium voltage electrical systems as either main or backup protection.

Available in a self-powered or in a dual-powered version, they offer three phase and earth fault protection.

When supervision functions are required, the dual-powered version offers additional measurement, monitoring and recording functions.

Numerous integrated communication protocols are available for flexible integration in most substation control or SCADA systems.

The user-friendly operator interface allows easy reading of measured values and simple configuration of the relay.

Associated accessories (low energy striker, battery box or capacitor trip unit) are also available to fit your particular application.

Housed in a 4U metal case, it can be easily mounted in a panel or in a rack.

APPLICATION

MiCOM P124 overcurrent protection relays provide a complete and fully safe protection for applications where no external auxiliary power supply is available or guaranteed.

They provide efficient protection for industrial plants, utilities' distribution substations or customers and can be used as either main or backup protection.

The following two models are available:

- Self-powered P124
- Dual-powered P124

Self-powered P124 model offers a simple and cost efficient solution when no external auxiliary power supply is available.

In addition to its protection functions and when powered by an external auxiliary source, dualpowered

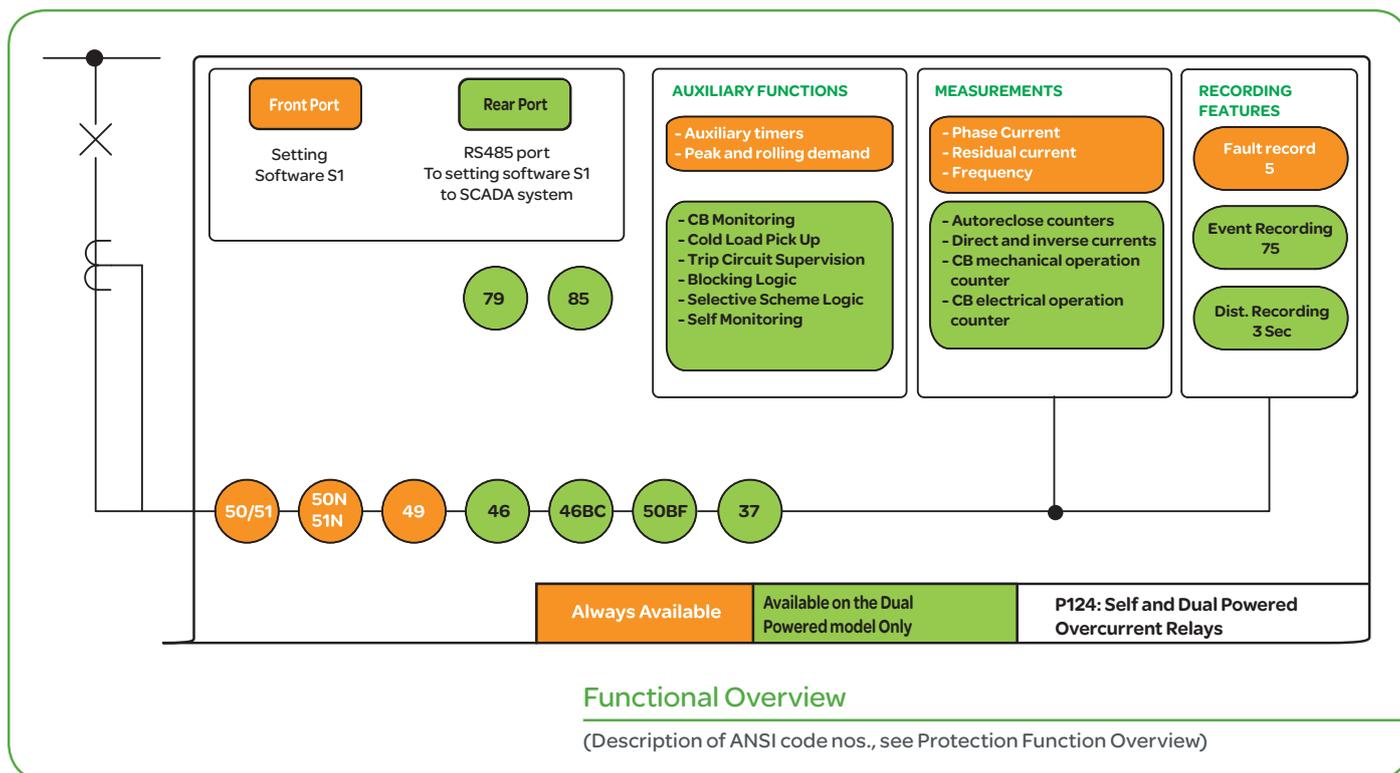
P124 offers the ability to transmit recorded and measured data to a supervisor via communication networks. Should the auxiliary power supply fail, protection and tripping functions remain fully operational.

