Maximize protection

MiCOM series 10, 20, 30, 40

Comprehensive range of digital protection relays

Make the most of your energy

Schneider Electric

Increase energy availability

Fast response

Maximum dependability

100% available energy

Your electrical equipment is under control. With MiCOM protection relays, you get maximum energy availability for your process.

Maximize energy availability and the profits generated by your installation while protecting life and property.

The MiCOM range of relays

offers scalable levels of functionality and hardware options to best suit your protection requirements, and allows you to choose the most cost effective solution for your application.

The MiCOM protection relay range provides the capability for a wide variety of protection, control, measurement, monitoring and communication.

The versatile hardware and common relay management software (MiCOM S1 studio) allows a simple configuration and installation in different applications.

A standard and simple user interface across the entire range makes MiCOM ideal in any environment, from the more complex bay level control with mimic, to the most simple LCD display with menu interrogation.

Keep informed to manage better

Every MiCOM relay provides you with intuitive access to all system information in your own language so that so that you can manage your electrical installation effectively.

If a problem occurs, clear and complete information puts you in a position to make the right decisions immediately. The electrical supply is restored without delay.

Maintain installation availability

MiCOM relays maintain high energy availability thanks to their diagnostics function that continuously monitors the network status.

In-depth analysis capabilities and high reliability ensure that the equipment is de-energised only when absolutely necessary. Risks are minimised and servicing time reduced by programming maintenance operations.

1999

Launch of first MiCOM relay protection

2013

Over 500,000 MiCOM units installed around the world

Increase your capabilities...

From cost effective to high end protection and control, the comprehensive MiCOM series allows complete optimisation of your solution.

MiCOM series 10

Fulfils the basic requirements of Buildings and small Industries applications with particular focus on overcurrent and motor protection. Two families are available.

- Auxiliary powered
- Self powered / dual powered.

MiCOM series 20

Fulfils the basic/medium requirements of Industrial, Utility and Building applications providing simplicity and ease of use in a wide range of installations.

- Scalable solutions where type and quantity of protection features is model dependent
- Flexible logic equations available on most models
- Compact hardware options for easy installation
- Common functions throughout the range
- Multi-language HMI
- Advanced protection functions

MiCOM series 30

Fulfils the protection requirements of Utility and Industrial applications with particular focus on integrated feeder control and provides dedicated railway protection devices.

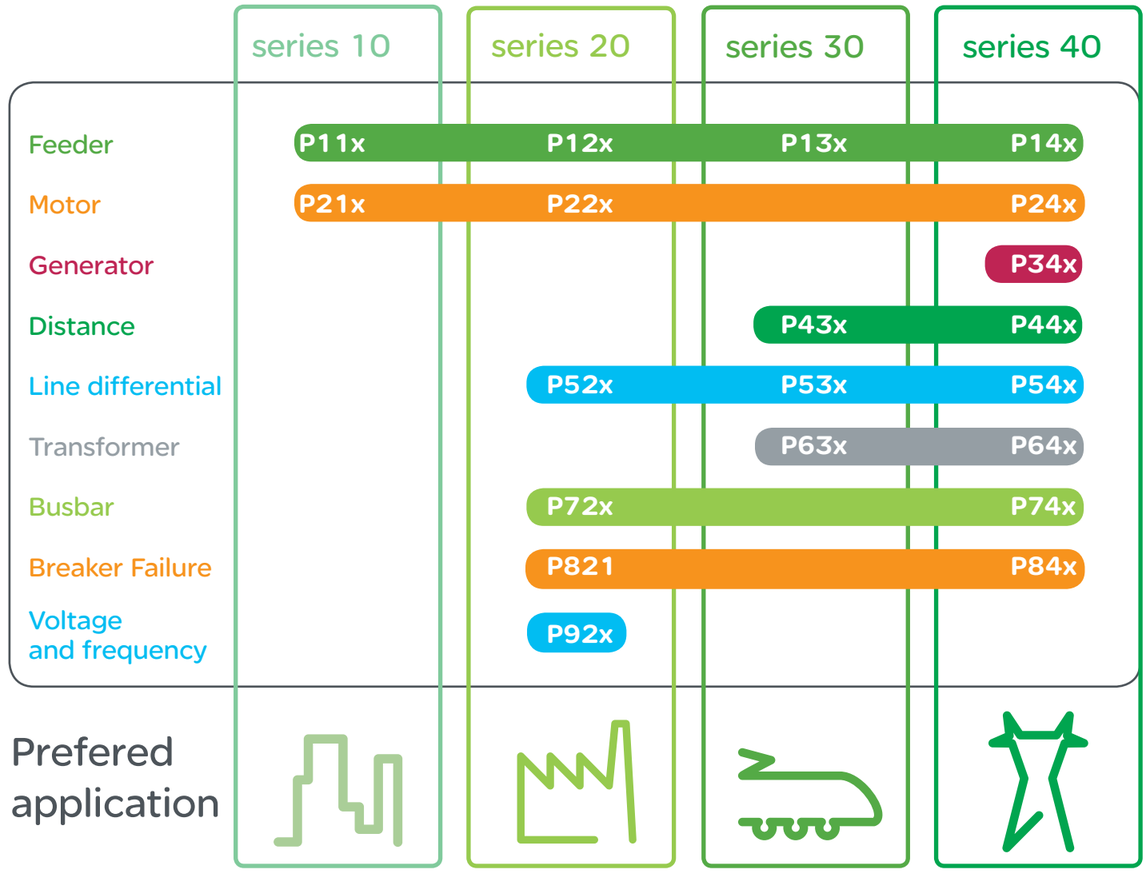
- Protection with bay level control options to facilitate feeder management
- Input/Output quantity selectable based on requirements
- Numerous rear port communication hardware options available with a wide range of protocols selectable via software
- Protection functions available for isolated/Petersen coil earthed systems
- Surface and flush mounted (including detachable HMI option) as well as compact case models available in the range
- Full Programmable Scheme Logic (PSL) and function keys

MiCOM series 40

Fulfils the protection requirements for a wide market of Utility and Industrial application and offers a wide range of protection functions.

