EcoStruxure™
Innovation At Every Level

PowerLogic™ P5

Catalog 2025

Network Protection and Control Relays

se.com

Life Is On Schneider Electric

Overview

PowerLogic P5 protection relay is based on proven technology concepts and developed in close cooperation with customers, so it's built to meet your toughest demands:

- Modular design that allows user-defined conventional protection and arc-flash protection solutions.
- Compatible with conventional CTs/VTs or low power instrument transformers LPCT/LPVT compliant to IEC 61869-10 and IEC 61869-11.
- Embeds latest cybersecurity functionality to help prevent intentional misuse and cyber-threats.
- Fast replacement with enhanced safety thanks to withdrawability and backup memory that automatically restores parameters without using any configuration tools.
- Wireless ZigBee connectivity with PowerLogic TH110 and CL110 sensors for condition monitoring of the switchgear.
- Advanced logic engine (option) supports the most complex automation and control schemes.
- Wide range of accessories allowing to expand the application.

PowerLogic products are designed to be user friendly, a feature that is proven in our customer reports day after day. You'll benefit from features that include:

- A complete set of protection functions incl. optional arc-flash detection in PowerLogic P5x30 models.
- Dedicated circuit breaker control with single-line diagram, push buttons, programmable function keys, LEDs, and customizable alarms.
- Multilingual HMI for customized messaging.
- Settings tool relay management software for setting parameters, configuring, and network fault simulation.
- Serial and redundant Ethernet communication as well as wireless connectivity.
- IEC 61850 communication protocol including flexible product naming for smooth multi-vendor integration.

PowerLogic P5 is available in two sizes to best fit your needs:

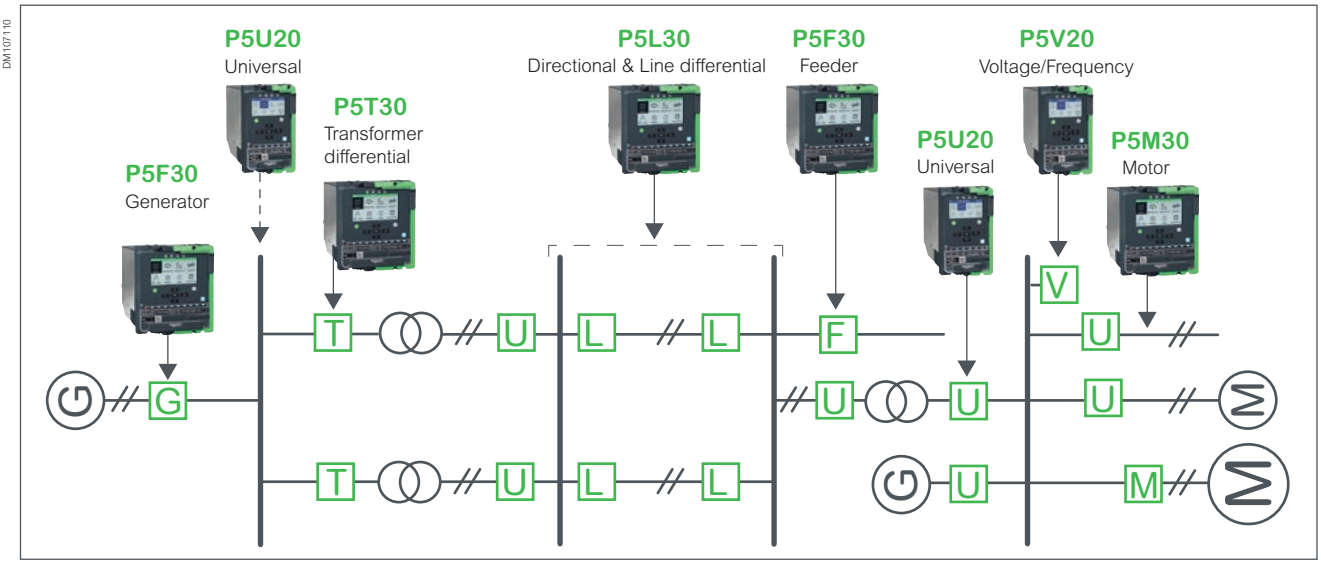
PowerLogic P5x20

PowerLogic P5x30

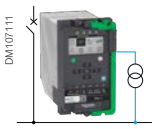
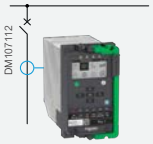
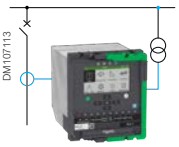
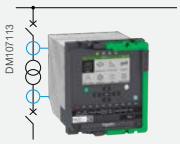
PowerLogic P5 digital protection relays are designed for power distribution networks in:

- Electric utilities
- Critical buildings and Industry:
  - Data Center
  - Healthcare
  - Transportation
  - Industrial buildings
- Large industrial processes:
  - Oil and Gas
  - Mining
  - Mineral and Metals
  - Water

Range overview



Selection Guide

PowerLogic P5 contains two main devices, each with specific functions to address your needs in a one-box design, regardless of application.		PowerLogic P5x20		PowerLogic P5x30	
					
Voltage		P5V20	-	-	-
Feeder		-	P5U20 with directional in LPCT/LPVT version	P5F30 with directional	-
Transformer				-	P5T30
Motor				P5M30 with directional	-
Line		-	-	P5L30 with directional	-
Characteristics					
Measuring inputs	Phase current	-	1/5A CT (x3) or LPCT (x3) (1)	1/5A CT (x3) or LPCT (x3)	1/5A CT (x6)
	Residual current	-	1/5A CT & 1A CT or CSH core balance CT	1/5A CT & 1A CT or CSH core balance CT	1/5A CT (x2)
	Voltage	VT (x4)	LPVT (x4) (1)	VT (x4) or LPVT (x4)	VT (x1)
Arc-flash sensor inputs		-		0 to 6 point sensors	
Digital	Inputs	4 to 16		4 to 40	
	Outputs	3 to 8 + Watchdog (WD)		3 to 18 + Watchdog (WD)	
Temperature sensor input		-	0 to 16 (external modules)	0 to 16 (external modules)	
Analogue inputs/outputs		0 to 12/12 (external modules)		0 to 12/12 (external modules)	
Front ports		1 USB for configuration 1 USB for USB key		1 USB for configuration 1 USB for USB key	
Power supply		24-250 VDC ; 100-230 VAC		24 - 48 VDC or 48-250 VDC ; 100-230 VAC	
Ambient temperature, in service		-40 to 70°C (-40 to 158°F)		-40 to 70°C (-40 to 158°F)	
Communication					
Hardware modules	Extension(2) + Backup memory	●		●	
	Serial	●		●	
	Ethernet	●		●	
	2nd Ethernet or InterRelay	-		●	
Protocols	IEC 61850 Ed.1 & Ed.2	●		●	
	IEC 60870-5-103 & 101	●		●	
	DNP3 Ethernet	●		●	
	DNP3 serial	●		●	
	Modbus Ethernet	●		●	
	Modbus serial	●		●	
	EtherNet IP	●		●	
Redundancy protocols	RSTP	●		●	
	PRP / HSR	●		●	
Wireless protocols	ZigBee 2.4 GHz (IEEE 802.15.4) Green Power	●		●	
Time synchronization	Pulse, IRIG-B(3)	●		●	
	SNTP, PTP IEEE 1588 v2(4)	●		●	
Others					
Control		8 controlled objects Mimic		8 controlled objects Mimic	
Logic (Matrix + Programmable logic)		●		●	
Optional Advanced Logic Engine (order option)		●		●	
Cybersecurity (settable)		Basic or Advanced		Basic or Advanced	
Draw-out device (withdrawability)		●		●	
Hardware dimensions (W/H/D)		102 / 176 / 219 mm 4.01 / 6.93 / 8.62 in		152 / 176 / 219 mm 6.0 / 6.93 / 8.62 in	

(1) In case P5U20 is choosen for cooperation with low power sensors, it contains LPCT (x3) and LPVT (x4) channels
(2) for connection of RTD module and IRIG-B module
(3) IRIG-B module is a separate accessory
(4) PTP IEEE 1588 v2 is availaible with HSR/PRP communication board
(5) P5L30 is not available with LPCT/LPVT inputs.

Selection Guide by Functionality

Protection Functions	ANSI code	IEC 61850 Logical Node	P5V20 VT	P5U20 CT	P5U20 LPCT/LPVT	P5F30 CT/VT LPCT/LPVT	P5M30 CT/VT LPCT/LPVT	P5T30 CT/VT	P5L30 CT/VT
Current protection									
Non-direction or directional phase overcurrent(1)	50/51/67	OC**PTOC**	-	6	6	6	6	6	6
Non-directional or directional earth/ground fault (2)	50N/51N 50G/51G 67N	DEFU**PTOC**	-	6	6	6	6	6	6
Transient intermittent/ground fault	67NI	IOIO**PTEF**	-	-	1	1	-	-	1
Neutral admittance	21YN	EF**PADM**	-	-	-	2	2	-	2
Negative sequence overcurrent	46 (I2/I1)	NEG**PTOC**	-	2	2	2	2	2	2
Current unbalance, Broken conductor	46BC (I2)	UIBC**PTOC**	-	2	2	2	-	2	2
Breaker failure	50BF	CBFP**PIOC**	1	1	1	1	1	2	1
Phase undercurrent	37	UC**PTUC**	-	1	1	1	1	-	1
Low impedance restricted earth/ground fault[4]	64REF	REF**PDIF**	-	1	-	1	1	2	1
High impedance restricted earth/ground fault[4]	87N		-	A	-	A	A	A	A
High impedance busbar differential[4]	87BB		-	A	-	A	A	A	A
Switch on to fault (SOTF)	50HS	SOTF**PIOC**	-	1	1	1	1	-	1
Cold load pickup (CLP or CLPU)		CLP**PIOC**	-	1	1	1	1	-	1
Voltage controlled overcurrent	51V		-	A	A	A	A	-	A
Voltage protection									
Undervoltage	27	OF**PTOF**	3	-	3	3	3	-	3
Overvoltage	59	OV**PTOV**	3	-	3	3	3	-	3
Neutral voltage displacement	59N	UO**PTOV**	3	-	3	3	3	3	3
Negative sequence overvoltage	47	NEG**PTOV**	2	-	2	2	2	-	2
Frequency protection									
Overfrequency	81	OFUF**PTOF**	2	-	2	2	2	-	2
Underfrequency	81U	UF**PTUF**	8	-	8	8	8	-	8
Rate of change of frequency (RoCoF)	81R/81RF	DFDT**PFRC**	9	-	9	9	-	-	9
Thermal protection									
Thermal overload	49	THF**PTTR**	-	2	2	1	1	1	1
Temperature monitoring	38	RTD**GAPC**	-	16	16	16	16	16	16
Power protection									
Wattmetric earth/ground fault	32N	EF**PDOP**	-	-	-	2	2	-	2
Directional active underpower	32P	REVP**PDOP**	-	-	2	2	2	-	2
Rotating machine protection									
Frequent start inhibition	66	FST**PMRI**	-	1	1	-	1	-	-
Motor start-up supervision, locked rotor	48/51LR	STAL**PMSS**	-	1	1	-	1	-	-
Positive sequence undervoltage	27P	UVPS**PTUV**	2	-	-	-	2	-	-
Underspeed (3)	14	MOT**PZSU**	-	2	2	-	2	-	-
Overspeed (3)	12	MOT**POVS**	-	2	2	-	2	-	-
Anti-backspin(3)	ABS	MABS**PMSS**	-	1	1	-	1	-	-
Emergency restart			-	1	1	-	1	-	-
Line protection									
Fault locator	21FL	FL**RFLO**/ SC**RFLO**	-	-	-	1	-	-	1
Auto-Recloser	79	AR**RREC**	-	1	1	1	-	-	1
InterRelay protection	85	**IRInGGIO1, IROutGGIO1**	-	-	-	16	16	16	16
2-ends line differential	87L	**LinePDIF1**	-	-	-	-	-	-	1
Transformer protection									
Inrush/2nd harmonic detection	68H2	ID**PHAR**	-	1	1	1	1	2	1
Fifth harmonic detection	68H5	HAR5**PTOC**	-	1	1	1	1	-	1
2-winding transformer differential	87T	OCPDIF	-	-	-	-	-	1	-
Thermostat / Buchholz	26/63	TRF**SIML**	-	2	2	2	-	2	-
Overfluxing	24	TVF**PVPH**	-	-	-	-	-	3	-
Capacitor protection									
Capacitor bank unbalance	51C	CAP**PTOC**	-	2	-	2	-	-	-
Capacitor overvoltage	59C	CAP**PTOV**	-	1	-	1	-	-	1
Other protection									
Arc-flash detection	50ARC	ARCM**PIOC**	-	-	-	8	8	8	8
Programmable stages	99	PS**GAPC**	8	8	8	8	8	8	8
Programmable curves			3	3	3	3	3	3	3
Control, monitoring, supervision									
Synchronization check	25	**RSYN**	1	-	-	1	-	-	1
Lockout relay	86		1	1	1	1	1	1	1
CT supervision	60	CTS**GGIO**	-	1	1	1	1	2	1
VT supervision	60	VTS**GGIO**	1	-	1	1	1	-	1
Setting groups			4	4	4	4	4	4	4

(1) Only non-directional phase overcurrent is availaible in P5U20 CT variant and P5T30.
(2) Only non-directional earth/ground fault overcurrent is availaible in P5U20 CT variant.
(3) Function available if 12 BI / 4 BO board is present.
(4) Only available with conventional (phase or neutral) CTs
A Function available by application guidelines

Selection Guide by Functionality (cont'd)

Control functions	P5V20 VT	P5U20 CT	P5U20 LPCT/LPVT	P5F30 CT/VT LPCT/LPVT	P5M30 CT/VT LPCT/LPVT	P5T30 CT/VT	P5L30 CT/VT
Control with Mobile application	●	●	●	●	●	●	●
Switchgear control and monitoring	8	8	8	8	8	8	8
Programmable switchgear interlocking	●	●	●	●	●	●	●
Local control on single-line diagram	●	●	●	●	●	●	●
Local switchgear control with OPEN/CLOSE keys	●	●	●	●	●	●	●
Local/remote function	●	●	●	●	●	●	●
Programmable function keys	1	1	1	7	7	7	7
Programmable logic	●	●	●	●	●	●	●
Advanced logic engine (order option)	●	●	●	●	●	●	●
Analogue inputs/outputs (external modules)	Up to 12/12	Up to 12/12	Up to 12/12	Up to 12/12	Up to 12/12	Up to 12/12	Up to 12/12

Measurement functions	P5V20 VT	P5U20 CT	P5U20 LPCT/LPVT	P5F30 CT/VT LPCT/LPVT	P5M30 CT/VT LPCT/LPVT	P5T30 CT/VT	P5L30 CT/VT
RMS current values		●	●	●	●	●	●
RMS voltage values	●		●	●	●	●[2]	●
RMS active, reactive and apparent power			●	●	●		●
Frequency	●	●	●	●	●	●	●
Fundamental frequency current values		●	●	●	●	●	●
Fundamental frequency voltage values	●		●	●	●	●[2]	●
Fundamental frequency active, reactive and apparent power values			●	●	●		●
Power factor			●	●	●		●
Phase differential currents						●	●
Phase bias currents						●	●
Motor speed detection [1]		●	●		●		
Energy values: active and reactive			●	●	●		●
Demand values: phase currents		●	●	●	●	●	●
Demand values: active, reactive, apparent power and power factor			●	●	●		●
Maximum demand values: phase currents		●	●	●	●	●	●
Minimum and maximum demand values: RMS phase currents		●	●	●	●	●	●
Minimum and maximum demand values: active, reactive, apparent power and power factor			●	●	●		●
Maximum demand values over the last 31 days and 12 months: active, reactive, apparent power			●	●	●		●
Minimum demand values over the last 31 days and 12 months: active, reactive power			●	●	●		●
Maximum and minimum values: currents		●	●	●	●	●	●
Maximum and minimum values: voltages	●		●	●	●	●[2]	●
Maximum and minimum: frequency	●	●	●	●	●		●
Maximum and minimum: active, reactive, apparent power and power factor			●	●	●		●
Harmonic values of phase current and THD		●	●	●	●	●	●
Harmonic values of voltage and THD	●		●	●	●	●[2]	●
Voltage sags and swells	●		●	●	●		●

Logs and records	P5V20 VT	P5U20 CT	P5U20 LPCT/LPVT	P5F30 CT/VT LPCT/LPVT	P5M30 CT/VT LPCT/LPVT	P5T30 CT/VT	P5L30 CT/VT
Sequence of event record	●	●	●	●	●	●	●
Last fault record	●	●	●	●	●	●	●
Disturbance record	●	●	●	●	●	●	●
Tripping context record	●	●	●	●	●	●	●
Relay maintenance data log	●	●	●	●	●	●	●
Security data log	●	●	●	●	●	●	●
Settings, events and disturbance records download to USB-key	●	●	●	●	●	●	●

Monitoring functions	ANSI code	P5V20 VT	P5U20 CT	P5U20 LPCT/LPVT	P5F30 CT/VT LPCT/LPVT	P5M30 CT/VT LPCT/LPVT	P5T30 CT/VT variant	P5L30 CT/VT
Trip circuit supervision	74	1	1	1	1	1	2	1
Circuit breaker monitoring		1	1	1	1	1	1	1
Relay monitoring		●	●	●	●	●	●	●

(1) Function available if 12DI / 4DO board is present (2) For 1 voltage channel

Functions and Description

Motor overspeed - ANSI 12

The function is based on the direct measurement of motor speed. The overspeed protection function detects racing when the motor is driven by the load, or a loss of synchronization for synchronous motors, or for process monitoring. This function picks up if the speed measured exceeds the speed setting and it will trip after a definite time delay.