These two types of MiCOM P124 relays take the power necessary for their operation from line current transformers.



CUSTOMER BENEFITS

- 1A & 5A in same relay
- Wide auxiliary supply voltage range
- Option of multiple communication protocol and interfaces, including IEC 61850
- User customisable menu text



ANSI Codes	Function	Self-powered MiCOM P124S	Dual-powered MiCOM P124D
50/51	Three-phase non directional overcurrent 3 independent thresholds	•	•
50N/51N	Phase-earth non directional overcurrent 3 independent thresholds	•	•
49	Thermal overload (true RMS) 2 independent thresholds	•	•
37	Undercurrent		• (1)
46	Negative phase sequence overcurrent		•
	Broken conductor detection (I2/I1)		•
	Blocking logic		• (1)
	Selective relay scheme logic		• (1)
	Cold load pickup		• (1)
	Setting groups	1	2
	Assignable inputs/outputs		• (1)
79	Autoreclose option (4 shots)		• (1)
	Output for striker triggering	•	•
	Changeover contact output for trip coil	•	•
	Bistable magnetic indicator flag for trip indication	•	•
	4 extra magnetic flags option		•
86	Output relay latching		• (1)
50 BF	Circuit breaker failure		•
	Circuit breaker supervision		•
	Measurements (true RMS)	•	•
	Peak and rolling values	•	•
	Event records		• (1)
	Fault records	•	•
	Disturbance records		• (1)
	Rear port RS485 communications		• (1)
	Front port RS232 communications	•	•

• (1) : Function not available if auxiliary power supply fails.

MAIN FEATURES

Both models offer a wide range of overcurrent protection functions without requiring an external auxiliary supply: three independent phase stages, three independent earth stages, twelve groups of IDMT curves for the phase and 14 for the earth, and two thermal overload stages.

The dual-powered model offers additional protection, automation and monitoring. Some of these additional functions are operational only when an auxiliary power supply is available. In the event of loss of this power supply, the performances of the P124 dual-powered relay become equivalent to the ones of the selfpowered model.

The power supply to the electronic circuits of the MiCOM P124s has been optimised so that it can trigger the circuit-breaker with a load current of 0.2 In on at least one phase.

The hardware architecture and software algorithms have been studied to operate on very short failure detection times, so that, starting from a load current of 0.2 In, tripping occurs within no more than 30 ms.