- Full Programmable Scheme Logic available with graphic configuration tool for easy setting
- Scalable Input/Output hardware depending on requirements
- Operating voltage selectable via software for opto inputs
- Hardware accessories available for easy mounting in racks or panels.

... with a comprehensive range



MiCOM relays fulfil the requirements at all voltage levels:

Save time...

... with a simple operating software

The MiCOM S1 Studio programming and operating software provides a single environment for the entire range. The result is a simple, user-friendly approach for fast commissioning.

Configuration

Equipment setup

Upload data on-line from the relay or off-line from a data model template

Automatic hardware description

Protection activation

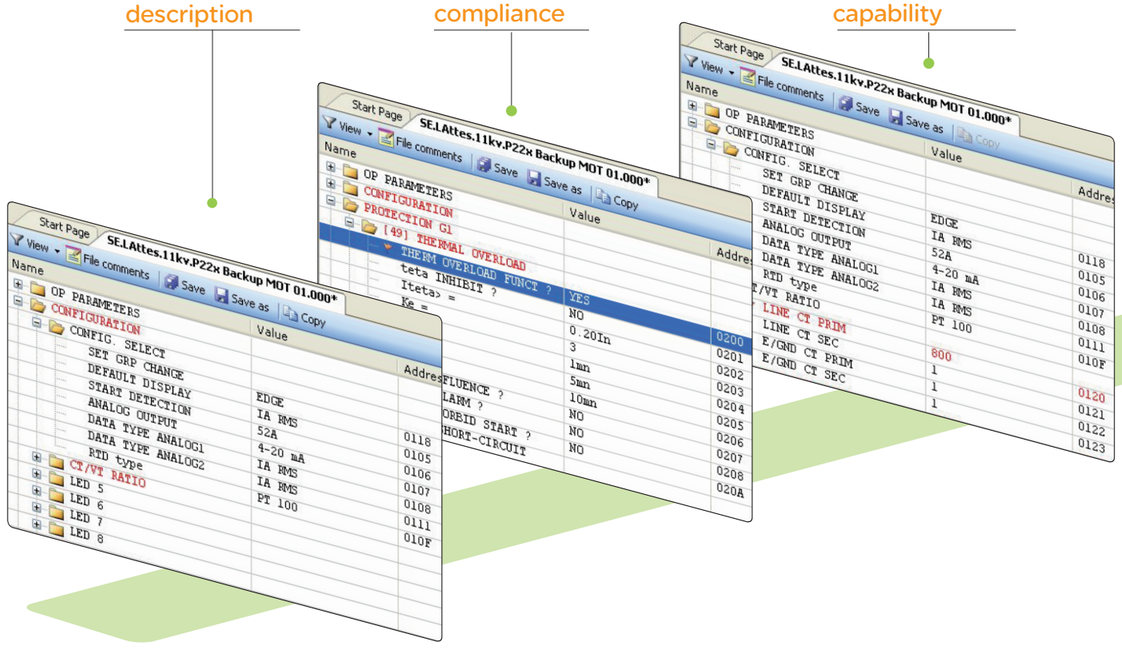
Enable protection functions

Application compliance

Summary of functions

Easily and quickly apply protection, control and monitoring settings

Fine tune capability



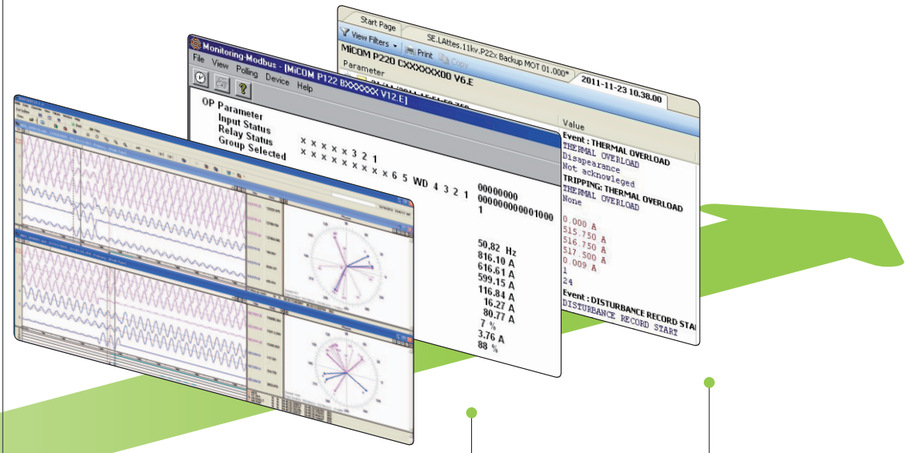
Setting file ready to be downloaded to MiCOM relay

download

export

Straightforward facility for commissioning

Operation



Analysis of waveform capture

Display, analysis and printing of disturbance recording data.

Real-time supervision

Supervision of the status of all the relays in the electrical installation

Management of alarms and events

1 to 5 minutes | 5 minutes | 20 minutes | Complete peace of mind during operation

Protect your network...

Protect

MiCOM protection relays were launched in 1999 using best-in-class protection techniques now combined with latest technology to position MiCOM as a highly dependable range of device.

At Schneider Electric, these protection techniques are fine tuned to give you the best possible protection for your assets. We also engineer quality into every device in line with best in class standards to match our protection performance.

Our latest range of devices are better than they have ever been.

Secure

Our comprehensive self monitoring provides peace of mind that errors are detected to ensure high reliability for your plant and assets.

Schneider Electric's Cyber Security solution encompasses the entire substation, many elements are now available.

Please contact your local Schneider Electric representative for availability.

Communicate

Local and remote communication is provided and designed for use with the MiCOM S1 Studio software. Rear communication port(s*) are intended for remote communication to SCADA or engineering access.

When an Ethernet card is installed in series 30 or 40 devices, IEC 61850 communication is available for the latest in high speed communication and GOOSE messaging. Various network architectures are supported including Parallel Redundancy Protocol (PRP) on series 40. All port types, quantities and protocols vary by product, please check the order form for availability.