- Two stages of overspeed protection with definite time delay
- The function is available when a 12 DI / 4 DO board is present and the motor speed detection function is enabled.

Functions	Settings
Motor speed setting range	100 – 160% Ωn
Definite time delay	1 s to 300 s

Motor underspeed - ANSI 14

The function is based on the direct measurement of motor speed. The underspeed protection function can detect the slow-down of motor speed after motor starting, possibly resulting from mechanical overloads or locked rotor. This protection is active after the motor speed has successfully achieved the speed setting. The function picks up if the speed measured drops below the speed setting after having first exceeded the set point by 5%. Underspeed protection is blocked when the motor speed drops below 5% of rated motor speed to avoid unwanted tripping when the motor is switched off.

- Two stages of underspeed protection with definite time delay
- The function is available when a 12 DI / 4 DO board is present and the motor speed detection function is enabled.

Functions	Settings
Motor speed setting range	10 – 100% Ωn
Definite time delay	1 s to 300 s

Motor anti-backspin (ABS)

For a motor with high inertia, once the CB/Contactor supplying power to the motor is switched off, the rotor may continue to turn for a considerable length of time. In that case, the motor terminal voltage is out of phase and the motor re-starting operation may result in catastrophic failure. In some other applications for example when a motor is on a down-hole pump, after the motor stops, the liquid may fall back down the pipe and spin the rotor backwards. It would be very undesirable to start the motor at this time. In these circumstances the anti-backspin function is used to detect when the rotor has completely stopped, to allow re-starting of the motor.

- One stage of anti-backspin protection with definite time delay
- This function is availaible when Motor Status function is enabled
- 3 different criteria for rotor stop detection
- Depending on criteria selected, a 12 DI / 4 DO board and the motor speed detection function may be required.

Functions	Settings
Rotor stop detection mode	Zero speed, Zero speed switch, Motor stopped
Definite time delay	1 s to 7 200 s

Functions and Description

Fault locator - ANSI 21FL

The function can be used to locate a short-circuit fault and an earth/ground fault in radially operated networks. The fault location is given as reactance (Ohms) and as distance in kilometers or miles. The fault value can then be exported, for example, with an event to a Distribution Management System (DMS). The system can then locate the fault. If a DMS is not available, the distance to the fault is displayed as kilometers and as a reactance value.

Functions	Settings
Pick-up	0.10 - 5.00 pu
Line reactance	0.010 to 10.000 Ohm/km
Earth/ground factor	0.000 to 10.000
Earth/ground factor angle	-60° to +60°

Neutral admittance - ANSI 21YN

The neutral admittance protection function can be applied in high resistance earthed, unearthed or compensated power systems to detect earth fault with increased sensitivity. The neutral admittance Yn is calculated based on the zero-sequence current IN and the zero-sequence voltage VN.

- Two independent stages with definite time delay.
- Each stage settable for over-admittance or over-conductance or over-susceptance.
- Four setting groups.

Functions	Settings
Pick-up for Yn	1% - 200% IN/VN for current measured with very sensitive earth/ground fault CT
	5% - 1000% IN/VN for current measured by standard earth/ground fault CTs
	25% - 5000% IN/VN for current measured by CSH and for calculated IN
Pick-up for Gn	1% - 100% IN/VN for current measured with very sensitive earth/ground fault CT
	5% - 500% IN/VN for current measured by standard earth/ground fault CTs
	25% - 2500% IN/VN for current measured by CSH and for calculated IN
Pick-up for Bn	1% - 100% IN/VN for current measured with very sensitive earth/ground fault CT
	5% - 500% IN/VN for current measured by standard earth/ground fault CTs
	25% - 2500% IN/VN for current measured by CSH and for calculated IN
Directional mode	Non-directional, Forward, Reverse
Operation delay	0.00 to 300 s
Reset time	0 to 100 s
SOL(1) operation	Disable/Enable
SOL(1) operation delay	0.05 to 300 s

(1) SOL = Selective Overcurrent Logic

Functions and Description

Overfluxing - ANSI 24

The transformer overfluxing protection detects an inadmissibly high induction in the iron core of transformers which may have been caused by a voltage increase and/or a frequency decrease. This protection function is available in P5T30 when voltage connection mode is VP or VPP. The element measures the ratio of voltage to frequency (Volts per Hertz) and operates when this ratio exceeds the setting. When the flux level drops below the reset value, the reset time starts.

- One stage with definite time delay for alarm purposes
- Two stages for tripping purposes incl. one with inverse time delay
- Four setting groups

Functions		Settings
V/f>1 alarm stage	Pick-up	1.00 - 1.60
Operate delay		0.00 - 10000.00 s
V/f>1 trip stage	Pick-up	1.05 - 1.60
Operate curve		DT, Prg1, Prg2, Prg3
Operate delay		0.00 - 10000.00 s
V/f>2 trip stage	Pick-up	1.05 - 1.60
Operate delay		0.00 - 10000.00 s

Synchro-check - ANSI 25

This function checks the phase -to- phase voltages on both sides of a circuit breaker (CB) and allows CB closing when the voltage phase angle, magnitude, frequency differences are all within permitted limits.

- Seven operation modes of no-voltage conditions are provided (dead line, dead bus).
- Synchronous mode is provided, where the frequency difference is less than 0.3 Hz.
- Asynchronous mode is provided, where CB close time is compensated.
- Independent settings for voltage phase angle, magnitude, frequency differences.
- Four setting groups.

Functions	Settings
Synchronization mode	Off, Asynchronous, Synchronous
Voltage check mode	DD, DL, LD, DD/DL, DD/LD, DL/LD, DD/DL/LD (1)
Circuit breaker close time	0.04 to 0.60 s
Dead line voltage setting limit	0.01 - 1.20 pu
Active line voltage setting limit	0.10 - 1.30 pu
Frequency difference	0.01 - 1.0 Hz
Voltage difference	0.01 - 0.60 pu
Phase angle difference	2° - 90°
Request timeout	0.1 to 600 s

(1) D = no-voltage condition, L = voltage condition

Functions and Description

Undervoltage - ANSI 27

The Undervoltage protection function (ANSI code 27) is used to detect voltage dips or sense abnormally low voltages to trip, trig load shedding or load transfer. The function provides the selection of three phase-to-phase voltages or three phase-to-ground voltages for comparison with the voltage threshold. Each phase can start or trip independently. If the fault situation remains longer than the protection operates time setting, a trip signal is issued.

- Three independent stages with the same settings and performance
- Blocking during voltage transformer fuse failure
- Apply programmable curves and adapt operation to the low voltage ride through capability of the generator
- Four setting groups for each stage

Functions		Settings
Measurement mode		Phase-Phase; Phase-Ground
Tripping logic		Any Phase; Three Phase
V<1 ... V<3 stages	Pick-up	0.02 - 1.20 pu
Delay type		DT, IDMT, Prg1-3: 3 programmable curves with 16 setting points
Definite time delay		0.00 - 600.00 s
Reset delay		0.00 - 100.00 s
Hysteresis		1 - 5%
CB open blocking		Off/On

Positive sequence undervoltage - ANSI 27P

This function is applied to detect insufficient or unbalanced system voltages and detect reverse rotation.

- Two independent stages with define time are provided.
- Low voltage self-blocking will operate when the maximum phase to phase voltage is less than 10% Vn.

Functions	Settings
Pick-up	0.20 - 1.20 pu
Time delay	0.00 - 300.00 s
Low voltage self-blocking	0.02 - 1.00 pu

Directional active underpower - ANSI 32P

This function can be used as underpower protection (e.g. loss of load of a motor) or as reverse power protection (e.g. power generation by a motor if supply is disconnected). It starts if measured active power drops below the set threshold and operates with definite time delay.

- Two independent stages with definite time delay are provided
- Undervoltage blocking if the maximum phase to phase voltage is less than 5% Un.
- Four setting groups for each stage.

Functions	Settings
Pick-up	-200 % to 200 % Sn(1) *with Sn = √3 Un In*
Time delay	0.0 to 300.00 s

Functions and Description

Wattmetric earth/ground fault - ANSI 32N

This function detects single phase to earth/ground faults in Petersen coil compensated power systems. It operates on active residual power. Using memory mode also allows operation on intermittent earth/ground faults.

- Neutral displacement voltage VN> element to enable function.
- Settable forward/reverse direction.
- Operating characteristic with settable minimum active power and sector angles.
- Dedicated blocking input.
- Dedicated input to bypass operate time delay.
- Four setting groups for each stage.

Functions	Settings
Direction mode	Reverse, forward
Setting range	0.1 % to 20 % Sn
Time delay	0.00 to 300.00 s
VN pick-up	0.020 - 0.800 pu
Sector angle	0° - 90°
Memory mode	None, voltage, time, voltage+time
Memory hold time	0.05 to 10.00 s
Memory operating time	0.00 to 100.00 s
SOL(1) operation	mode Off, SOL1, SOL2

Phase undercurrent - ANSI 37

This function is typically used to detect defects in motor drives based on loss of load detection due to a significant drop of current. It measures the fundamental component of the phase currents.

- One stage with definite time delay is provided.
- Settable low current self-blocking parameter.
- Four setting groups.

Functions	Settings
Pick-up	0.05 - 1.00 pu
Low current blocking	0.02 - 0.50 pu
Time delay	0.00 - 300.00 s

(1) SOL = Selective Overcurrent Logic

Functions and Description

Temperature monitoring - ANSI 38

This function is used to detect abnormal heat rise by directly measuring the temperature inside equipment (transformer, motors, generators, and so on.) with RTD thermal sensors such as Pt100, Ni100 or Ni120.

- Two independent set points: alarm and tripping for each RTD sensor.
- Inbuilt RTD supervision (shorting, open loop).

Functions	Settings
Pick-up	0 to 180 °C (32 at 356 °F)
Time delay	0.00 to 600.0 s

Negative sequence overcurrent - ANSI 46

This function provides greater sensitivity to detect phase to phase faults at the end of long lines or behind transformers. It can also be used for machine application against temperature rise caused by unbalanced power supplies, phase inversion, or loss of phase.

- Two stages with definite time or inverse time delayInbuilt RTD supervision (shorting, open loop)
- Definite-time adder and minimum operating time functions in IDMT mode
- Four setting groups for each stage

Functions	Settings
Pick-up	0.02 - 5.00 pu
Definite time delay	0.00 - 300.00 s
Inverse time delay curves	IEC: SI, VI, EI, LTI, UTI
	IEEE: MI, VI, EI
	ANSI: NI, STI, LTI
	Others: UK Rectifier, FR_STI, RI, CO2, CO5, CO7, CO8, CO9, CO11, BPN
	Prg1-3: 3 programmable curves with 16 setting points
Reset curve	DT, IDMT, Prg1-3
Reset delay	0.00 - 100.00 s
DT adder	0.00 - 1.00 s
Minimum operate delay	0.00 - 10.00 s

Functions and Description

Unbalanced overcurrent, broken conductor - ANSI 46BC

This function is applied to detect broken conductor conditions, based on the ratio between the negative sequence current and positive sequence current.

- Two stages with definite time delay are provided.
- This function is not available in 2CT mode.
- Four setting groups.

Functions	Settings
Pick-up	2 to 70 %
Time delay	0.00 s to 300 s

Negative sequence overvoltage - ANSI 47

Protection of a rotating machine from being energized with a reverse voltage sequence or prevention of overheating of the motor due to a broken conductor condition. It monitors the voltage phase sequence detecting a reverse rotation or voltage unbalance due to a missing (asymmetrical) phase. The detection of these conditions can then be used to trip the machine to prevent damage to both motor and any mechanically coupled processes.

- Two independent stages with definite or inverse time delay.
- When the VT connection is configured to VPP/VPPy the function is automatically disabled.
- Four setting groups for each stage.

Functions	Settings
Pick-up value	0.01 - 1.00 pu
Delay type	Definite time (DT), inverse time (INV)
Time delay	0.00 s to 300 s
Reset time	0.03 s to 300 s

Functions and Description

Motor start-up supervision - ANSI 48

Protection of motors against overheating caused by excessive start time due to heavy motor load or too low voltage.

- Motor start detection is based on circuit breaker (CB) position and current.
- Operation with definite time delay or inverse time delay.

Functions	Settings
Motor start detection current	1.50 - 10.00 pu
Motor start detection mode	CB position, current, CB position and current
Delay type	Definite time (DT), inverse time (INV)
Motor start time	1 s to 300.0 s

Thermal overload protection for feeders - ANSI 49F

This function is applied to detect conditions where thermal damage may be caused by overloads on cables. The thermal capacity is calculated by the thermal replica according to IEC60255-149. The equivalent current for the thermal replica is the maximum RMS current of 3 phases.

- Independent settable alarm stage and trip stage are provided.
- Current based setting mode and temperature based setting mode are provided.
- Temperature sensor can be applied for ambient temperature based mode.
- A digital input can be applied to inhibit the thermal overload protection
- Four setting groups are provided.

Functions	Settings
Base current	0.10 to 4.00 pu
Overload factor k	0.10 to 1.50
Time constant	1.0 min to 1000 min
Thermal alarm value	50 % to 100 %
Reserve time thermal alarm	1.0 min to 1000 min
Temperature based mode	Current, Ambient
Nominal ambient temperature	-40 °C to 300 °C
Max object temperature	-40 °C to 300 °C
Alarm temperature	0 °C to 300 °C
Min ambient temperature	-40 °C to 300 °C
Default ambient temperature	-40 °C to 300 °C
Thermal level initiation	0 to 90%

Functions and Description

Thermal overload protection for motor - ANSI 49M

This function is applied to detect conditions where thermal damage may be caused by overloads on motors or cables. The thermal capacity is calculated by the thermal replica according to IEC 60255-149. The equivalent current for the thermal replica considers the maximum RMS current of 3 phases and the negative phase sequence current with a settable weighting coefficient.