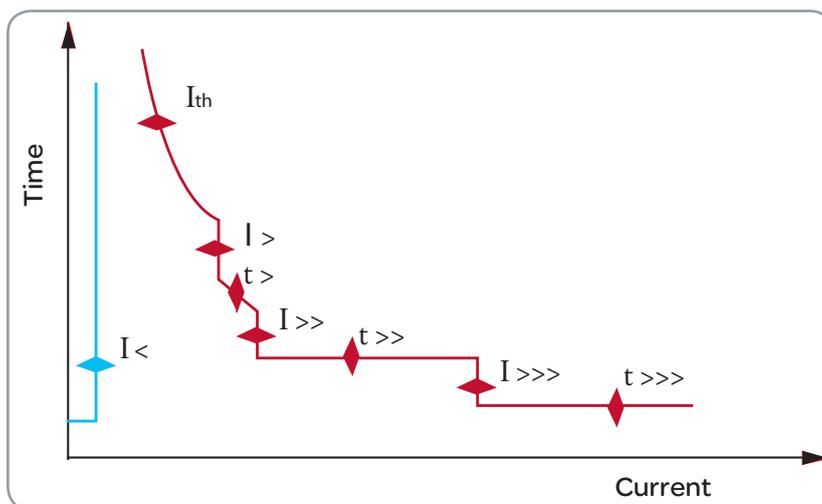
MiCOM P124 relays are equipped with two types of circuit-breaker trip outputs, fully independent from an external auxiliary power supply:

- A capacitance discharge output capable of putting out sufficient power to a striker releasing the actuating mechanism of the circuit-breaker,
- A changeover contact relay output capable of sending an order directly to the circuit-breaker coil.

The front panel includes an electromagnetic bistable flag to indicate that a trip has occurred. As an option in the dual-powered model, four additional magnetic indicator flags are freely configurable. Depending on the model, one or several LEDs indicate the correct operation of the relay as well as other information regarding protection of the electrical system.

MiCOM P124 relays are housed in a 4U-30 TE shallow metal case for mounting either in a rack or in a panel.

Overcurrent Stages



PROTECTION AND CONTROL

Time-Delayed Phase Overcurrent (51)

MiCOM P124 relays provide three phase current inputs. Three independent stages are available.

For the first stage, the user can select between 12 different types of curves (IEEE/ANSI, IEC, RI, RC). For each curve model a selection of 60 different TMS values are available to optimise fault detection and shorten tripping time in co-ordination with fuses, motors, feeders, transformers and other devices.

The second and third stages have independent settings with adjustable definite time tripping.

Time delays can be set from 0 to 180s thus providing maximum selectivity.

The phase current can be set from 0.1 to 40 times the rated phase current (first threshold limited at 4In).

Instantaneous Phase Overcurrent (50)

For each phase overcurrent stage, the instantaneous information is generated within 30 ms after the threshold has been exceeded, with a load current of 0.2In on at least one phase. This instantaneous information is generated within 60 ms of the circuit-breaker opening (close-on-to-fault case).

For the dual-powered model, the user can assign each instantaneous information to output contacts, as well as to four LEDs and four magnetic indicator flags located on the front panel.

Time-Delayed Earth Fault (51N)

Earth fault detection is identical to the detection of time-delayed phase overcurrent.

Three independent earth fault stages can be selected. For the first stage, the user can select either any of the 14 families of curves and TMS values or a definite time setting.

Earth current range can be set from 0.002 to 40 times the rated earth current to allow maximum sensitivity for earth fault detection.

Earth current is generated either by a CT core of sufficient power, or by a residual connection of the three line CTs.



Two protection relays to ensure 100% safety

Instantaneous Earth Fault (50N)

As for phase faults, MiCOM P124 relays generate instantaneous data for each earth fault stage, with the same characteristics.

For the dual-powered model, the user can assign instantaneous earth fault stages to output contacts, as well as to four LEDs and four magnetic indicator flags located on the front panel.

Thermal Overload (49)

Transformers and cables must be protected taking into account their particular thermal characteristics. MiCOM P124 relays include a thermal overload element based on true RMS value of the current.

Alarm and overload thresholds as well as thermal time constants are fully programmable to match each device requirement.

Undercurrent (37)

MiCOM P124 dual-powered relays provide undercurrent protection. This function is particularly useful to detect a loss of load or a circuit breaker failure.

Negative Sequence Overcurrent (46)

In order to maximise the time of operation of electrical systems, dual-powered MiCOM P124 relays provide a negative sequence overcurrent protection function. This programmable function is particularly well adapted to detect any phase unbalance conditions. Instantaneous and time-delayed (DT or IDMT) negative sequence overcurrent stages are the same stages as the phase overcurrent.