*Optional rear communication port on many relays.

Setting

Setting is achieved with the MiCOM S1 Studio support package. The intuitive support software is all you need for the management of your entire MiCOM installed base, which manages all setting files with its unique substation file management facility.

The in-built datamodel manager also ensures that you always have the latest support files installed on your computer for all of your devices. Multiple independent setting groups are supported in most MiCOM relays, they can be activated locally, remotely or via a dedicated input condition, to allow for different system operating conditions or adaptive relaying.

... with a complete set of tools

Mesure

MiCOM devices measure (and store) a wide comprehensive range of system values such as Current, Voltage, Frequency, Power etc. from instantaneous or derived values.

Measurements can be displayed on the front LCD display or transferred via the communication ports. The high accuracy measurement class transformers throughout the MiCOM range provide data that you can rely on.

Records

Event records are generated by status changes to logic inputs, outputs, settings and alarms. They are readily available for view on the LCD display, or extraction via the communication ports. All records are time tagged to a resolution of 1ms and are maintained during auxiliary supply interruptions.

Fault records capture information including Fault number, date and time, active setting group, function that issued the trip and measurement values. Disturbance records capture the sampled values of all analogue inputs such as phase currents or voltages present during the fault. Oscillographic analysis using MiCOM S1 Studio provides quick analysis of analogue and digital signals on the same time-scale. They can be extracted from the relay via the communication ports and saved in COMTRADE format.

Control

Fully programmable function keys and programmable tri-state LEDs (red/yellow/green) are available on MiCOM series 30 and 40. Bay Control on selected series 30 devices is provided on a graphical display with customizable mimic. MiCOM series 40 also provides programmable hot-keys for direct menu access (e.g. Trip/Close command).

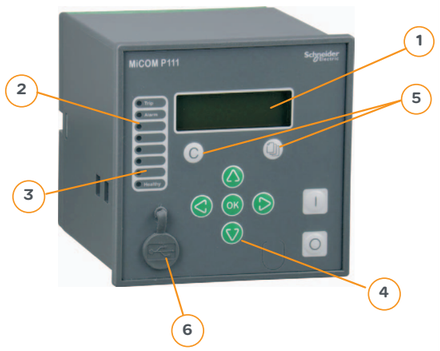
Time synchronisation of the internal real-time clock can be implemented from various sources including an optional IRIG-B port (MiCOM series 30, Compact and 40) or communication protocol (protocol and device dependent).

Logic

Programmable scheme logic is configured using the MiCOM S1 Studio. MiCOM series 20 uses Boolean equations, whilst series 30, Compact and 40 use graphical programming (series 30 and Compact can use either method). Flexible logic in most series 20 relays allows users to create equations to be assigned to LEDs, outputs, trips, alarms or back into other equations. Programmable graphical logic in MiCOM series 30 and 40 relays are an extremely powerful tool. Users can customise protection and control functions or add additional supervision or custom schemes, e.g. trip circuit supervision or frequency restoration. This logic is event driven to ensure that protection is not delayed.

Simplify your operation...

MiCOM series 10



MiCOM series 30 in compact case

The user interface and menu text is available in English, French, German and Spanish as a standard. Other languages such as for example Russian and Chinese are supported on some relays depending on the market requirements.

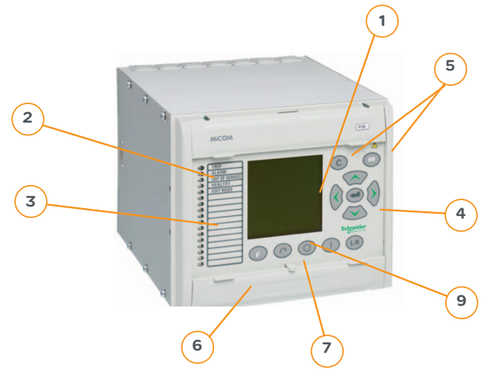
The ability to customize the menu text and alarm descriptions is also supported on series 30 and 40.

The front panel user interfaces comprises:

1. A back-lit liquid crystal display (series 10, 20, 30, 40)
   Graphic LCD display (series 30)
2. 3 fixed function LEDS (series 10)
   4 fixed function LEDs (series 20, 40)
   5 fixed function LEDs (series 30)
3. Up to 4 user programmable LEDs (series 20)
   Up to 18 user programmable LEDs (series 30)
   Up to 8 user programmable LEDs (series 40)
4. Menu navigation and data entry keys

... with a user friendly interface

MiCOM series 30 with bay control



MiCOM series 20 and 40

User language options that provide true global convenience

5. “READ” and “CLEAR” keys for viewing and reset of alarms
6. Front communication port
7. Facility for fitting a security seal
8. Programmable Function keys (compact case, series 30 and 40)
9. Switchgear control keys up to 6 bays control (series 30)

Mechanical description

Case construction

The MiCOM series are housed in specially designed cases which provide a high density of functionality within the product. Communication ports and model/serial number information is concealed by upper and lower covers on certains models.

Physical protection of the front panel user interface and prevention of casual access is provided by an optional transparent front cover (selected models only), which can be fitted or omitted, since the front panel has been designed to IP52 protection against dust and water.

The cases are suitable for either rack or panel mounting.