- Independent settable alarm stage and trip stage are provided.
- Current based setting mode and temperature based setting mode are provided.
- Temperature sensor can be applied for ambient temperature based mode.
- A digital input can be applied to inhibit the thermal overload protection
- Four setting groups.

Functions	Settings
Base current	0.1 to 4.0 pu
Overload factor k	1.0 to 1.5
Heating time constant 1	1.0 min to 1000 min
Heating time constant 2	1.0 min to 1000 min
Cooling time constant	1.0 min to 1000 min
Thermal alarm value	50% to 100%
Reserve time thermal alarm	1.0 min to 1000 min
Temperature based mode	Current, Ambient temperature
Nominal ambient temperature	-40 °C to 300 °C
Max object temperature	-40 °C to 300 °C
Alarm temperature	0 °C to 300 °C
Min ambient temperature	-40 °C to 300 °C
Default ambient temperature	-40 °C to 300 °C
Thermal level initiation	0 to 90%
Unbalance factor	0 to 10

Functions and Description

Arc-flash - ANSI 50ARC

This function is used to detect and minimize the effects of an internal arcing fault, commonly by tripping the CB faster than conventional protection to mitigate the fault.

- Eight independent arc-flash stages.
- GOOSE communication to share informations between two PowerLogic P5 relays.
- Three to six arc-flash sensors available.
- Trip in 4 ms maximum if light detection only.
- Trip in 15 ms maximum if light detection and overcurrent conditions detected with GOOSE communication between two PowerLogic P5 relays.

Functions	Settings
Arc-flash stage 1 to 8	On, Off
Detection mode	Light, light + current
Pick-up phase current	0.50 to 8.00 pu
Pick-up ground/earth current	0.10 to 5.00 pu
Trip delay	0 ms to 255 ms
Hold time	20 ms to 2500 ms

Breaker failure - ANSI 50BF

The circuit breaker failure function (CBF) can be used to operate any upstream circuit breaker (CB) if the programmed output signals, to the main breaker, have not disappeared within a given time after the initial command.

- Two circuit breaker controls are available.

Functions	Settings
Phase current pick-up	0.02 to 4.00 pu
Earth/ground current pick-up	0.02 to 4.00 pu with 1/5 A standard CT
	0.05 to 4.00 pu with CSH core balance CT
Very sensitive earth/ground current pick-up	0.002 to 0.800 pu
Time delay	0.00 s to 50.00 s

Functions and Description

Switch onto fault (SOTF) - ANSI 50HS

This function is applied to provide fast tripping based on instantaneous overcurrent protection, when the CB is closed onto a faulted line.

- One stage instantaneous overcurrent is provided.
- CB open/dead line detection is based on a low current threshold 0.02 In or digital input.
- SOTF active duration after CB closure is settable.

Functions	Settings
Pick-up	1.0 to 40.0 pu
Dead line detection delay	0 to 60.0 s
SOTF active time	0.1 to 60.0 s

Voltage controlled overcurrent - ANSI 51V

Voltage-controlled overcurrent protection can be used as system back-up protection or as transformer back-up protection. Normally voltage-controlled overcurrent protection is preferred for the applications where a generator is directly connected to a busbar without a step-up transformer. It is recommended to use this solution to increase the sensitivity of overcurrent back-up transformer protection. PowerLogic P5 relays provide a dynamic setting mode for each overcurrent protection stage, so that the overcurrent pick-up setting and the operate delay setting will be replaced by dynamic threshold and dynamic operate delay settings. Thanks to this, the overcurrent protection adjusts the current setting according to the detected undervoltage condition. The information about application and setting examples can be found in the P5 Application Book at se.com

Cold Load Pick-up (CLP)

This function helps avoid unwanted tripping of overcurrent protecton elements (50/51, 50N/51N, 50G/51G and 67) during energisation after long periods of outage. Depending on installation characteristics such operations can generate inrush currents that can exceed the pick-up level of protection. These inrush currents may be caused by:

- Magnetizing currents of power transformers.
- Motor starting currents.
- Simultaneous re-energization of the entire facility load (air conditioning, heating, and so on).

In principle the protection settings should be defined in order to avoid tripping on such inrush currents. However if the settings result in insufficient sensitivity levels or too long delays, the CLP function can be used to temporarily increase or inhibit thresholds after re-energization.

Functions	Settings
Idle current	0.01 - 0.50 pu
Pick-up	0.30 - 10.00 pu
Dead time	0.10 - 14400.00 s
Definite time delay	0.01 - 300.00 s

Functions and Description

Non-directional/directional phase overcurrent - ANSI 50/51/67

The overcurrent protection function is used against short circuit faults and heavy overloads. It provides six stages with definite or inverse operate time delay. Each of the stages can be selected non-directional, directional forward or directional reverse. Phase segregated start and trip signals are available for every overcurrent stage. Typical applications are: short-circuit protection of two parallel cables or overhead lines in a radial network, short-circuit protection of a looped network with a single feeding point or short-circuit protection of a two-way feeder, which usually supplies loads but is used in special cases as an incoming feeder.

- Six (6) independent stages with the same settings and performance
- Selective overcurrent logic (SOL1, SOL2) function
- Inrush blocking (68H2) function for each stage
- Definite-time adder and minimum operating time functions in IDMT mode
- Dynamic mode allowing to adjust overcurrent protection settings during transient period. Cold load pick-up (CLPU) or voltage-controlled overcurrent protection can be realized.
- Four setting groups for each stage

Functions		Settings
Direction mode		Non-directional; Forward; Reverse
I>1 … I>6 stages	Pick-up	0.05 - 40.00 pu (DT) 0.05 - 5.00 pu (IDMT)
Definite time delay		0.00 - 600.00 s
Inverse time delay curves		IEC: SI, VI, EI, LTI, UTI
		IEEE: MI, VI, EI
		ANSI: NI, STI, LTI
		Others: UK Rectifier, FR_STI, RI, CO2, CO5, CO7, CO8, CO9, CO11, BPN
		Prg1-3: 3 programmable curves with 16 setting points
Reset curve		DT, IDMT, Prg1-3
Reset delay		0.00 - 100.00 s
DT adder		0.00 - 1.00 s
Minimum operate delay		0.00 - 10.00 s
Characteristic angle		-95° - +95°
VTS blocking		Blocked; Non-directional
Tripping logic		1 out of 3, 2 out of 3
Inrush blocking		Off/On
Selective overcurrent logic		Off, SOL1, SOL2
Dynamic mode		Off/On

Functions and Description

Non-directional/directional phase overcurrent - ANSI 50N/51N/50G/51G/67N

This protection element is used against phase to earth/ground faults in all types of networks. It provides six stages with definite or inverse operate time delay.

Each of the stages can be selected non-directional, directional forward or directional reverse. Each of the stages can be selected measurement mode as FFT or RMS. Default option is FFT (Fast Fourier Transform). Depending on the selection at ordering stage PowerLogic P5 offers two variants of analogue modules: standard module with 1A/5A and very sensitive 1A neutral inputs, or a module with one input for the cooperation with CSH core balance CT.

- Six (6) independent stages with the same settings and performance
- Selective overcurrent logic (SOL1, SOL2) functions and VTS blocking
- Definite-time adder and minumum operating time functions in IDMT mode
- Dynamic mode allowing to adjust earth/ground fault protection settings during transient period, for example Cold Load Pick-up.
- Four setting groups for each stage

Functions		Settings			
Neutral current input		Measured with 1 A/5 A CT			
		Measured with 1 CSH core balance CT			
		Calculated with the sum of the 3 phase currents			
		Measured with 1 A CT			
		Measured 1A/5A CT	Measured CSH	Calculated	Measured very sensitive
IN>1 … IN>6 stages	DT pick-up	0.02 - 20.00 pu	0.05 - 20.00 pu	0.05 - 40.00 pu	0.002 - 1.000 pu
	IDMT pick-up	0.02 - 5.00 pu	0.02 - 5.00 pu	0.05 - 5.00 pu	0.002 - 1.000 pu
VN Pick-up value		0.01 - 1.00 pu			
Pick-up sector size		10° - 170°			
Definite time delay		0.00 - 300.00 s			
Inverse time delay curves		IEC: SI, VI, EI, LTI, UTI			
		IEEE: MI, VI, EI			
		ANSI: NI, STI, LTI			
		Others: UK Rectifier, FR_STI, RI, CO2, CO5, CO7, CO8, CO9, CO11, BPN			
		Prg1-3: 3 programmable curves with 16 setting points			
Reset curve		DT, IDMT, Prg1-3			
Reset delay		0.00 - 100.00 s			
DT adder		0.00 - 1.00 s			
Minumum operate delay		0.00 - 10.00 s			
Angle offset		-180° - +180°			
VTS blocking		Blocked; Non-directional			
Selective overcurrent logic		Off, SOL1, SOL2			
Dynamic mode		Off/On			

(*) CSH current input is an ordering option.

Functions and Description

Capacitor bank unbalance - ANSI 51C

This function is used in double-wye-connected capacitor banks. The unbalance current is measured with a dedicated current transformer (i.e. 5A/5A) between two starpoints of the bank.

- Two stages with definite time delay.
- Unbalance current measured with standard earth/ground fault CT or CSH core balance CT.
- Four setting groups for each stage.

Functions	Settings
Pick-up	0.02 to 20.00 pu for standard CT
	0.05 to 20.00 pu for CSH core balance CT
Time delay	0.00 to 300 s

Locked rotor - ANSI 51LR

Protection of motors against overheating caused by motor rotor jam due to heavy motor load or a mechanical failure after the normal start.

- Operation with definite time delay or inverse time delay.
- Automatically blocked when the motor is starting.

Functions	Settings
Pick-up	10 to 100.0 % IStart
Time delay	1 to 300.0 s
Time delay type	Definite time (DT), Inverse time (INV)

Overvoltage - ANSI 59

The Overvoltage protection function (ANSI code 59) is used to detect system voltages that are too high or to check that there is sufficient voltage to authorize a source transfer. The function provides the selection of three phase-to-phase voltages or three phase-to-ground voltages for comparison with the voltage threshold. Each phase can start or trip independently. If the fault situation remains longer than the protection operate time setting, a trip signal is issued.

- Three independent stages with the same settings and performance.
- Four setting groups for each stage.

Functions		Settings
Measurement mode		Phase-Phase; Phase-Ground
Tripping logic		Any Phase; Three Phase
V>1 … V>3 stages	Pick-up	0.02 - 1.50 pu
Delay type		DT, IDMT, Prg1-3: 3 programmable curves with 16 setting points
Definite time delay		0.00 - 600.00 s
Reset delay		0.00 - 100.00 s
Hysteresis		1 - 5%
CB open blocking		Off/On

Functions and Description

Capacitor overvoltage - ANSI 59C

This function calculates the voltages of a three-phase Y-connected capacitor bank using the measured currents of the capacitors. No voltage measurements are needed. Especially used in filter applications, harmonics are present, which depending on phase angles, can increase the peak voltage. This protection function calculates the worst-case overvoltage in per-unit values using Equation 7.10 according to IEC 60871-1 standard. Harmonics up to 15th are taken into account.

- Three independent stages with define time.
- Four setting groups.

Functions	Settings
Pick-up setting UC>	0.10 to 2.50 UCLN
Time delay	1.0 to 30.0 s
Rated L-N voltage UCLN	100 to 260 000 V
Capacitance per phase	1.00 to 650.00 µF

Neutral voltage displacement - ANSI 59N

This function is used for general earth/ground fault detection and for backup protection (unselective). It measures the fundamental component of the neutral displacement voltage.

- 3 stages with DT operating time
- Attenuation of the third harmonic by more than 60 dB
- 4 setting groups for each stage.

Function	Settings
Pick-up	0.02 to 1.50 pu
Time delay	0.00 s to 300.00 s

Functions and Description

Low impedance restricted earth/ground fault - ANSI 64REF

The Restricted Earth/Ground Fault protection element is mainly used as a unit protection for two-winding transformers, generators and motors in order to detect ground-faults more sensitively than overall machine differential protection is able to do. This protection element is based on the principle of differential protection, it compares phase and starpoint currents. It provides selectivity, with boundaries of the protected zone given from the CT locations.

- Operation characteristic with biasing from residual or maximum phase current.
- Unrestrained operation with high set threshold.
- Optional blocking or restraining from CT supervision
- Four setting groups.

Function		Settings
Neutral current input		Measured with 1A/5A CT, Measured with very sensitive 1A CT
5 CT application		Off/On
Operating mode		Sum(IP) bias, Max(IP) bias
Low set Is1	Pick-up	0.01 - 1.00 pu
Operate delay		0.00 - 1.00 s
High set mode		Off/On
High set Is2	Pick-up	2.00 - 30.00 pu
Slope k1		0 - 100 %
Low set Ib1		0.10 - 1.50 pu
Slope k2		10 - 200 %
Minimum IG	Pick-up	0.00 - 1.00 pu
CTS operating mode		Indication, Blocking, Restraining
CTS low set Is1	Pick-up	0.01 - 1.00 pu

Motor restart inhibition - ANSI 66

This function prevents too frequent motor starts. Every motor has a restriction on the number of starts within a defined period to avoid thermal overload, mainly inside the rotor. A settable time interval between two consecutive starts is also necessary to allow the motor to cool down following the previous start.

- Settable number of starts per hour.
- Settable minimum time between consecutive starts.

Functions	Settings
Time from motor start	0 min, 120 min
Maximum hot starts / hour	1 to 20
Maximum cold starts / hour	1 to 20
Minimum time between starts	0.0 min to 100.0 min

Functions and Description

Transient intermittent earth/ground fault - ANSI 67NI

This function detects short transient intermittent phase to earth/ground faults in compensated networks, which cannot be correctly recognized by steady-state directional earth/ground fault functions using the fundamental frequency components only.

- Neutral displacement voltage VN> element to enable function.
- Settable forward/reverse direction.
- Dedicated blocking input to coordinate with AR.
- Four setting groups.

Functions	Settings
Direction mode	Reverse, Forward
Minimum of number of peaks	1 to 20
VN pick-up	0.01 to 0.60 pu
Time delay	0.00 to 300.00 s
Intermittent time	0.01 to 300.00 s
Reset time	0.06 to 300.00 s

Inrush / 2nd harmonic detection - ANSI 68H2

This function detects inrush current flows that occur when transformers or machines are energized. It may be used to stabilize protection functions (e.g. phase overcurrent, earth/ground fault overcurrent, …) or even to issue a trip if the inrush condition persists too long.

- Based on proven I_2/I_1 measurement.
- Measurement per phase.

Functions	Settings
Pick-up	10 to 35 %
Max Inrush current	1 to 20.00 pu
Operate mode	Cross block, phase block

5th harmonic detection - ANSI 68H5

This function detects 5th harmonic current flows that occur during overexcitation of transformers. It may be used to stabilize protection functions or even to trip if the condition persists too long.

- Based on proven I_5/I_1 measurement.
- Measurement per phase.

Functions	Settings
Pick-up	10 to 100 %
Time delay	0.00 to 300.00 s

Functions and Description

Auto-recloser function - ANSI 79

The Auto-Recloser (AR) function can be utilized in feeder and line differential protection relays to minimize service interruptions caused by transient or semi-permanent faults affecting overhead lines.
The Auto-Recloser employes the object control function to operate the Circuit Breaker (CB) open and close. All other object control methods, including object failure monitoring, are simultaneously in use. If the CB control fails or another function takes control of the CB, the Auto-Recloser sequence stops.