Broken Conductor

A typical unbalanced fault that can occur on the system is an open circuit fault. This fault can arise from broken conductor, mis-operation of one of the switchgear poles, or blowing of a fuse. MiCOM P124 relays incorporate an element, which measures the ratio of negative to positive sequence current (I_2/I_1).

This fully programmable function allows more sensitivity and stability than pure negative measurement.



Broken Conductor Detection

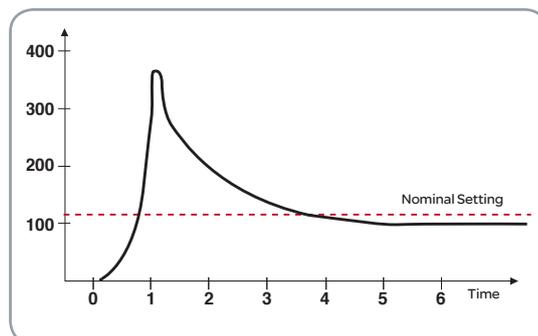
Blocking Logic

When relays are used in critical networks, management of protection relays must take surrounding devices into consideration.

In MiCOM P124 dual-powered relays, two blocking logic inputs can be configured independently of each other to lock any selected element (current thresholds, thermal replica, etc.). This function is deactivated in the event of a loss of auxiliary power supply.

Selective Relay Scheme Logic

Dual-powered MiCOM P124 relays include selective relay scheme logic. A dedicated digital input can temporarily alter the time delay settings in response to the phase/earth fault start condition of a downstream relay. This function allows the relay to clear the fault faster when used in a cascade scheme. It is an alternative for personnel more familiar with this type of selectivity than with blocking logic.



Cold Load Pickup Curve

Cold Load Pickup

The cold load pickup feature allows selected settings to be raised to react to temporary overload conditions that may occur during cold starts. This function is deactivated in the event of loss of auxiliary power.

Setting Groups

External conditions may impose the need of different settings. Dual-powered MiCOM P124 relays provide two setting groups.

Switching between setting groups can be done via the activation of a logic input, through the front panel interface, or through remote communication.

Inputs and Outputs

Dual-powered MiCOM P124 relays have seven output relays with unbiased changeover contacts and five opto-isolated logic inputs. Each input can be configured for the blocking logic, selective logic, etc. and each output can be assigned to trip on thresholds crossing and to light up a LED on the front panel.

Tripping Outputs

MiCOM P124 relays have two types of tripping outputs that are entirely independent from any auxiliary supply:

- A capacitance discharge output capable of supplying a striker with an energy of 20mJ at 12 volts.
- Another changeover contact relay output with a high breaking capacity to trip the circuit-breaker coil.

Optional Autorecloser (79)

MiCOM P124 dual-powered relays include an optional 4 shot autorecloser. All programmed protection functions may independently start any of the shots and the user can program which functions are allowed to trip after any of the shots. Dead and reclaim times are freely adjustable.

Front panel LEDs can be configured to display the status of the autorecloser.

A counter stores the number of reclose commands. This information can be displayed either locally or remotely. This function can be activated only when auxiliary power supply is present.

Output Relay Latching (86)

This function is available only for dual-powered versions of MiCOM P124 relays.

Any outputs, including the trip output, can be latched. Latched outputs can be reset via the activation of a logic input, through the front panel interface or through remote communication.

MONITORING FUNCTIONS OFFERED BY THE DUAL-POWERED MODEL

Trip Circuit Supervision

MiCOM P124 relay constantly monitors trip circuit and ensures that they are available. Operation personnel can easily view this information, both locally and remotely, and optimise switchgear maintenance.

Event Recording

75 logic events are stored in MiCOM P124 dual-powered model.

Events include inputs/outputs, change of status, alarms and contacts operations. All events are time stamped to 1ms, and can be accessed either locally or remotely.