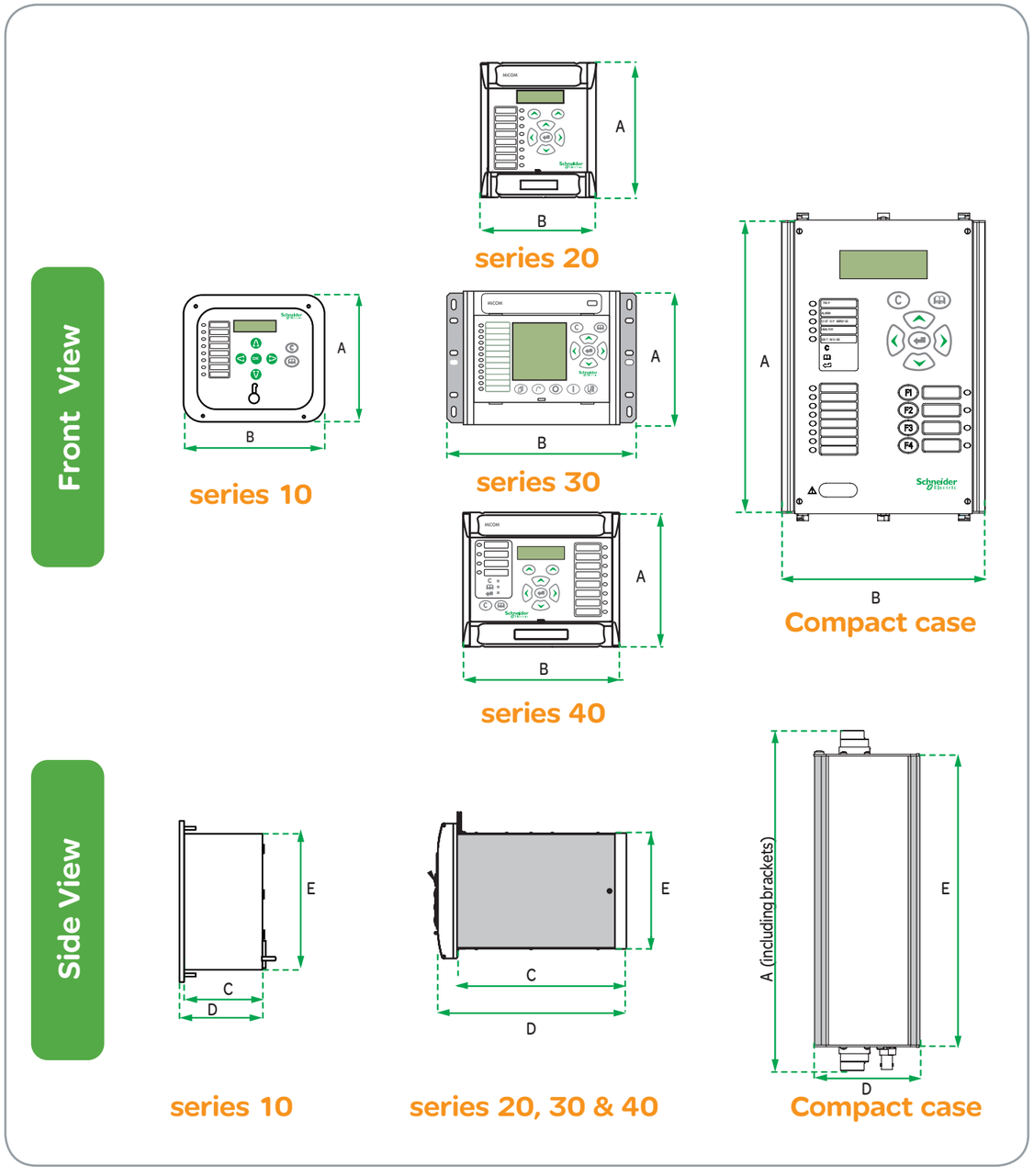
An option for surface mounting and a compact case is also supported on the series 30 for installations with space limitations.

The differing case widths of relays can be combined with or without the use of standard blanking plates to form a complete 19” mounting. This saves space and allows for a neat installation.

Dimensions

		A	B	C	D	E
series 10	Compact 1	106.5	106.5	113	118	101.5
	Compact 2	184	157	110	140	150
series 20	20TE	177	103	240 (incl. wiring)	270 (incl. wiring)	157.5
	30TE		155	139.8 223	166.4 249.6	155.2 156
series 30	24TE	184,5	186.4	227.9	253.6	177.5
	40TE		260.2			
	84TE		481.6			
	40TE Surface		260.2		257.1	177.5
	84TE Surface		481.6			
series 40	40TE	177	206	240 (incl. wiring)	270 (incl. wiring)	157.5 max
	60TE		309.6			
	80TE		413.2			
	80TE Rack		483			
series 30 Compact	Compact	294.4	175.6		88.5	253

Note: Maximum sizes for guidance only, for specific product information please check the relevant product documentation. (All dimensions in mm)



Typical case dimensions

Wiring

External connections are made via ring type terminal except on the compact case. These take pin type terminals along with the series 30 relays as an option.

Technical data description

Power supplies

A wide range of power supply options are available at the ordering stage.

	Nominal Voltage Vnom.	Operate Range (V) dc	Operate Range (V) ac
series 10	24-60Vdc/ac	19–72	19-66
	60-250 Vdc / 90-240 Vac	48-300	71-265
series 20	24-250 Vdc / 48-240 Vac	19.2-300	38.4-264
	48-250 Vdc / 48-240 Vac	38.4-300	38.4-264
series 30	24-60 Vdc	19-72	-
	60-250 Vdc / 100-230 Vac	48-300	100-230
series 40	24-48 Vdc	19-65	-
	48-110 Vdc / 40-100 Vac	37-150	32-110
	110-250 Vdc / 100-240 Vac	87-300	80-265

Digital Inputs

A wide range of opto input voltages are supported throughout the range

	Auxiliary Voltage	Thresholds (V)
series 10	> 24 Vdc/ac	> 19.2 Vdc/ac
	> 90 Vac	> 71 Vac
	> 90 Vdc	> 77 Vdc
series 20	24- 250 Vdc / 48-240 Vac	> 19.2 Vdc/ac (Variant code"Z")
	48- 250 Vdc / 48-240 Vac	> 19.2 Vdc/ac (Variant code"Z") > 105 Vdc (Variant code "H") > 77V (70% of Uaux. 110 Vdc; Variant code "V") > 154V (70% of Uaux. 220 Vdc; Variant code "W")
series 30	Thresholds	
	Standard Variant > 18 (Uaux. 24-250 Vdc)	Further Options > 73 V (67% of Uaux. 110 Vdc) > 90 V (60-70% of Uaux. 125/150 Vdc) > 146 V (67% of Uaux. 220 Vdc) > 155 V (60-70% of Uaux. 220/250 Vdc)
series 40	Universal programmable voltage thresholds	
	24/27, 30/34, 48/54, 110/125 and 220/250 Vdc	