- One to five autorecloser shots.
- Control of one circuit breaker.
- Control via binary or virtual inputs (IEC 61850).

Functions	Settings
Enable Auto-Recloser	On; Off
	with digital input (DI), virtual input (VI), virtual output (VO) or function key
AR enable delay at CB close	0.00 to 100.00 s
CB maximum open time	0.02 to 1.00 s
CB maximum close time	0.02 to 1.00 s
DI to extend reclaim time	with digital input (DI), virtual input (VI), virtual output (VO) or function key
Settings per shot	0.00 to 10.00 s (start delay)
	0.01 to 1200.00 s (dead time)
	0.02 to 3000.00 s (reclaim time)

Overfrequency - ANSI 81

Overfrequency protection can be used as a back-up for generator overspeeding. It is used as well in load restoration schemes to detect that the power system frequency has recovered sufficiently to allow load which had previously been shed to be reconnected. Whenever the frequency reaches the pick-up value of a particular stage, this stage starts, and a start signal is issued. If the fault remains on longer than the operating delay setting, a trip signal is issued.

- Two independent stages with definite time delay
- Low voltage blocking feature
- Four setting groups for each stage

Functions		Settings
f>1 … f>2 stages	Pick-up	40.00 - 65.00 Hz
Definite time delay		0.00 - 7200.00 s
Low voltage blocking		0.10 - 1.00 pu

Functions and Description

Rate of change of frequency - ANSI 81R/81RF

Frequency deviations result from an imbalance between power generation and power loads. Rate of change of frequency protection helps to protect the system from the consequences of such imbalances mainly through two applications. The first one is low frequency load shedding when the system frequency falls too quickly. This becomes more important as power systems with low intertia generation due to many renewable energy sources are increasing. Another application of RoCoF protection is islanding detection, used to identify islanded generators and initiate any appropriate action. Both applications are critical to the stability of modern power systems and can reduce the risk of equipment damage or a widespread outage.

- Nine independent stages with the same settings and performance.
- The function works as independent RoCoF or frequency supervised RoCoF.
- Alternatively, it can be used as additional stages of under/overfequency protection
- Four setting groups for each stage.

Functions	Settings
Direction mode	Negative, Positive, Either
Operating mode	f + RoCoF, Frequency
Pick-up	0.1 - 10.0 Hz/s
df/dt window	0.05 - 1.00 s
Low voltage blocking	0.10 - 1.00 pu
df/dt blocking	0.10 - 20.00 Hz/s
Frequency threshold	40.00 - 65.00 Hz
Definite time delay	0.00 - 100.00 s

Underfrequency - ANSI 81U

The underfrequency protection function is used for detection of an abnormally low frequency compared to the rated frequency to monitor power supply quality. The protection may be used for overall tripping or load shedding. Whenever the frequency reaches the pick-up value of a particular stage, this stage starts, and a start signal is issued. If the fault remains on longer than the operating delay setting, a trip signal is issued.

- Eight independent stages with definite time delay
- Low voltage blocking and large df/dt blocking features
- Four setting groups

Functions		Settings
f<1 … f<8 stages	Pick-up	40.00 - 65.00 Hz
Definite time delay		0.00 - 7200.00 s
Low voltage blocking		0.10 - 1.00 pu
df/dt blocking		0.10 - 20.00 Hz/s

Functions and Description

InterRelay - ANSI 85

InterRelay application offers an effective alternative to traditional hardwired exchange of digital information between two PowerLogic P5 protection and control relays within or between substations. It provides optimized communication in terms of speed, security, and dependability, with minimal amount of wiring between relays. Using fiber optical communication channel makes it immune to electromagnetic interferences.

Nevertheless, comprehensive monitoring and status reporting of the communication link are provided.

- 16 binary data sending and receiving capability
- Flexible usability for all kinds of application requirements
  - Protection: blocking, permissive, or direct tripping and others.
  - Control: status, interlocking, operate, and others.
  - Automation
- Fast data transmission over distances of up to 40 km.

Functions	Settings
InterRelay send/receive signals	Configuration via matrix
Fallback mode	Default, Latching
Default value	0, 1
Address	00, 1A...20A, 1B...20B
Baudrate	56, 64, 115.2 kBit/s

Lockout - ANSI 86

The lockout feature, also called latching, ensures a manual intervention is needed to reset alarm or tripping conditions. It can be programmed in the output matrix setting view. Any protection stage start or trip, digital input, logic output, alarm and GOOSE signal connected to the following outputs can be latched when required:

- Output contacts
- LEDs on the local panel
- Virtual outputs.

High impedance busbar differential - ANSI 87BB

The PowerLogic P5 overcurrent elements I> can be used for high impedance busbar protection based on the high impedance differential protection principle, offering stability for any type of fault occurring outside the protected zone and satisfactory operation speed for faults within the zone. For this application instantaneous operation is commonly applied, which can be obtained in a simple way by selecting definite time delay characteristic with minimum time delay setting. The information about application, calculations, setting examples and recommendations for resistors can be found in the P5 Application Book at se.com.

High impedance restricted earth/ground fault - ANSI 87N

The high impedance protection principle can be applied as differential protection for machines, power transformers and busbar installations. It is offering stability for any type of fault occurring outside the protected zone and satisfactory operation speed for faults within the zone. The PowerLogic P5 protection relays can provide this application. Both the standard neutral overcurrent element and the very sensitive neutral overcurrent elements can be used for high-impedance restricted earth fault (REF) protection when paired with suitable external protection components. The information about the application, setting examples and recommendations for resistors can be found in the P5 Application Book at se.com.

Functions and Description

2-ends line differential protection - ANSI 87L

Line differential protection is based on phase-segregated comparison of primary currents flowing in and out of the protected overhead line or underground cable. It provides absolute selectivity with fast tripping. Despite instantaneous tripping is applied in most cases, a settable time delay is available to accommodate for teed feeders with fuse protection. Also, any kind of power transformer in the zone of protection can be accommodated by settings. Inrush and overflux detection and selectable enhanced restraining or blocking is available. To enhance sensitivity, line or cable capacitive charging current can be compensated, if voltage measurement is made available through the device VT inputs. Complementary to the commonly known triple-slope differential tripping characteristic, a minimum current release, phase comparison technique and comprehensive CT saturation detection prevent false operation under high through-flowing fault currents, with moderate CT sizing requirements. Likewise, fast differential CT supervision prevents false operation in case of CT failures.

- Triple slope characteristic plus high-set unrestraint element
- Capacitive charging current compensation
- In-zone transformer protection
- Direct and permissive intertrip
- Four setting groups.

Functions		Settings
Low set Id1	Pick-up	0.10 - 3.00 pu
Slope 1		10 - 150 %
Ib for start of slope 2		1.00 - 30.00 pu
Slope 2		30 - 150%
High set Id	Pick-up	0.00 - 100.00 s
Operate delay		0.00 - 100.00 s
I> release		0.02 - 1.00 pu
Angle supervision slope		1 - 30%
Angle supervision time		0.10 - 100.00 s
CTS operating mode		Indication, Blocking, Restraining
PIT current selection		Disabled, Remote, Local
Compensation mode		None, Cap. Charging, Transformer
Inrush operating mode		Disabled, Restraining, Blocking

Functions and Description

2-winding transformer differential protection - ANSI 87T

This protection element provides fast, selective tripping for faults within a transformer. It can be used for medium and large sized power transformers, step-up or unit transformers in industrial and utility networks. It offers a protection of the transformer from winding and terminal faults, core faults, overloads and pertaining external faults.

Phase-segregated transformer biased differential protection is provided for high-speed discriminative protection for all fault types on both HV and LV windings. It offers through-flowing fault current stabilization as well as inrush and overfluxing restraints combined with more sensitive restricted earth/ground fault protection on both sides of the transformer. The scheme can be enhanced by the use of other protective devices associated with the transformer such as the Buchholz, pressure relief and winding temperature devices.

- Adjustable polarities of the CTs and settable phase sequence
- Zero sequence current filtering for both HV and LV sides
- Optional blocking or restraining from CT supervision
- Four setting groups

Functions		Settings
Low set Id1	Pick-up	0.10 - 3.00 pu
Slope 1		10 - 150 %
Ib for start of slope 2		1.00 - 30.00 pu
Slope 2		30 - 150%
High set Id	Pick-up	1.00 - 30.00 pu
Bias calculation mode		Sum of phasors, Sum of abs
Operate delay		0.00 - 100.00 s
Vector group		0 - 11
Zero-sequence current filtering HV/LV		Off, On
Inrush blocking		5 - 50 %
Inrush cross-block		Off/On
Max inrush Id		2.50 - 30.00 pu
Overflux blocking		5 - 100 %
Overflux cross-block		Off/On
CTS operating mode		Indication, Blocking, Restraining

Functions and Description

Programmable stages - ANSI 99

For special applications the user can build their own detection stages by selecting the supervised signal and the comparison mode. This allows the user to trigger an event from a selection of signals and select the type, level and timing to suit the application.

- Eight independent stages with definite time delay.
- Priority selection for fast operation needs.
- Multiple coupling and comparison conditions.
- Four setting groups for each stage.

Functions	Settings
Coupling	Phase currents and earth/ground currents, Simple or composed voltages, Cuurent and voltage distortion values, Direct current or voltage, Inverse current or voltage, Phase and earth/ground effective current
Trip conditions	Under, over, difference, absolute difference
Time delay	0.00 to 300 s

Selective Overcurrent Logic (SOL)

The Selective Overcurrent Logic (SOL) function, can considerably reduce the tripping time of the circuit breakers closest to the source, compared to pure time discrimination, and may be used for logic discrimination in closed ring networks also using directional protection. SOL function is applied to the phase overcurrent, directional phase overcurrent, earth/ground fault overcurrent, very sensitive earth/ground fault overcurrent protection elements, with definite time and inverse time delays.

The selective overcurrent logic allows:

- To send a blocking signal when a fault is detected by overcurrent or earth/ground fault protection elements (ANSI 50/51, 50N/51N, 50G/51G, 67, 32N).
- To receive a blocking signal that inhibits the protection elements.

Circuit Breaker (CB) monitoring

Periodic maintenance of circuit breakers is necessary to ensure that the trip circuit and mechanism operate correctly and that the interrupting capability has not deteriorated due to previous fault interruptions. The PowerLogic P5 protection relay records various statistics related to each circuit breaker operation, allowing an accurate assessment of the circuit breaker condition. Statistics are recorded to allow evaluation of both the electrical wear of the breaker contacts and the mechanical wear of the breaker mechanism.

Following counters are provided:

- Number of all circuit breaker operations.
- Number of circuit breaker operations triggered by protection functions e.g. faults.
- Cumulative broken current.
- Circuit breaker operating times.
- Charging times.
- Number of rack-in and rack-out operations.

This feature, when paired with EcoStruxure Asset Advisor brings a proactive maintenance approach to electrical distribution critical assets, combining newest technologies with Schneider Electric's expertise and services. EcoStruxure Asset Advisor offers the ability to anticipate and address issues before they become critical incidents, mitigating safety risks, avoiding unplanned downtime, operational losses and expensive maintenance interventions.

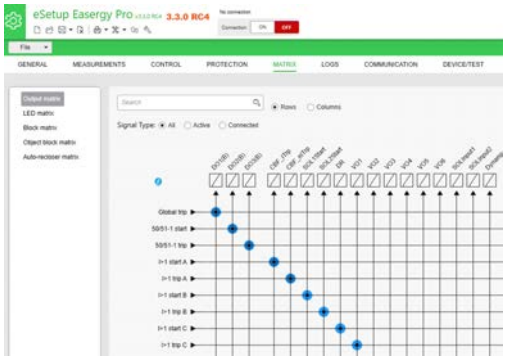
Automation and Control

Logic Capabilities

PowerLogic P5 protection relays offer versatile logic capabilities:

- Matrices and Logic timers
- Programmable logic
- Advanced Logic Engine

Matrices_eSetup

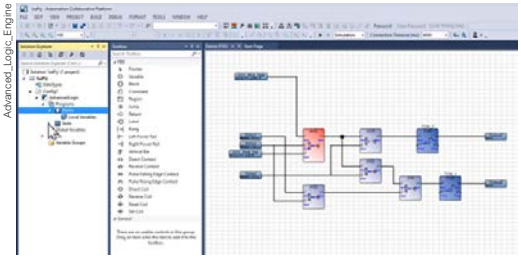


Output matrix view of eSetup Easergy Pro

Programmable_Logic

Programmable logic view of eSetup Easergy Pro

Advanced_Logic_Engine



ISaGRAF™ Workbench view of Rockwell Automation

Overview

Growing complexity of the distribution grids, more demanding reconfiguration schemes and increasing pressure for simplification of architectures are imposing additional flexibility challenges to protection relays. PowerLogic P5 is well suited to tackle these requirements offering versatile logic capabilities which are maximizing its application flexibility. PowerLogic P5 provides several different programmability features allowing the user to create functionality that is not built into its default functionality. The principle is that the application receives analogue or digital inputs, processes the information to sends out analogue or digital outputs.

Matrices

The PowerLogic P5 protection relay provides several matrices that allow to link the hardware and software elements to form protection and control signal chains. This functionality can be used to link different inputs, outputs, statuses and signals allowing activation or blocking other protection elements, control commands, automation functions or recording. Up to 250 GOOSE messages (Network Inputs) can be associated to virtual inputs and thus received for processing.

Calendar and Logic timers

The PowerLogic P5 protection relays offer four settable timers that can be used for the applications that require actions based on calendar time. Logic timer function offers a possibility of assigning freely configurable time schemes to the output signal of each Boolean equation. 13 special logic timers can be configured thru HMI and IEC 61850.

Programmable logic

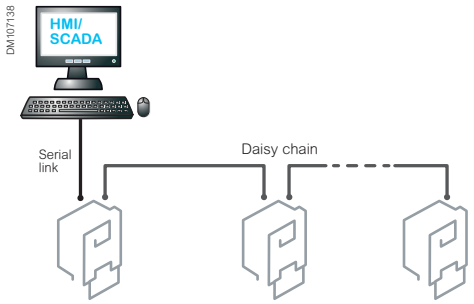
PowerLogic P5 protection relays support user-defined programmable logic for Boolean signals. User-configurable logic can be used to create functionality that is not provided by the protection relay as a default. 128 input logic gates, 50 virtual inputs, 20 virtual outputs and logic timers provide a flexible and easy to use interface optimized for realization of time critical schemes at an execution rate of 10 ms.

Advanced Logic Engine

In addition to the above "Programmable Logic" PowerLogic P5 protection relays can be equipped with Advanced Logic based on ISaGRAF™ Runtime. With this optional device feature the user is able to define his programmable logic using the environment of the ISaGRAF™ Workbench software tool of Rockwell Automation. Advanced Logic can be used in conjunction with the programmable logic to create a very flexible and strong logic capability. The Advanced Logic is optimized for configuring very flexible but less time demanding application functions such as complex control schemes like Automatic Transfer Switch (ATS). The Advanced logic is compliant to the IEC 61131 and IEC 61499 standards supporting FBD, SFC, ST, LD, SAMA programming languages. This approach maximizes flexibility and interoperability with well recognized automation software technology at an execution rate of 40 ms.