Disturbance Recording

Up to five records or 3 seconds each can be stored in MiCOM relays.

The current sampling frequency is 1600 Hz. The different records can be retrieved either locally or remotely.

Measurements

MiCOM P124 relays permanently monitor all current inputs, calculate the frequency and line currents, display values on the LCD and store measurements in memory.

The measured values are true RMS up to the 10th harmonic. This data can be accessed either locally or remotely.



MiCOM P124:
the easy, safe and fast way
to detect the fault in your
power system.

FAULT RECORDING

The last 5 faults are stored inside both models of MiCOM P124 relays.

Each fault includes:

- Record number
- Fault time
- Active setting group
- Faulted phase
- Protection operation
- Magnitude of input quantities
- Fault indicator helps the user to clearly identify the fault and to monitor relay setting and operation.

In addition, the dual-powered model offers the following functions:

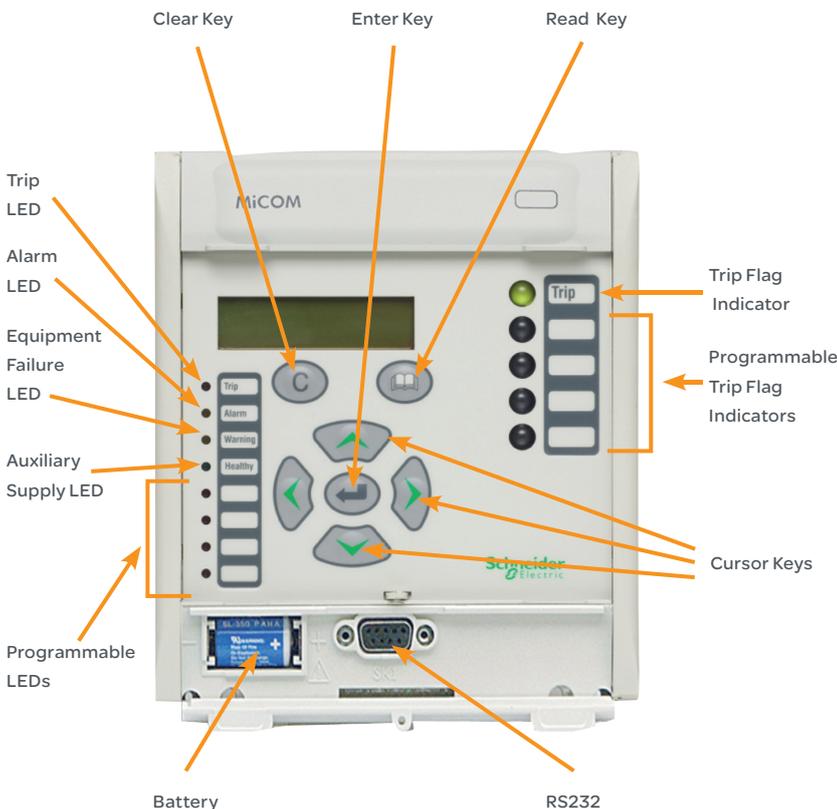
- time-tagging of all parameters,
- status of logic inputs and outputs, and
- remote retrieval of stored information.

USER INTERFACE

Front Panel and Menus

The user can program and modify all parameters (protection, communication, automation, LEDs, inputs and outputs) through the front panel user interface. The backlit LCD informs the user about settings, measurements, faults, etc.

The menus have a pull-down structure to allow easy and quick access to any data.



Dedicated LEDs

An healthy LED on the front panel of MiCOM P124 relays indicates that the relay is correctly energized with sufficient power from line current.

In addition, for the dual-powered model, three LEDs indicate the relay condition (Trip, Alarm, Watchdog).

Configurable LEDs (Dual-Powered Model Only)

To facilitate identification of electrical faults, 4 LEDs are freely programmable. Each LED can be programmed to light up when one or several thresholds are crossed or when a logic input is activated.