General series data

	series 10	series 20	series 30 Standard case	series 30 Compact case	series 40
Frequency 50/60Hz	■	■	■	■	■
Dual rated 1A/5A *	■	■	■	■	■
Opto inputs	max 8	max 12	max 82	2	max 64
Output contacts	max 8	max 9	max 48	8	max 60
Continuous carry	5A	5A	5A	5A	10A
Make and carry	25A for 3s	30A for 3s	30A for 0.5s	30A for 0.5s	30A for 3s
High break contacts			■		■
LED indication (freely programmable)	8 (6)	8 (4)	29 (24)	17 (12)	22 (18)
Function keys / Hot keys	No	No	6	4	10/2 **
Settings groups	up to 2	up to 8	4	4	4 (2)
Fault records	20	25	8	8	5
Event records	200	250	1000	200	250-512
Disturbance records	5 (6s max)	5 (15s max)	8 (16.4s max)	8 (16.4s max)	75 s max.
Programmable logic	No	Flexible logic **	Fully programmable	Fully programmable	Fully programmable
IRIG B	No	Option	Option	Option	Option
LCD display	Alphanumeric	Alphanumeric	Alphanumeric / Graphical **	Alphanumeric	Alphanumeric
Front port	USB	RS 232	RS 232	RS 232	RS 232
Rear Port/2nd rear port	Yes/No	Yes/Option	Yes/Option	Yes/Option	Yes/Option
Courier	No	EIA(RS)485 **	EIA(RS)485 or fibre	EIA(RS)485 or fibre	K-Bus/ EIA(RS) 485 or fibre**
Modbus	Yes	EIA(RS)485	EIA(RS)485 or fibre	EIA(RS)485 or fibre	EIA(RS) 485 or fibre**
IEC 60870-5-103	Yes	EIA(RS)485	EIA(RS)485 or fibre	EIA(RS)485 or fiber	EIA(RS) 485 or fibre **
IEC 60870-5-101	No	No	EIA(RS)485 or fibre	EIA(RS)485 or fibre	No
DNP3.0	No	EIA(RS)485 **	EIA(RS)485 or fibre	EIA(RS)485 or fibre	EIA(RS) 485 or fibre**
IEC 61850	No	No	With Ethernet	No	With Ethernet
One box bay control with mimic	No	No	Yes **	No	No
Terminals	Pin or Ring **	Ring	Pin or Ring	Pin	Ring

** CT thermal ratings continuous: 4 In/10s & 30 In/1s & 100 In*
*** model dependent*

MiCOM series description

Feeder management and overcurrent relays

series	10				20						
model	P111	P114D	P115	P116	P120	P121	P122	P123	P125	P126	P127
Case size					20TE	20TE	20TE	20TE	30TE	30TE	30TE
CT Inputs	4	4	4	4	1	4	4	4	1	4	4
VT Inputs									1	1	3
Opto Inputs (max)	8	2	2	6	2	2	3	5	4	7	12
Output Contacts (max)	8	4	4	7	5	5	7	9	7	9	9
Output for striker triggering		1	1	1							
Magnetic flags (max)				5							
RTDs (max. option)											
Analogue Input/ Output (max)											
Function Keys/Hotkeys											
Bay Control & Monitoring											
- with Mimic											
Interlocking logic											
PROTECTION FUNCTION	ANSI										
Check synchronising	25										
Directional power	32										■
Master sequence device	34										
Undercurrent	37				■			■	■		■	■
Negative sequence overcurrent	46				■			■	■		■	■
Broken conductor	46BC				■			■	■		■	■
Negative sequence overvoltage	47											■
Incomplete sequence relay	48											
Thermal overload	49	■			■			■	■		■	■
Ground fault	50/51N	■	■	■	■		■	■	■	■	■	■
3 Phase overcurrent	50/51P	■	■	■	■		■	■	■		■	■
1 Phase or earth overcurrent	50/51P/N					■				■		
Circuit breaker failure	50BF	■		■	■			■	■		■	■
Motor	51LR											
Voltage controled overcurrent	51V											■
Over/Under voltage	59/27											■
Residual over voltage	59N									■	■	■
Restricted earthfault	64					■	■	■	■	■	■	■
Startup monitoring	66											
Ground fault directional	67N									■	■	■
Sensitive directional earthfault	67N											
Phase directional	67P											■
Wattmetric earthfault	67W									■	■	■
Autoreclose	79				■				■		■	■
Under/Over frequency	81											■
Rate of change of frequency	81R											■
Protective signalling	85											
Lock-out	86	■		■	■	■	■	■	■	■	■	■
Current transformer supervision	CTS											■
Switch on to fault	SOTF	■			■				■		■	■
Trip circuit supervision	TCS	■			■			■	■		■	■
Voltage transformer supervision	VTS											■
Neutral admittance	YN											
Circuit breaker monitoring		■			■			■	■		■	■
Cold load pick-up		■			■			■	■		■	■
Inrush blocking		■			■			■	■			■
InterMiCOM												
Limit value monitoring												