Communication

Examples of Architectures



Connection to SCADA using serial line

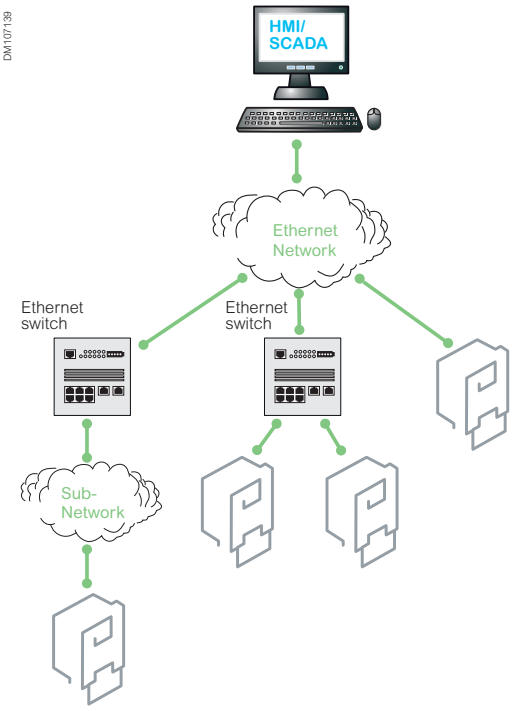
This architecture allows you to connect HMI/SCADA to a set of PowerLogic P5 protection relays using a multi-drop serial communication link with master-slave communication.

Available protocols:

- Modbus RTU
- IEC 60870-5-101
- IEC 60870-5-103
- DNP3

Time synchronization protocol:

- IRIG-B
- Minute pulse



Connection to SCADA using Ethernet

This architecture allows you to connect a set of PowerLogic P5 protection relays directly to an Ethernet network.

Available protocols:

- IEC 61850 Edition 1 and Edition 2
- DNP3
- EtherNet/IP
- Modbus TCP/IP

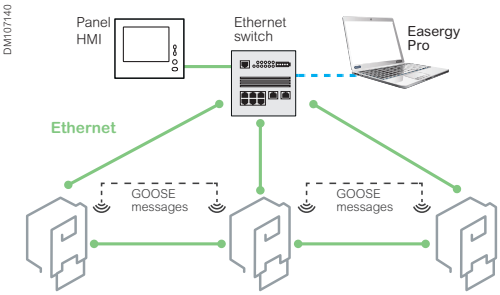
Note: It is possible to mix IEC 61850 protocol with other communication or redundancy protocols from PowerLogic P5 on the same Ethernet network. This allows you to use GOOSE messages between relays together with another protocol for communication to SCADA. It is also possible to connect to two different control systems, using the same Ethernet communication port and IEC 61850 protocol for one network, and any available protocol for the second network.

Equipped with two Ethernet modules, PowerLogic P5x30 can handle 3 Ethernet protocols simultaneously with a single IP or 3 different IP adresses. Optionally, PowerLogic P5x30 offers a capability of dual redundancy providing PRP/HSR protocol for one system and a separate RSTP protocol for another system or engineering channel.

PowerLogic P5 protection relay handles the IEC 61850 station bus, in compliance with IEC 61850-6, 7-1, 7-2, 7-3, 7-4 and 8-1 Edition 1 or Edition 2 standards, according to the configuration.

Other available Ethernet protocols:

- sFTP for file transfer
- SNTP for time synchronization
- PTP for precise time synchrionisation according to IEEE 1588v2 standard
- HTTPs for web server (setting changes)

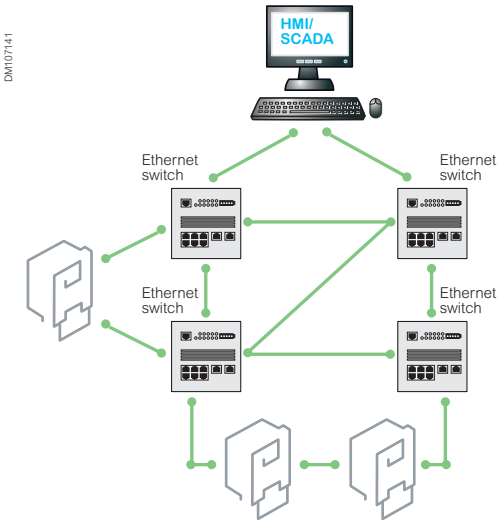


Switchboard internal network

This architecture allows fast GOOSE communication between PowerLogic protection relays in the same switchboard, thus avoiding costly wiring. Typical uses are logic discrimination, load shedding, etc.
In addition, a panel HMI featuring a web browser can be used to monitor and control the entire switchboard.
A spare connection on the panel Ethernet switch can also be provided for connecting the eSetup Easergy Pro setting and configuration tool.
On PowerLogic P5x30 models, two independent Ethernet communication modules are available. This allows implementation of the switchboard internal network and the communication to SCADA on two separate Ethernet networks.

Communication

Redundancy Protocols

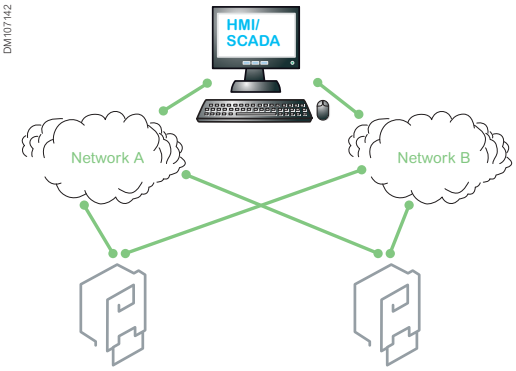


RSTP (Rapid Spanning Tree Protocol)

The principle of RSTP is to virtually remove all links that are not necessary at a given time, changing the meshed topology into a tree topology.

The main advantage of RSTP is that it is widespread and works on any network topology. On the other hand, RSTP takes milliseconds or seconds to reconfigure the network in case of network interruption.

With PowerLogic P5, the typical reconfiguration time for a loop of 10 relays is 0,050s.

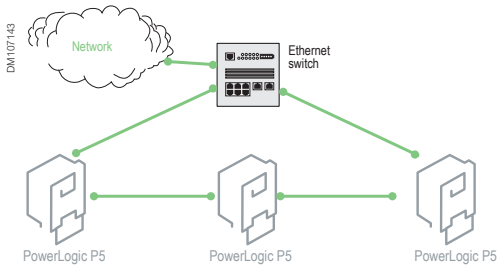


PRP (Parallel Redundancy Protocol)

The principle of PRP is to transmit frames in parallel on two independent network infrastructures: A and B.

The receiving device is in charge of removing the redundant frame, if it has already been received.

PRP protocol provides an instantaneous recovery time in case of failure, since no re-transmission of the message is needed.



HSR (High-availability Seamless Redundancy)

HSR is similar to PRP but only works on a ring architecture.

Frames are transmitted on the ring in both directions and the receiving device eliminates redundant frames.

HSR protocol provides an instantaneous recovery time and is an alternative to PRP when network topology is restricted to a ring.

Both PRP and HSR protocols are listed in IEC 62439-3 as part of IEC 61850 standard. They both provide standardized, interoperable and high performance redundant Ethernet solutions.

Communication

Time Synchronization

PowerLogic P5 protection relays offer following solutions for time synchronization:
Communication protocol, Minute Pulse, IRIG-B, SNTP and PTP.

In modern protective schemes it is required to synchronize the internal real-time clock of the relay, so that events from different relays can be placed in chronological order.

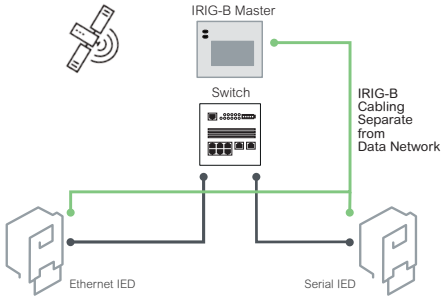
This can be done using the communication interfaces connected to the substation control system or via dedicated time synchronization options provided by PowerLogic P5 relays: minute pulse, IRIG-B time code and SNTP or PTP IEEE 1588v2 over Ethernet networks.

Minute pulses

The clock can be synchronized by reading minute pulses from digital inputs, virtual inputs or virtual outputs. The sync source is selected with the SyncDI setting.

When a rising edge is detected from the selected input, the system clock is adjusted to the nearest minute.

DM107460



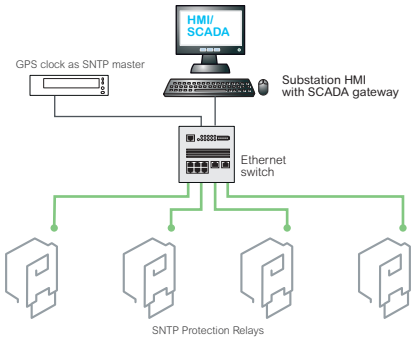
IRIG-B

Inter-Range Instrumentation Group time code B (IRIG-B) is a standard format for transferring timing information. IRIG-B time synchronization standard is based on a frame of 100 data bits sent every second to the device.

This time synchronization standard is supported in PowerLogic P5 by the IRIG-B module connected to the optional extension module of the relay.

The module provides both a modulated and an unmodulated input and can automatically detect which input type is used. The time synchronization accuracy in PowerLogic P5 with this mode is less than 5 ms. For more information, see the IRIG-B module details so page 89.

DM107461



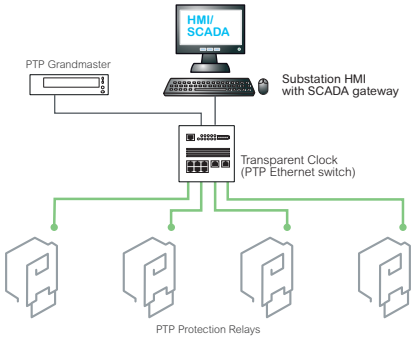
SNTP

Simple Network Time Protocol (SNTP) is a less complex implementation of Network Time Protocol (NTP), using the same protocol but without requiring the storage of state over extended periods of time. SNTP is used to synchronize the clocks of computer systems over packet switched, variable-latency data networks.

A jitter buffer is used to reduce the effects of variable latency introduced by queuing in packet switched networks, ensuring a continuous data stream over the network.

The PowerLogic P5 protection relay receives the synchronization from the SNTP/ NTP server. The time synchronization accuracy in this mode is less than 5 ms.

DM107462



PTP

Precision Time Protocol according to IEEE 1588-2008 (v2) standard. The PTP implementation in PowerLogic P5 protection relay is compliant to IEC61850-9-3 standard. This protocol enables precise synchronization of clocks in measurement and control systems implemented with technologies such as network communication, local computing, and distributed objects.

The protocol is applicable to systems communicating via Ethernet. Systemwide synchronization accuracy and precision in the sub-microsecond range are supported with minimal network and local clock computing resources. The time synchronization accuracy in PowerLogic P5 with this mode is less than 1 ms.

Communication

Data Exchanged

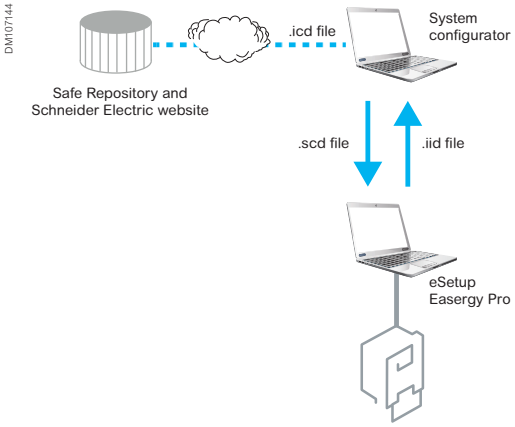
Data exchanged with SCADA

Ports	Ethernet			Serial or Ethernet		Serial	
Protocol	IEC 61850	Ethernet/IP	sFTP	DNP3	Modbus	IEC 60870-5-103	IEC 60870-5-101
Real time data							
Measurement	●	●	-	●	●	●	●
Alarms and status	●	●	-	●	●	●	●
Controls	●	●	-	●	●	●	●
Time-stamped events	●	●	-	●	●	●	●
Historical data							
Disturbance records	●	-	●	●	●	●	-
Setting management							
Setting group change	●	●	-	●	●	●	●
Settings	●	-	-	-	●	●	-

Communication

Focus on IEC 61850 Protocol

PowerLogic P5 protection relay is an easy to handle and flexible network component ready for end-to-end IEC 61850 engineering.

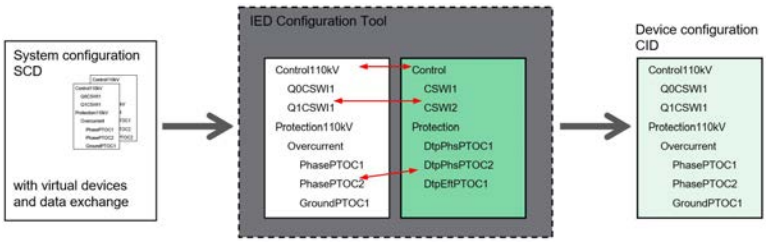


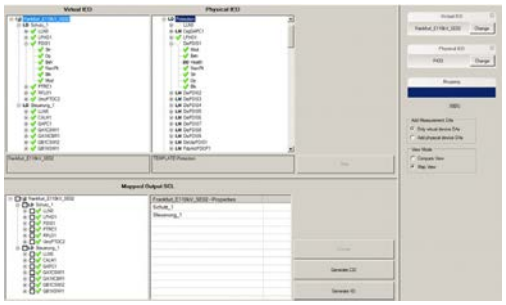
Data exchange according to IEC 61850

Overview

IEC 61850 is a series of standards for communication networks and systems in power grids which has become widely used in utility and industrial applications around the globe. The versatility and the interoperability throughout the entire lifecycle are main advantages of this standard. Having a strong foundation of multiple communication ports with various redundancy protocols and proven performance, PowerLogic P5 is ready for demanding IEC 61850 applications. PowerLogic P5 protection relays offer up to 8 simultaneous IEC 61850 client-server associations and up to 3 access points. This helps to realize the most advanced network topologies combining vertical (Edge/SCADA) and horizontal (GOOSE) communication modes and multiple services.

Compared to various other communication protocols the IEC 61850 standard brings significant improvement in terms of system engineering and deployment. With a top-down configuration approach, the users are able to design, configure, operate and maintain their IEC 61850 based systems in a more efficient and reliable way. PowerLogic P5 and its configuration tools are well prepared for standardized IEC 61850 system engineering and bring the Flexible Product Naming (fPN) feature for smoother, vendor independent integration of substation automation systems. Flexible Product Naming allows re-naming and re-mapping of the IEC 61850 device data model of an PowerLogic P5 to a user defined data model aligning with the users standard. With the help of this configuration feature the names of Logical Devices, the names of Logical Nodes instances and the Data Objects which they contain, as well as the names of Data Sets and Control Blocks can be aligned to a user defined naming concept.





fPN Editor view demonstrating side-by-side data model mapping.

fPN Editor

The fPN Editor tool provides a clear separation between the user definition and the PowerLogic P5 device data model. Mapping of the two is made on a simple drag & drop basis. There are two ways of customizing PowerLogic P5 data models:

- The user defines vendor agnostic data models of fictive IEDs and creates a system configuration out of them. One after the other PowerLogic P5 devices are mapped against these fictive IEDs. This method brings full flexiblity when engineering the system but results in multiple mappings for similar IEDs.
- The user defines typical IED data models and maps selected IED types to these typicals. The system configuration is created making use of the customized IED templates. This method brings reduced mapping effort but limits system engineering to pre-selected IEDs.

The Flexible Product Naming functionality of PowerLogic P5 enables smooth and vendor independent IEC 61850 configuration deployment. In connection EcoStruxure Power Automation System Engineering tool (EPAS-E) or other vendor engineering tools PowerLogic P5 becomes a easy to handle and flexible network component ready for end-to-end engineering.