Dedicated Magnetic Indicator Flag

The front panel also features a bistable magnetic flag that indicates that the trip order has been issued to operate the circuit breaker.

Configurable Magnetic Indicator Flags (Dual-Powered Model Only)

In order to display faults even when the auxiliary power is down, four additional bistable magnetic flags exactly replicate the status of the four programmable LEDs.

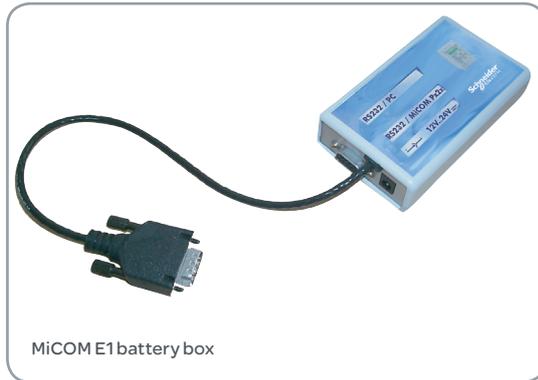
RS485 Communications

The dual-powered MiCOM P124 includes an RS485 communication rear port. This port is available for MODBUS™, Courier, DNP3.0 or IEC 60870-5-103 protocols. MiCOM relays can transmit to the monitoring or SCADA system, settings, measurements, alarms, faults, events and disturbance records. The communication parameters (relay address, data rate, parity, etc.) can be programmed using the operator interface front port.

A communication failure does not affect the protection functions of MiCOM relays.

Communication RS232

The front serial RS232 communication port has been designed to be used with MiCOM S1 Studio Software, which provides the ability to program settings off-line, extract and view event, disturbance and fault records, view the measurement information dynamically and perform control functions.



MiCOM E1 battery box

ACCESSORIES

Battery Box

Even when the circuit-breaker is open, i.e. the relay is no longer energized by the load current, settings can be applied thanks to a simple and inexpensive battery box. On one side, this battery box is connected to the RS232 port of the relay and on the other side to the PC loaded with the support software MiCOM S1 Studio.

This battery box temporarily energizes the relay and so allows the user to quickly and easily retrieve or change the setting of the relay.



K1-3 Striker

K1-3 Striker

Associated with a self-powered relay, such as MiCOM P124, the K1-3 Striker converts an electrical pulse of low intensity (<20mA during 25ms) into a mechanical pulse of 4,7 daN, thus allowing the trip of the circuit breaker.

Capacitor Trip Unit MiCOM E124

For applications where there is no auxiliary supply or where a striker can not be used, MiCOM E124 ensures the supply of energy to a self or dual powered relay, such as MiCOM P124.

This capacitor module has such storage capacity that, in case of loss of auxiliary supply, it can supply sufficient energy to excite a standard trip coil for two consecutive tripping orders without recharge.



MiCOM E124
Capacitor Trip Unit

HARDWARE

Case

The relays have a drawout metal 4U shallow case. All CT inputs are short-circuited if the active unit is withdrawn from its case. All MiCOM relays can be mounted in a panel or in a rack.

They require no handling operations, since all the settings are put in through the operator interface.

Wiring

External connections are made via MIDOS type terminal blocks. Each connection includes 2 x 6.35mm Faston and one M4 screw fixing.

The wiring of both models of MiCOM P124 is standard to provide maximum compatibility.



DEVICE TRACK RECORD

- **MiCOM Px2x range:** Over 250.000 Medium Voltage Protection Relays sold in only 6 years of existence
- **MiCOM P124:** First released in September 2000. Over 6.150 devices installed.

Schneider Electric Industries SAS

35, rue Joseph Monier
CS 30323
F - 92506 Rueil Malmaison Cedex (France)
Tel.: +33 (0) 1 41 29 70 00
RCS Nanterre 954 503 439
Capital social 896 313 776 €
www.schneider-electric.com

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