Feeder management relays

30			40				series
P130C	P132	P139	P141	P142	P143	P145	model
Compact	24, 40 or 84TE	40 or 84TE	40TE	40TE	60 or 80TE	60TE	
4	4	4	5	5	5	5	
3	4 or 5	4 or 5	3	3	3 or 4	3 or 4	
2	70	70	8	16	32	32	
8	32	28	8	15	30	32	
	10	10					
	1/2	1/2					
■	■	■	■	■	■	■	
	■	■					
		■					
	■	■					
						ANSI	PROTECTION FUNCTION
	■	■			■	■	25
■	■	■					32
		■					34
■	■	■	■	■	■	■	37
■	■	■	■	■	■	■	46
■	■	■	■	■	■	■	46BC
■	■	■	■	■	■	■	47
■	■	■					48
■	■	■					49
■	■	■	■	■	■	■	50/51N
■	■	■	■	■	■	■	50/51P
	■	■					50/51P/N
■	■	■	■	■	■	■	50BF
■	■	■					51LR
	■	■	■	■	■	■	51V
■	■	■	■	■	■	■	59/27
■	■	■	■	■	■	■	59N
	■	■	■	■	■	■	64
■	■	■					66
■	■	■	■	■	■	■	67N
	■	■	■	■	■	■	67N
■	■	■	■	■	■	■	67P
■	■	■	■	■	■	■	67W
■	■	■		■	■	■	79
■	■	■	■	■	■	■	81
■	■	■	■	■	■	■	81R
■	■	■					85
■	■	■	■	■	■	■	86
■	■	■	■	■	■	■	CTS
■	■	■	■	■	■	■	SOTF
■	■	■	■	■	■	■	TCS
■	■	■	■	■	■	■	VTS
	■	■	■	■	■	■	YN
	■	■	■	■	■	■	
■	■	■	■	■	■	■	
■	■	■	■	■	■	■	
■	■	■	■	■	■	■	
■	■	■					

Motor management relays

	series	10	20		30			40		
	model	P211	P220	P225	P130C	P132	P139	P241	P242	P243
Case size		-	30TE	30TE	Com-pact	24, 40 or 84TE	40 or 84TE	40TE	60TE	80TE
CT Inputs		4	4	4	4	4	4	4	4	7
VT Inputs				1 or 3	3	4 or 5	4 or 5	3	3	3
Opto Inputs (max)		4	5	11	2	70	70	8	16	16
Output Contacts (max)		4	6	6	8	32	28	7	16	16
RTDs / Thermistors			6/0 or 4/2	10/3 or 0/0		10/0	10/0	10/0	10/0	10/0
Analogue Input/Output (max)			0/1	0/2		1/2	1/2	4/4	4/4	4/4
Function keys					■	■	■	■	■	■
Interlocking logic						■	■	■	■	■
PROTECTION FUNCTION	ANSI									
Speed switch input	14	■		■		■	■	■	■	■
Check synchronising	25					■	■			
Reacceleration	27LV		■	■	■	■	■	■	■	■
Unballance/Lock out	30/46/86		■	■	■	■	■	■	■	■
Directional power	32L/O/R				■	■	■			
Reverse power	32R				■	■	■	■	■	■
Loss of load	37	■	■	■	■	■	■	■	■	■
Undercurrent	37P/37N		■	■	■	■	■	■	■	■
Thermal overload	38/49	■	■	■	■	■	■	■	■	■
Loss of field	40							■	■	■
Negative sequence overcurrent	46	■		■	■	■	■	■	■	■
Negative sequence over voltage	47				■	■	■	■	■	■
Neutral over voltage	47N				■	■	■			
Phase overcurrent	50/51P	■	■	■	■	■	■	■	■	■
Circuit breaker failure	50BF			■	■	■	■	■	■	■
Ground fault	50N/51N	■	■	■	■	■	■	■	■	■
Locked rotor	50S/51LR/51S	■	■	■	■	■	■	■	■	■
Out of step	55							■	■	■
Under/Over voltage	59/27			■	■	■	■	■	■	■
Residual over voltage	59N				■	■	■	■	■	■
Wattmetric earth fault	64N/32N				■	■	■	■	■	■
Startup monitoring	66/48/51	■	■	■	■	■	■	■	■	■
Ground fault directional	67N				■	■	■			
Sensitive directional earth fault	67N				■	■	■	■	■	■
Phase directional	67P				■	■	■			
Over frequency	81O				■	■	■			
Under frequency	81U				■	■	■	■	■	■
Rate of change of frequency	81R				■	■	■			
Motor differential	87M									■
Current transformer supervision	CTS		■	■	■	■	■	■	■	■
Trip circuit supervision	TCS		■	■	■	■	■	■	■	■
Voltage transformer supervision	VTS				■	■	■	■	■	■
Anti Backspin				■				■	■	■
Circuit breaker monitoring			■	■		■	■	■	■	■

Generator management relays

	series	40			
	model	P342	P343	P344	P345
Case size		40 or 60TE	60 or 80TE	80TE	80TE
CT Inputs		5	8	8	9
VT Inputs		4	4	5	7
Opto Inputs (max)		24	32	32	32
Output Contacts (max)		24	32	32	32
RTDs		10	10	10	10
Analogue Input/Output (max)		4/4	4/4	4/4	4/4
Function keys		■	■	■	■
Interlocking logic		■	■	■	■
PROTECTION FUNCTION	ANSI				
Underimpedance	21	■	■	■	■
Overfluxing	24	■	■	■	■
Check synchronising	25	■	■	■	■
100 % stator earth fault (3rd)	27TN/59TN	■	■	■	■
Directional power	32L/O/R	■	■	■	■
Thermal overload	38/49	■	■	■	■
Loss of field	40	■	■	■	■
Negative sequence overcurrent	460C	■	■	■	■
Negative sequence thermal	46T	■	■	■	■
Negative sequence over voltage	47	■	■	■	■
Thermal overload	49T	■	■	■	■
Unintentional energisation	50/27	■	■	■	■
Phase overcurrent	50/51P	■	■	■	■
Circuit breaker failure	50BF	■	■	■	■
Ground fault	50N/51N	■	■	■	■
Interturn/split phase	50DT		■	■	■
Voltage dependent O/C	51V	■	■	■	■
Under/over voltage	59/27	■	■	■	■
Residual over voltage	59N	■	■	■	■
Restricted earth fault	64	■	■	■	■
Wattmetric earth fault	64N/32N	■	■	■	■
Rotor earth fault (MiCOM P391 option)	64R	■	■	■	■
100 % stator earth fault (low frequ.)	64S				■
Sensitive directional earth fault	67N	■	■	■	■
Phase directional	67P	■	■	■	■
Wattmetric sensitive earth fault	67W	■	■	■	■
Pole slipping	78		■	■	■
Turbine abnormal frequency	81AB	■	■	■	■
Under/Over frequency	81	■	■	■	■
Generator Differential	87G/87GT		■	■	■
Current transformer supervision	CTS	■	■	■	■
Trip circuit supervision	TCS	■	■	■	■
Voltage transformer supervision	VTS	■	■	■	■
Circuit breaker monitoring		■	■	■	■