Cybersecurity

Cybersecurity - Basic Level

Cybersecurity features implemented in PowerLogic P5 help to mitigate cyber threats. PowerLogic P5 can be set, either with:

- Cybersecurity basic level, or
- Cybersecurity advanced level, 3rd party certified accrding to IEC 62443 4-2 at Security Level 1

Cybersecurity

Cybersecurity in the scope of energy management is a set of rules, methods, and technical features intended to improve the quality of service and minimize risk of interruption of deliveries, resulting from accidental or intentional actions.

The PowerLogic P5 protection relay is designed with special attention to cybersecurity aspects, with compliance to Schneider Electric's Cybersecurity Policy and following Secure Development Lifecycle process.

All these efforts have been proved in obtaining certificates of Level 1 and Level 2 of Achilles Communications Certification Standard.

Depending on customer needs, the PowerLogic P5 protection relay can be set with Cybersecurity Basic Level or Advanced Level. Each PowerLogic P5 is delivered with Cybersecurity Basic Level as a default setting. It can be easily upgraded to Cybersecurity Advanced Level with a change of settings.

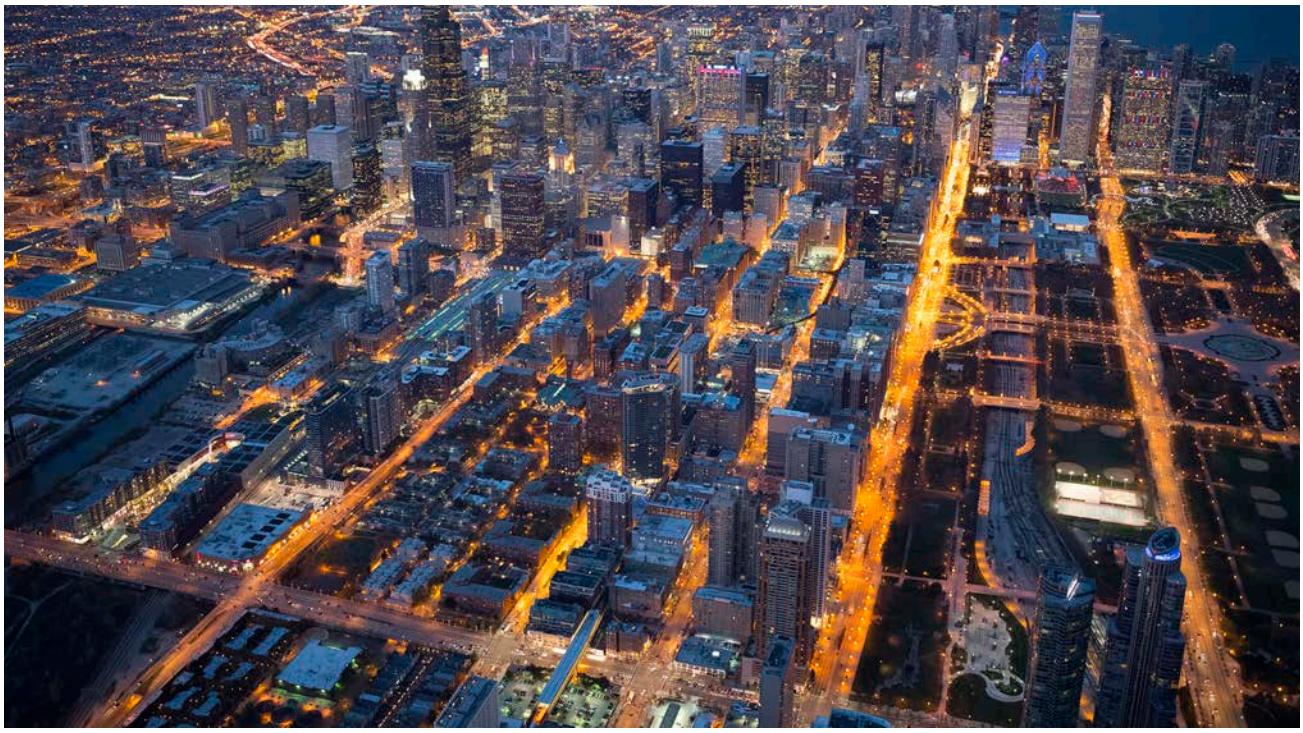
Cybersecurity Basic Level

The features available for Basic Level are also found in the Advanced Level.

- Secured communication between PowerLogic P5 protection relays and associated tools.
- Protection of the hardware and logical communication ports.
- Firmware signature.
- Password based user authentication.
- Role Based Access Control (RBAC) authorization management.
- Secured log storage.
- Client IP address filter
- Compliance to NERC CIP and BDEW standard requirements.

More info on the Schneider Electric Cybersecurity Support portal:

www.se.com/ww/en/work/support/cybersecurity/overview.jsp

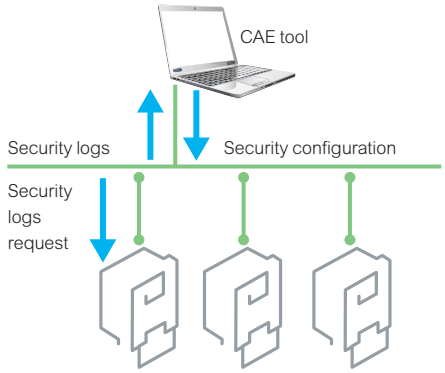


Cybersecurity

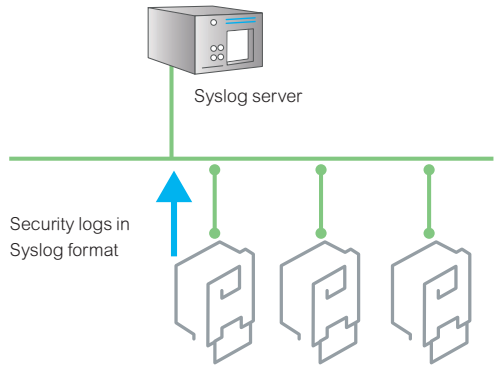
Cybersecurity - Advanced Level

PM109582

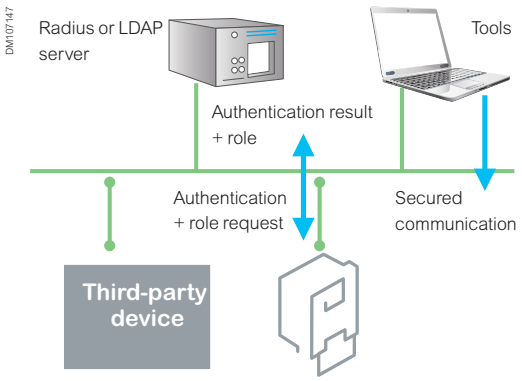
DM107145



DM107146



DM107147



Cybersecurity Advanced Level with EcoStruxure Cybersecurity Admin Expert - proven in 3rd party certication according to the standard IEC 62443 4-2 Security Level 1

With the cybersecurity advanced package, PowerLogic P5 protection relays take benefit of EcoStruxure Cybersecurity Admin Expert (CAE), a comprehensive and intuitive, software-based, cybersecurity configuration and policy tool for your operational technology environment.

EcoStruxure Cybersecurity Admin Expert (CAE) faciliates operations and maintenance, being a single interface to manage and perform a mass update of your security configuration to the entire system.

EcoStruxture Cybersecrity Admin Expert (CAE) is free-of-charge and helps to:

- Define the security policy, including for example: password complexity or password strategy.
- Define rules for security logs, choose between NERC CIP, BDEW, P1686 2014 or a combination.
- Define the RBAC (Role Base Access Control) parameters of your environment.
- Define system or device users and assign one or several roles per user customized based on organization.
- Retrieve security logs including several Schneider Electric devices.

In summary, with cybersecurity advanced package, the PowerLogic P5 protection relay becomes part of a cybersecurity management system consisting of servers for security logs, authentication and authorization, using standard network protocols.

EcoStruxure Cybersecurity Admin Expert (CAE) facilitates the management of cybersecurity in your electrical network's operational technology (OT) from policy definition, thru configuration, commissioning, operation and maintenance stages.

Two usecases are available for authentication and authorization features:

Advanced - Local Authentication and Authorization

In this use case, local authentication and authorization don't rely on any external servers. Security configuration is stored locally in each PowerLogic P5. User authentication and authorization using associated roles are performed locally (RBAC). CAE is used to update the global security configuration of all the PowerLogic P5 devices located inside the substation.

Advanced - Centralized Authentication and Authorization

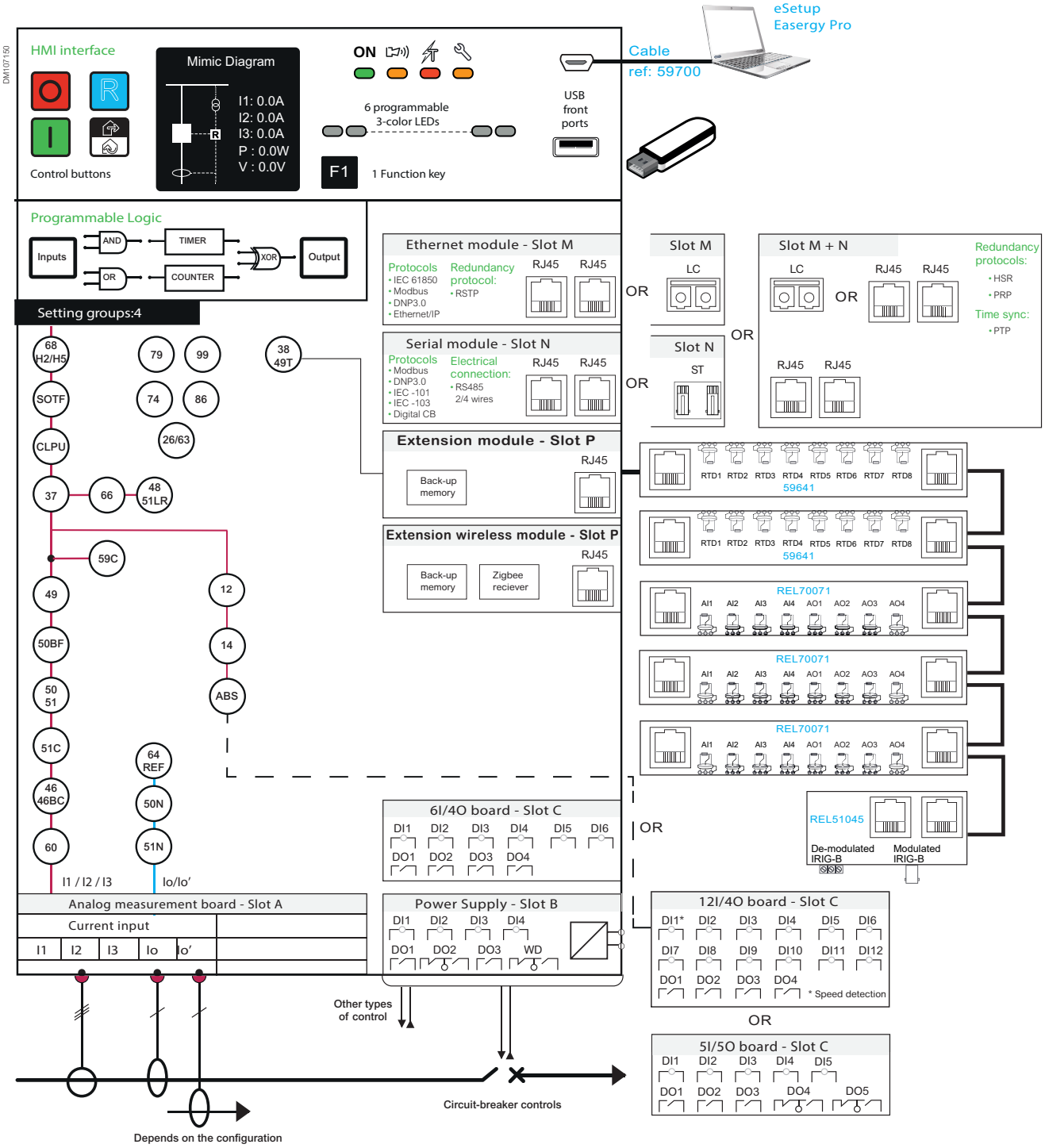
In this use case, centralized authentication and authorization relies on one or two Radius or LDAP servers with the IEC 62351-8 extension.This allows the use of a Unified Account management system shared across heterogenous solutions. The same credentials are used at the front panel of each device, tools and also third party devices. The Radius or LDAP server is in charge of authenticating users and providing the associated role. Then PowerLogic P5 protection relays allow access based on this role and the internal security configuration (RBAC).

Functional Description

PowerLogic P5U20 - Universal Application with CT

PowerLogic P5U20 is used for feeder (incomer and outgoing), motor, or distribution transformer protection.

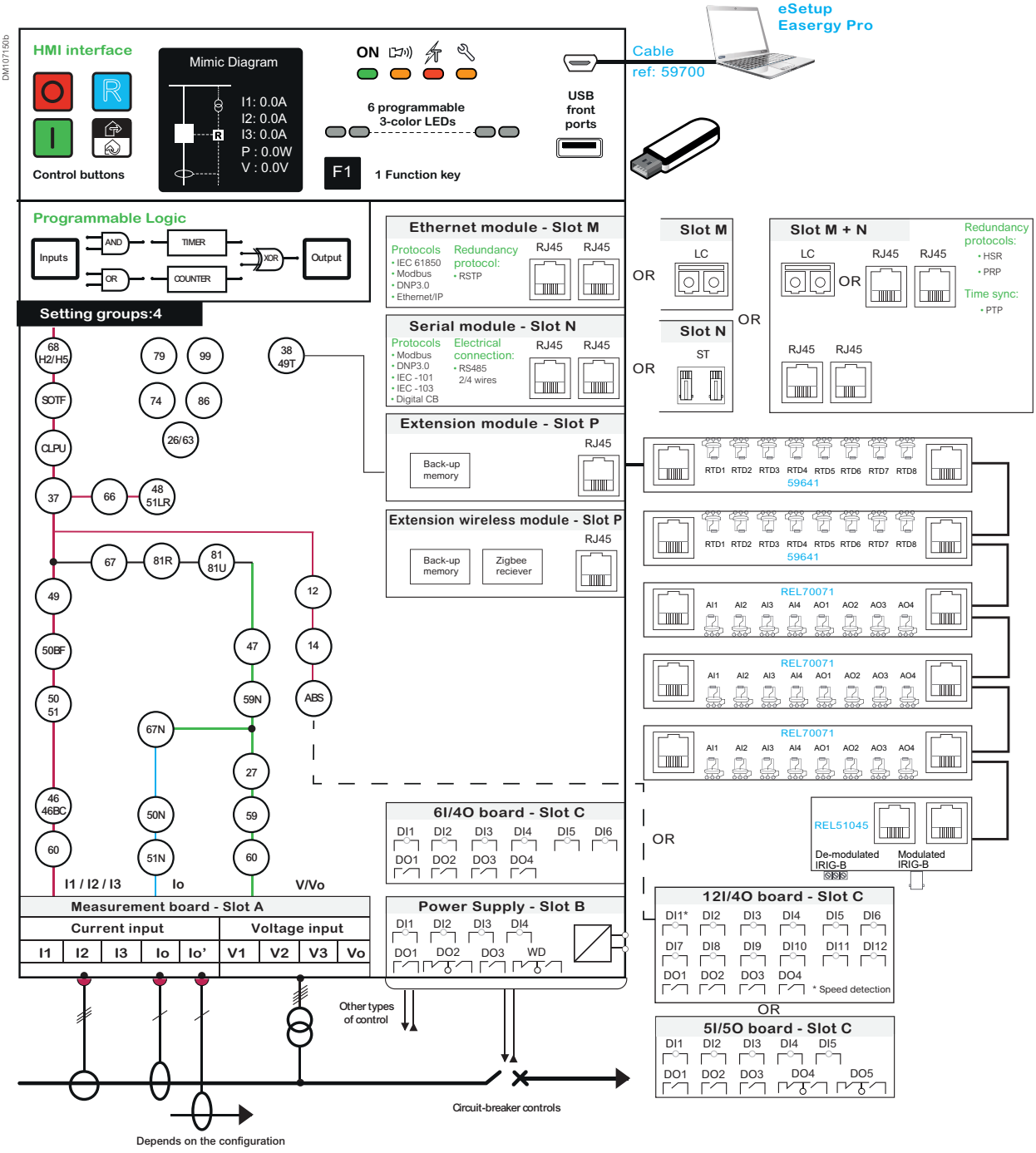
It offers a complete set of current-based protection functions and measurement, control facilities and recording/monitoring functionsfor efficient operation of the power system.