Distance protection relays

	series	30					40					
	model	P430C	P433	P435	P437	P439	P441	P442	P443	P444	P445	P446
Case size		Compact	40 or 84TE	40 or 84TE	84TE	40 or 84TE	40TE	60TE	80TE	80TE	40 or 60TE	80TE
CT Inputs		4	4	4	4 or 5	4	4	4	5	4	4	8
VT Inputs		3	4 or 5	4 or 5	4 or 5	4 or 5	4	4	4	4	4	5
Opto Inputs (max)		2	70	82	36	70	8	16	32	24	16	24
Output Contacts (max)		8	32	48	48	28	14	21	32	46	16	32
RTDs (option)			1	1	1	1						
Analogue Input/Output (max)			1/2	1/2	1/2	1/2						
Function keys/hotkeys		■	■	■	■		■	■	■	■	■	■
Bay control & monitoring with Mimic						■						
Interlocking logic			■	■		■						
PROTECTION FUNCTION	ANSI											
Distance	21/21N	■	■	■	■	■	■	■	■	■	■	■
Check synchronising	25		■	■	■	■	■	■	■	■		
Directional power	32	■	■	■	■	■						
Negative sequence overcurrent	46	■	■	■	■	■	■	■	■	■	■	■
Directional negative sequence	46/67	■			■		■	■	■	■	■	
Broken conductor	46BC	■	■	■	■	■	■	■	■	■	■	■
Thermal overload	49	■	■	■	■	■	■	■	■		■	■
Switch on-to fault	50/27	■	■	■	■	■	■	■	■	■	■	■
Earth fault	50/51N	■	■	■	■	■	■	■	■	■	■	■
Phase overcurrent	50/51P	■	■	■	■	■	■	■	■	■	■	■
Stub bus protection	50ST	■	■	■	■	■	■	■	■	■	■	■
Over/Undervoltage	59/27	■	■	■	■	■	■	■	■	■	■	■
Residual overvoltage	59N	■	■	■	■	■			■		■	■
Circuit breaker failure	62/50BF	■	■	■	■	■	■	■	■	■	■	■
Earth fault directional	67N	■	■	■	■	■	■	■	■	■	■	■
Transient earth fault directional	67N		■	■		■						
Phase directional	67P						■	■	■	■	■	■
Wattmetric earth fault	67W	■	■	■		■						
Out of step tripping	68	■	■	■	■	■			■			■
Power swing blocking	78	■	■	■	■	■	■	■	■	■		■
Autoreclose	79	3 pole	3 pole	1/3 pole	1/3 pole	3 pole	3 pole	1/3 pole	1/3 pole	1/3 pole	3 pole	1/3 pole
Over/Under frequency	81	■	■	■	■	■	■	■		■		■
Rate of change of frequency	81R	■	■	■	■	■						
Channel aided scheme logic	85	■	■	■	■	■	■	■	■	■	■	■
Capacitive voltage transformer supervision	CVTS						■	■		■		
Trip Circuit Supervision	TCS	■	■	■	■	■	■	■	■	■	■	■
Voltage/Current transformer supervision	VTS/CTS	■	■	■	■	■	■	■	■	■	■	■
Delta directional comparison	ΔI/ΔV								■			
Neutral admittance	YN	■	■	■		■						
InterMiCOM		■	■	■	■	■	■	■	■	■	■	■
Mutual compensation					■			■	■	■		

Line differential protection relays

	series	20	30		40						
	model	P521	P530C	P532	P541	P542	P543	P544	P545	P546	P547
Case size		30TE	Compact	40 or 84TE	40TE	60TE	60TE	60TE	80TE	80TE	80TE
CT Inputs		4	4	4	4	4	5	8	5	8	5
VT Inputs			3	4 or 5			4	5	4	5	4
Opto Inputs (max)		5	2	46	8	16	16	16	32	24	24
Output Contacts (max)		8	8	30	7	14	14	14	32	32	32
Function Keys/Hotkeys			■	■	■	■	■	■	■	■	■
Interlocking logic				■							
PROTECTION FUNCTION	ANSI										
Distance	21						■	■	■	■	■
Check synchronising	25			■			■	■	■	■	■
Loss of load/Undercurrent	37	■									
Negative sequence overcurrent	46	■	■	■			■	■	■	■	■
Thermal overload	49	■	■	■	■	■	■	■	■	■	■
Earth fault	50/51N	■	■	■	■	■	■	■	■	■	■
Phase overcurrent	50/51P	■	■	■	■	■	■	■	■	■	■
Circuit breaker failure	50BF	■	■	■	■	■	■	■	■	■	■
Over/Under voltage	59/27		■	■			■	■	■	■	■
Wattmetric earth fault	64W		■	■			■	■	■	■	■
Earth fault directional	67N		■	■			■	■	■	■	■
Sensitive directional earth fault	67N			■			■	■	■	■	■
Phase directional	67P		■	■			■	■	■	■	■
Power swing blocking	78						■	■	■	■	■
Autoreclose	79		3 pole	3 pole		3 pole	1/3 pole	1/3 pole	1/3 pole	1/3 pole	1/3 pole
Under/Over frequency	81						■	■	■	■	■
Line differential (terminal)	87L	2	2	2	2/3	2/3	2/3	2/3	2/3	2/3	
Phase comparison	87L										■
CT supervision	CTS	■					■	■	■	■	■
Trip Circuit Supervision	TCS	■	■	■	■	■	■	■	■	■	■
2 breaker configuration								■		■	
2nd harmonic restraint		■	■	■	■	■	■		■		
Copper wire signalling		■	■	■							
Direct/Permissive inter tripping		■	■	■	■	■	■	■	■	■	
FO signalling		■	■	■	■	■	■	■	■	■	
In Zone transformer		■			■	■	■		■		
PLC signalling											■
SDH/Sonet networks							■	■	■	■	
Vector Compensation		■			■	■	■		■		

Transformer protection relays

	series	20	30					40		
	model	P721	P630C	P631	P632	P633	P634	P642	P643	P645
Case size		20TE	Compact	40TE	40 or 84TE	40 or 84TE	84TE	40TE	60TE	60 or 80TE
CT Inputs		2	6	6	8	12	15	8	12	18
VT Inputs					1	1	1	1 or 2	1 or 4	1 or 4
Opto Inputs (max)		2	2	4	34	40	34	12	24	24
Output Contacts (max)		4	8	14	22	30	22	12	24	24
Analogue Input/Output (max)					1/2	1/2	1/2	4/4	4/4	4/4
RTDs (option)					1	1	1	10	10	10
Function Keys/Hotkeys			■	■	■	■	■		■	■
Interlocking logic					■	■				
PROTECTION FUNCTION	ANSI									
Overexcitation	24				■	■	■	■	■	■
Negative sequence overcurrent	46		■	■	■	■	■	■	■	■
Negative sequence overvoltage	47							■	■	■
Thermal overload	49		■	■	■	■	■	■	■	■
Ground fault	50/51N	■	■	■	■	■	■	■	■	■
Phase overcurrent	50/51P		■	■	■	■	■	■	■	■
Circuit breaker failure	50BF	■		■	■	■	■	■	■	■
Over/Under voltage	59/27				■	■	■		■	■
Ground fault directional	67N							■	■	■
Phase directional	67P							■	■	■
Under/Over frequency	81				■	■	■	■	■	■
Restricted earth fault	87G/64	1			2	3	3	2	3	3
Transformer diff. (windings)	87T		2	2	2	3	4	2	3	3
CT supervision	CTS	■		■	■	■	■	■	■	■
Trip Circuit Supervision	TCS	■	■	■	■	■	■	■	■	■
VT supervision	VTS							■	■	■
2 nd harmonic restraint			■	■	■	■	■	■	■	■
Overfluxing/ 5th harmonic			■	■	■	■	■	■	■	■

Busbar protection relays

	series	20	40			
	Device	P723	P741	P742	P743	P746
Case size		20TE	80TE	40TE	60TE	80TE
CT Inputs		8		4	4	18
VT Inputs						3
Opto Inputs (max)		5	8	16	24	40
Output Contacts (max)		8	8	8	21	32
Function Keys/Hotkeys			■		■	■
PROTECTION FUNCTION	ANSI					
Ground fault	50/51N			■	■	■
Phase overcurrent	50/51P			■	■	■
Circuit breaker failure	50BF	■	■	■	■	■
Busbar	87BB	■	■	■	■	■
Check Zones	87CZ	■	■			■
Phase segregated differential	87P	■	8 zones			2 zones
Sensitive earth fault differential	87P	■	8 zones			
CT supervision	CTS	■	■	■	■	■
Trip Circuit Supervision	TCS	■	■	■	■	■
VT supervision	VTS			■	■	■
Phase comparison						■
Central unit (Nbr of feeders)		No limit	up to 28			
Peripheral units 8 zones				■	■	
CT supervision				■	■	
CT saturation detection			■	■	■	

Voltage, frequency, and ancillary protection relays

	series	20				40		
	model	P821	P921	P922	P923	P341	P841	P849
Dimensions		20TE	20TE	20TE	20TE	40 TE or 60TE	60TE or 80 TE	80TE
CT Inputs		4				4	5 or 8	
VT Inputs			4	4	4	4	4 or 5	
Opto Inputs (max)		5	2	5	5	16	16 or 24	64
Output Contacts (max)		9	4	8	8	15	14 or 32	60
PROTECTION FUNCTION	ANSI							
Check synchronising	25					■	1 or 2	
Undervoltage	27		■	■	■	■	■	
Phase sequence voltage	47/27D			■	■		■	
Breaker failure protection	50BF	■				■	1 or 2	
Overvoltage	59		■	■	■	■	■	
Residual overvoltage	59N		■	■	■	■	■	
Restricted earth fault	64					■		
Wattmetric earth fault	64N/32N					■		
Phase directional with DLR option	67P					■		
Autoreclose	79						1 or 1/2	
Under/Over frequency	81			■	■	■	■	
Rate of change of frequency (df/dt+t)	81R				■	■	■	
Frequency supervised average rate of change of frequency (f+Δf/Δt)	81RAV				■			
Frequency supervised rate of change of frequency (f+df/dt)	81RF				■			
Voltage vector shift	dVq					■		
Trip circuit supervision	TCS		■		■	■		
3 pole tripping		■	■	■	■		■	■
Ferroresonance detection							■	
High speed contact							■	■

Rail protection relays

	series	30			
	model	P138	P436	P438	P638
Case size		40 or 84TE	40 or 84TE	40 or 84TE	84TE
CT Inputs		2	3	3	5
VT Inputs		1	2	2	1
Opto Inputs (max)		22	28	28	38
Output Contacts (max)		48	46	46	64
RTDs (option)		1	1	1	1
Analogue Input/ Output (max)		1/2	1/2	1/2	1/2
Function Keys/Hotkeys		■	■	■	■
PROTECTION FUNCTION	ANSI				
Distance	21/21N		■	■	
Over/Under voltage	27/59	■	■	■	■
Thermal overload	49	■	■	■	■
Switch on-to fault	50/27		■	■	
High current supervision	50H		■	■	
High current earth fault (tank protection)	50/51N	■			■
Phase overcurrent	50/51P		■	■	■
Circuit breaker failure	62/50BF	■	■	■	■
Phase directional	67P	■	■	■	■
Under/Over frequency	81	■			■
Lock-out	86	■	■	■	■
Transformer differential (windings)	87T				2
Train startups	di/dt,dv/dt,dΦ/dt		■	■	
Rail catenary protection	Hz		16 2/3	25/50/60	
Trip circuit supervision	TCS	■	■	■	■
Current transformer supervision	CTS		■	■	
Voltage transformer supervision	VTS	■	■	■	
2nd harmonic restraint			■	■	■
Defrost protection				■	
High impedance fault detection				■	
InterMiCOM			■	■	

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