Functional Description

PowerLogic P5U20 - Universal Application with LPCT/LPVT

PowerLogic P5U20 with Low Power CTs/VTs can be used for feeder (incoming and outgoing), motor, or distribution transformer protection. It offers essential current and voltage based protection functions, measurements, control facilities and recording/ monitoring features for efficient operation of the power system. It is designed for use with low-power sensors and is applicable in distribution networks of industrial installations and utility substations for all levels of voltages.

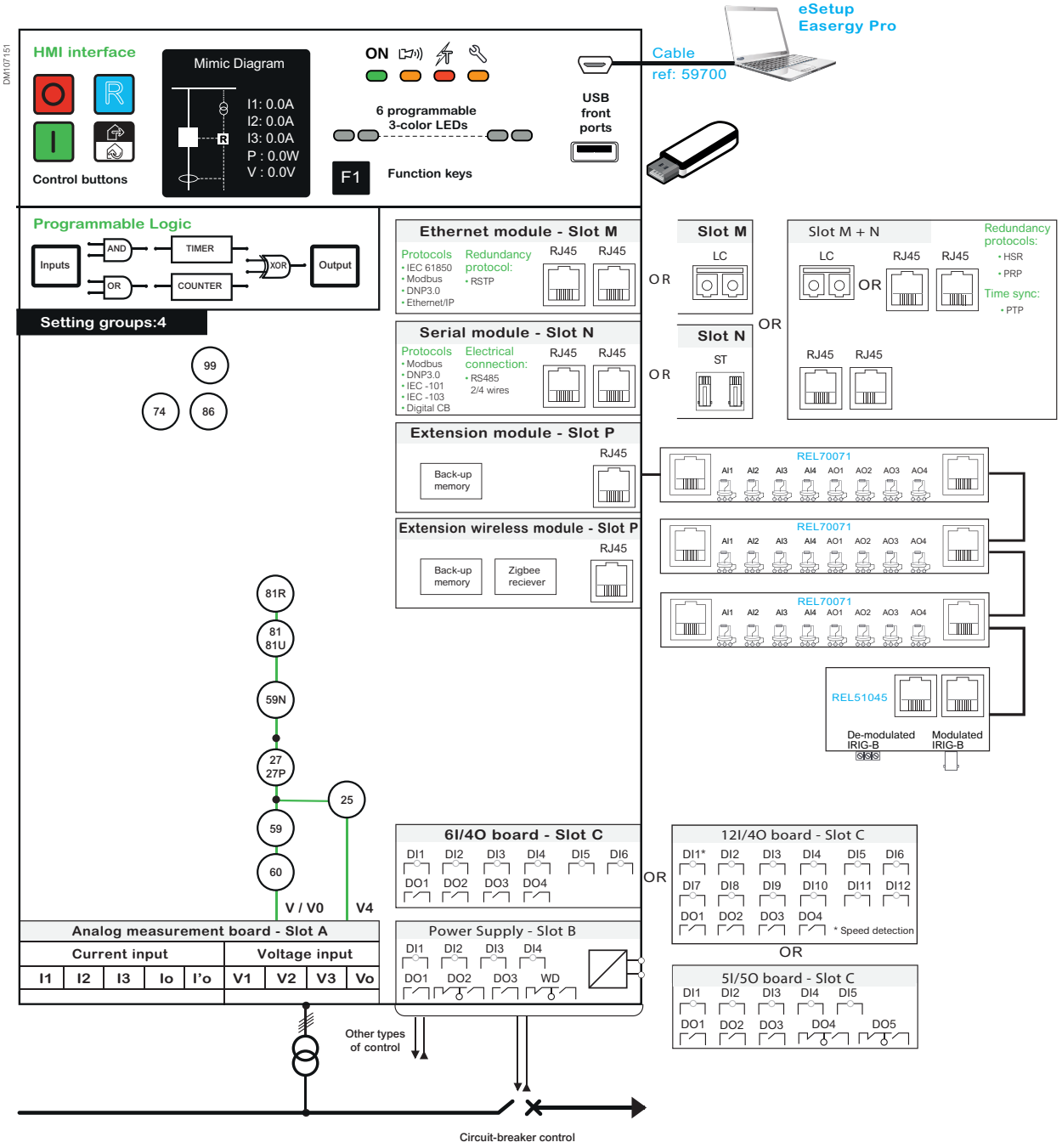


Functional Description

PowerLogic P5V20 - Voltage Application with VT

PowerLogic P5V20 protection relay offers a complete set of voltage and frequency protection functions, as well as measurements and recording/monitoring functions for efficient operation of the power system.

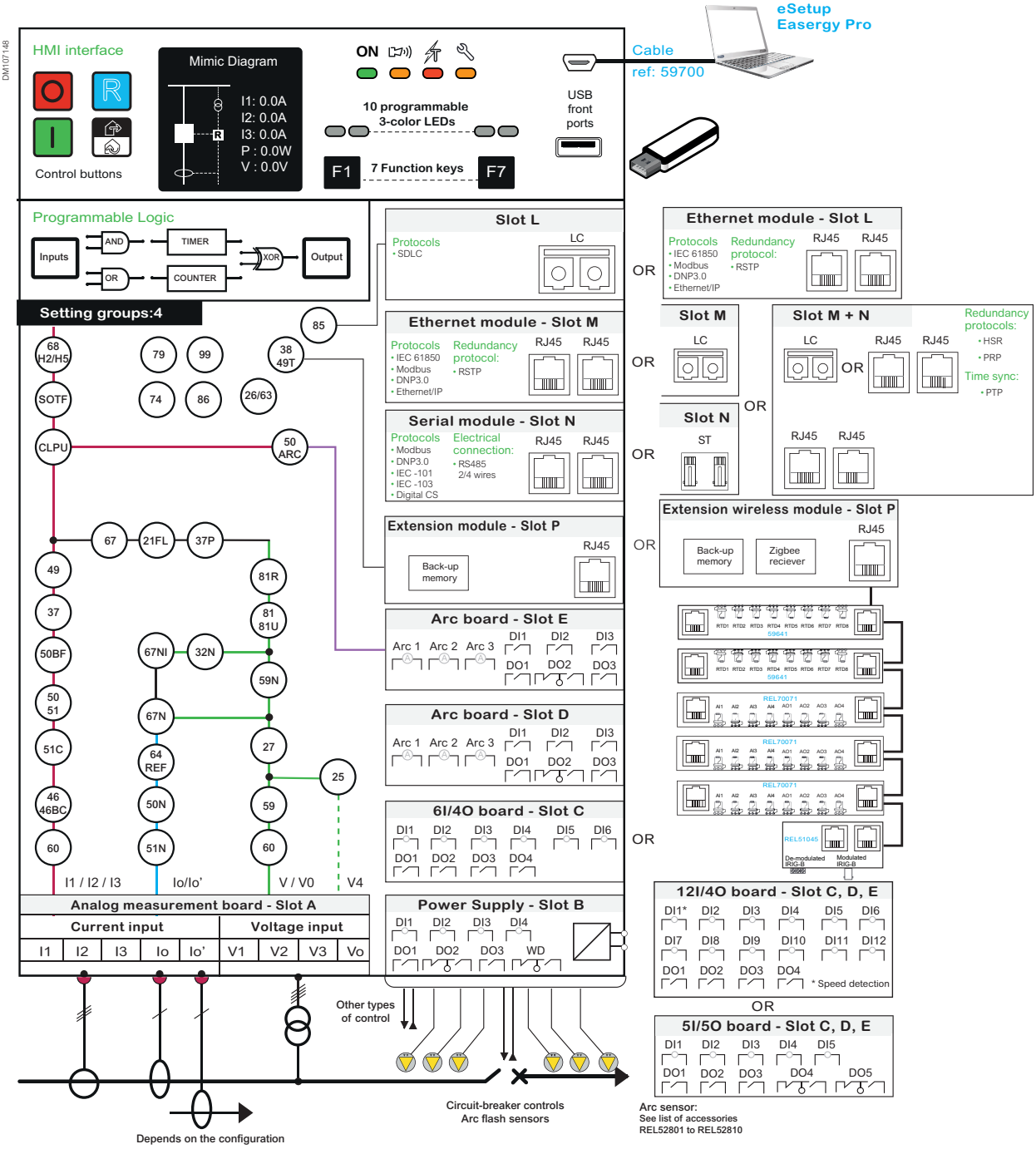
In addition it can be used for the control of switchgear.



Functional Description

PowerLogic P5F30 - Feeder Application with CT/VT or LPCT/LPVT

PowerLogic P5F30 protection relay is designed for the operation of electrical distribution networks of industrial installations and utility substations for all levels of voltages. It offers a complete set of current and voltage based protection functions, measurements, control facilities and recording/monitoring functions for efficient operation of the power system. It is suitable for application on solidly grounded, impedance grounded, Petersen coil grounded and isolated systems.



Base Unit Description

Hardware Description

PM107326

Withdrawable design (draw-out)

PowerLogic P5 protection relays can be drawn-out, offering faster and easier maintenance with less risk:

1. Removable part (including the I/O board, CPU board and power supply) can be easily replaced if required.
2. Thanks to the backup memory included in the extension module (optional), configuration and log records are automatically reloaded, allowing quick relay restart without additional configuration. The recommissioning can be limited or skipped.
3. The CT and VT inputs are isolated when the device is withdrawn.

Base Unit Description

Hardware Specification

Optional modules

PM107312

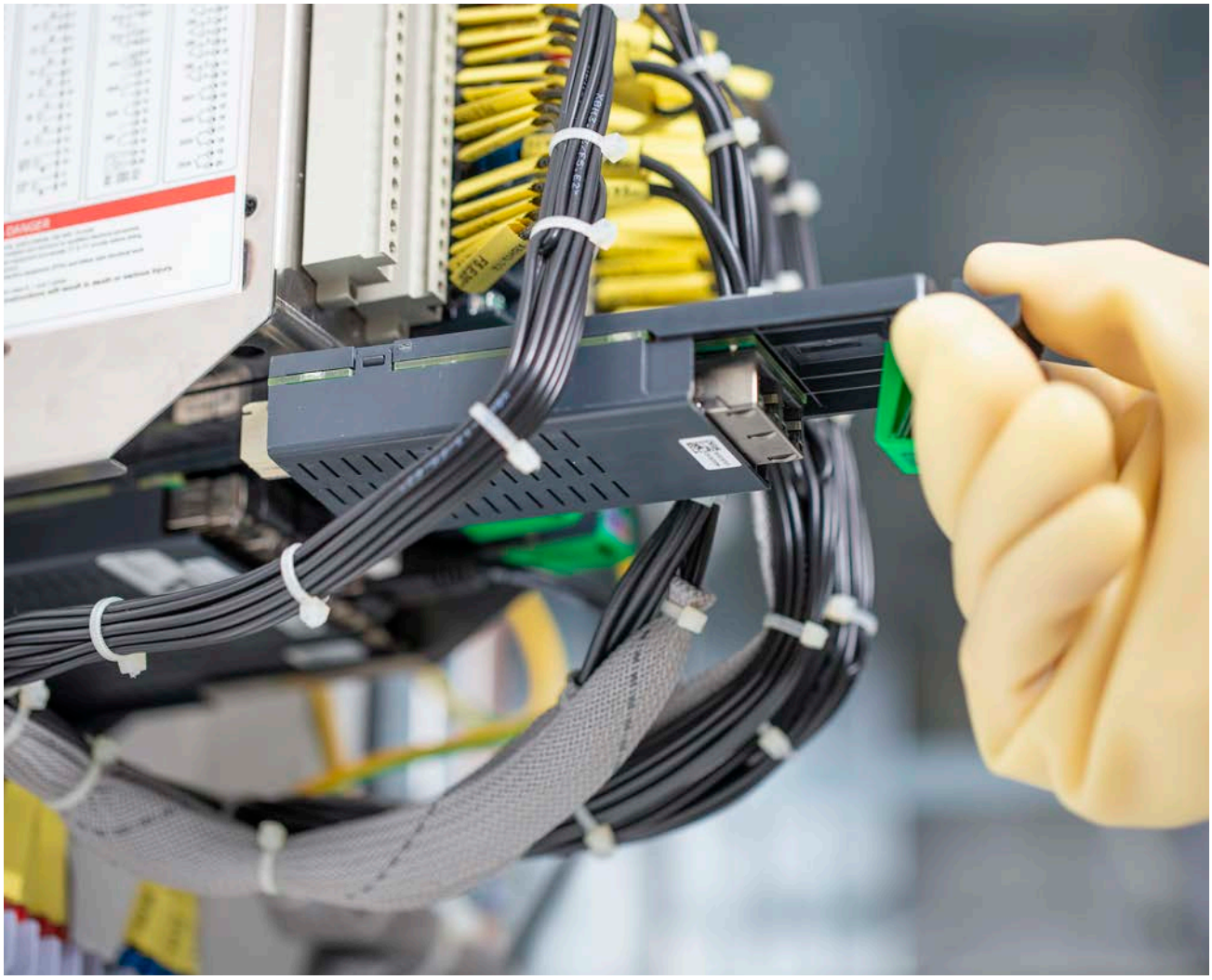
Options in slots A, B, C, D, E must be selected when ordering the device (measuring inputs, power supply and input/output optional boards).

Communication modules in slots L, M, N, P can be ordered in configuration or separately. They can be added on site when more communication capabilities are required. The relay will automatically integrate added modules.

Additionally, external modules are available:

- Up to 2 RTD modules for temperature monitoring.
- Up to 3 CLIO modules for analogue signals acquisition/exposure.
- Up to 1 IRIG-B module for time synchronization.

These modules are connected to extension/backup module in slot P.



Base Unit Description

Rear Panel Description - CT/VT Variant

Rear communication modules:

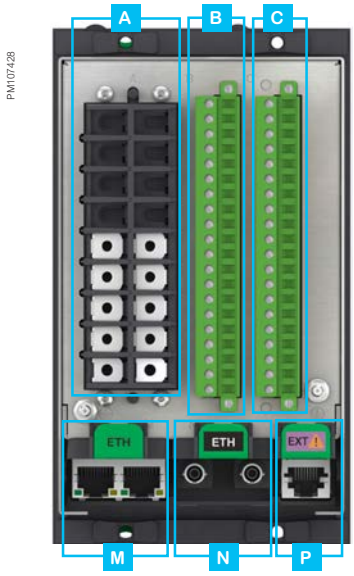
ETH Dual port copper (RJ45) or optical fibre (multimode glass fiber) Ethernet module

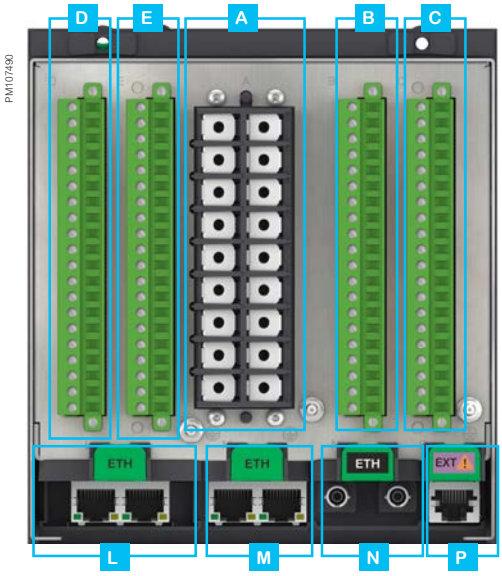
SRL RS485 or optical fibre serial communication module

P2P Serial communication module for direct relay-relay communication

EXT Extension port for connection with external modules

EXR Extension port for connection with external modules with wireless receiver





		PowerLogic P5x20 - CT/VT variant	**PowerLogic P5x30 -** CT/VT variant
Slot A	Measuring inputs	3 phase CT + 2 residual CT or 3 phase CT + CSH core balance CT 4 VT	3 phase CT + 2 residual CT + 4 VT or 3 phase CT + CSH core balance CT + 4 VT or 6 phase CT + 2 residual CT + 1 VT
Slot B	Power supply and digital I/O	24-250 V_{DC} / 100-230 V_{AC} + 4 DI + 3 DO + watchdog (WD)	24 - 48 VDC or 48-250 VDC ; 100-230 VAC + 4 DI + 3 DO + watchdog (WD)
Slot C (1)	Additional digital inputs and outputs 1	6 DI + 4 DO or 12 DI + 4 DO (2) or 5 DI + 5 DO (3)	6 DI + 4 DO or 12 DI + 4 DO (2) or 5 DI + 5 DO (3)
Slot D (1)	Additional digital inputs and outputs 2		6 DI + 4 DO or 12 DI + 4 DO (2) or 5 DI + 5 DO (3) or 3 Arc + 3 DI + 3 DO
Slot E (1)	Additional digital inputs and outputs 3		6 DI + 4 DO or 12 DI + 4 DO (2) or 5 DI + 5 DO (3) or 3 Arc + 3 DI + 3 DO
Slot M (1)	Communication interface 1 *Ethernet port*	Ethernet TP module with RSTP or Dual IP or Ethernet FO module with RSTP or Dual IP	Ethernet TP module with RSTP or Dual IP or Ethernet FO module with RSTP or Dual IP
Slots M&N (1)	Communication interface 1 *Ethernet port + serial port*	Combined Ethernet FO with HSR/PRP/PTP and RS485 serial line module or Combined Ethernet TP with HSR/PRP/PTP and RS485 serial line module	Combined Ethernet FO with HSR/PRP/PTP and RS485 serial line module or Combined Ethernet TP with HSR/PRP/PTP and RS485 serial line module
Slot N (1)	Communication interface 2 *Serial port*	RS485 serial line module or Fiber optic serial line module	RS485 serial line module or Fiber optic serial line module
Slot L (1)	Communication interface 3 *Ethernet or serial port*		Second Ethernet TP module with RSTP or Serial InterRelay FO module
Slot P (1)	Extension port	Extension module with backup memory or Extension module with backup memory and wireless receiver	Extension module with backup memory or Extension module with backup memory and wireless receiver

(1) Optional board
(2) The 12 DI + 4 DO board includes one motor speed detection input
(3) The 5 DI + 5 DO board includes two high break / high speed contacts

NOTE: For P5x30 the slot occupation rules apply. Follow the PowerLogic P5 Product Selector at se.com or consult the PowerLogic P5 User Guide.

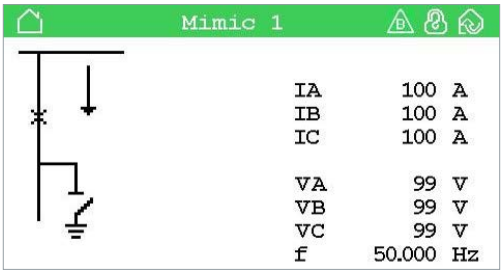
Base Unit Description

Front Panel Description

DM107197

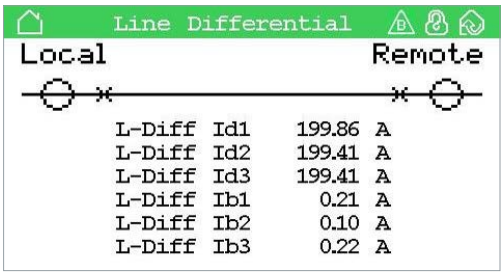
Home page with easy navigation

DM107196



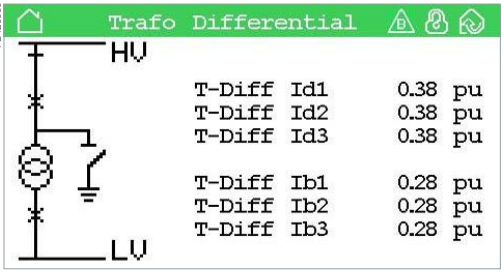
Single line diagram for easier operation. Up to 10 switchable mimic screens for improved flexibility.

PB125549



Single line diagram for Line Differential application.

PB125550



Single line diagram for Transformer Differential application.

Comprehensive data for fast and easy operation

All data required for a local equipment operation may be displayed on demand:

- Display the single-line diagrams and freely assignable analog values.
- Display of all measurements.
- Display of operation and alarm messages.
- Display and setting of all protection functions.
- Display and setting of all other functions and scaling parameters.
- Entry of password to protect parameter and protection settings.

Ergonomic data presentation

- 480 x 272 color LCD screen (PowerLogic P5x30 models) or 192 x 96 LCD screen (PowerLogic P5x20 models) can display any character or symbol
- Dedicated keys for operation:
  - Control buttons (O/I) to operate the circuit breaker and other controllable objects
  - Reset button (R) to clear the alarms and reset the lockout/latching function.
  - Local / Remote button
- Programmable function keys:
  - 1 on PowerLogic P5x20 models
  - 7 on PowerLogic P5x30 models
- Dedicated LEDs for indication of:
  - Power on
  - Relay maintenance
  - Trip
  - Alarm
- Tri-color programmable LEDs:
  - 6 on PowerLogic P5x20 models
  - 10 on PowerLogic P5x30 models

Working languages

All texts and messages displayed on the PowerLogic P5 protection relay are available in two languages: English plus a local language. PowerLogic P5 can be ordered with French, Chinese, Portuguese, Italian, Spanish, Polish, Russian, Traditional Chinese, and English ANSI.

Base Unit Description

PowerLogic P5x20 - Front Panel Description

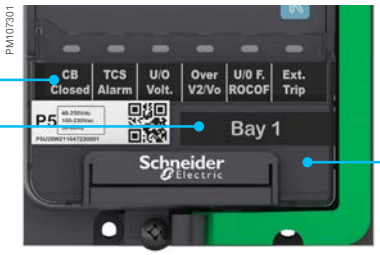
KEYS	
	HOME key: return to previous menu. Three second press returns to main menu
	INFO push-button for viewing additional information, entering the password view, and adjusting the LCD contrast
	Reset control key
Navigation keys	
OK	ENTER key: activate or confirm a function
	UP key: move up in the menu or increase a numerical value
	DOWN key: move down in the menu or decrease a numerical value
	LEFT key: move backwards in a parallel menu or select a digit in a numerical value
	RIGHT key: move forwards in a parallel menu or select a digit in a numerical value
	Switchgear control key (OPEN)
	Switchgear control key (CLOSE)
	Local/remote control key
F1	Customizable function key

LEDS	
	On (Green)
	Alarm (Yellow)
	Trip (Red)
	Maintenance (Yellow)
	6 customizable tri-color LEDs

PORTS	
	USB mini B (Computer)
	USB A (USB key)

ACCESS COVER (OPEN)

LABELS
Customizable LED labels
Customizable Bay label



ACCESS COVER (CLOSED)

Base Unit Description

PowerLogic P5x30 - Front Panel Description

KEYS

	HOME key: return to previous menu. Three second press returns to main menu
	INFO push-button for viewing additional information, entering the password view, and adjusting the LCD contrast
	Reset control key
Navigation keys: OK	ENTER key: activate or confirm a function
Navigation keys: △	UP key: move up in the menu or increase a numerical value
Navigation keys: ▽	DOWN key: move down in the menu or decrease a numerical value
Navigation keys: ◁	LEFT key: move backwards in a parallel menu or select a digit in a numerical value
Navigation keys: ▷	RIGHT key: move forwards in a parallel menu or select a digit in a numerical value
	Switchgear control key (OPEN)
	Switchgear control key (CLOSE)
	Local/remote control key
F1	7 customizable function keys

LEDS

	On (Green)
	Alarm (Yellow)
	Trip (Red)
	Maintenance (Yellow)
	10 customizable tri-color LEDs

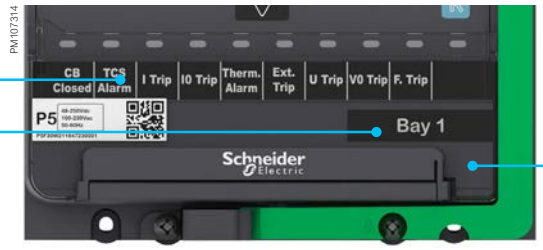
PORTS

	USB mini B (Computer)
	USB A (USB key)

ACCESS COVER (OPEN)

LABELS

Customizable LED labels
Customizable Bay label



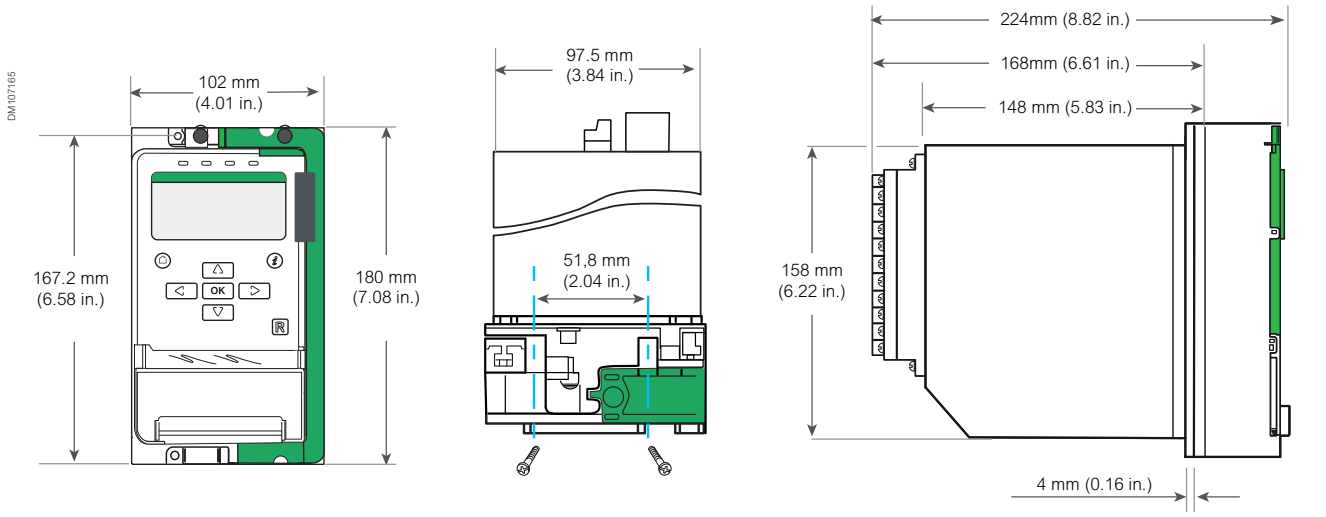
ACCESS COVER (CLOSED)

Base Unit Description

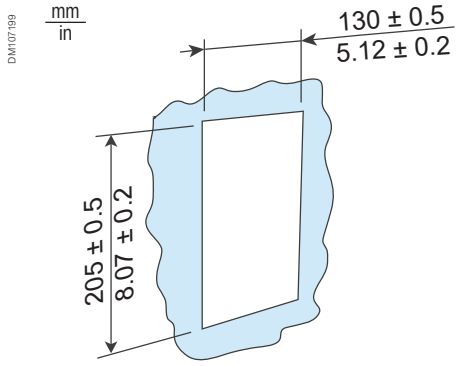
PowerLogic P5x20 - Dimensions and Weight

Dimensions and weight

Dimensions	mm	in
Height	180	7.08
Width	102	4.01
Depth	224	8.82
Weight	**kg**	**lb**
Weight	2.5 to 3.5	5.5 to 7.7

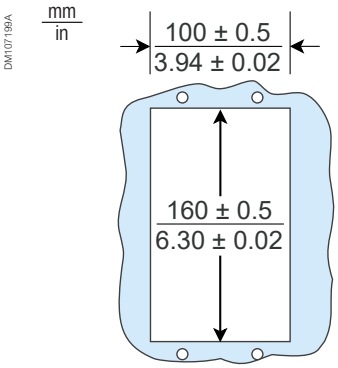


Flush mounting with accessory



Cut-out dimensions	mm	in
Height	205 ± 0.5	8.07 ± 0.2
Width	130 ± 0.5	5.12 ± 0.2

Flush mounting without accessory



Cut-out dimensions	mm	in
Height	160 ± 0.5	6.30 ± 0.2
Width	100 ± 0.5	3.94 ± 0.2

More info on installation accessories page 98

NOTE 1: PowerLogic P5 relays can be mounted in rack. Please consult User Guide for more details.
NOTE 2: Please see the appropriate Safety Guide or User Guide for correct installation information.

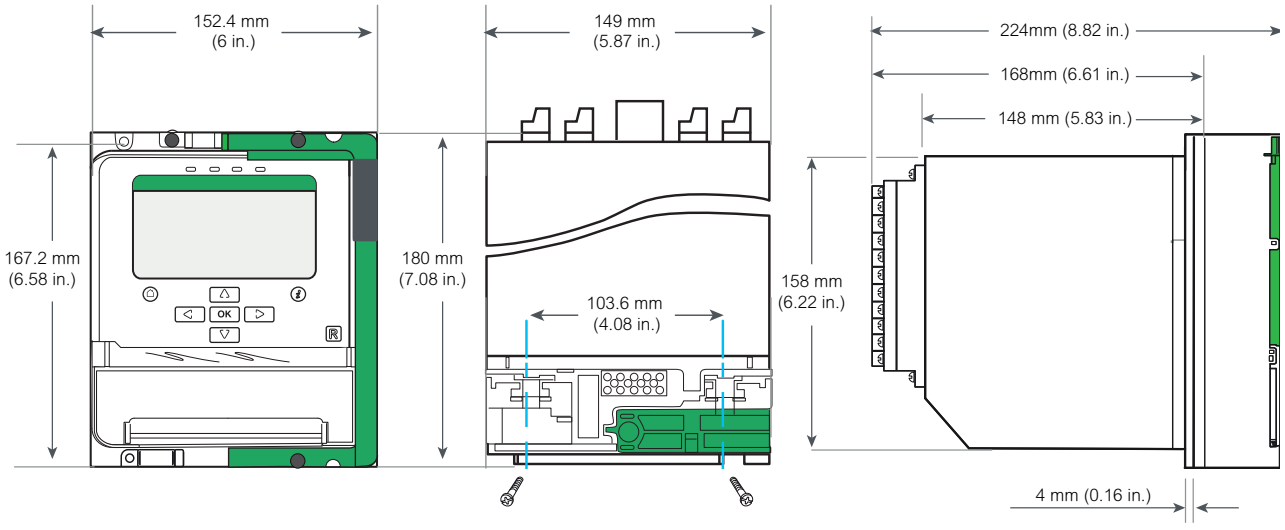
Base Unit Description

PowerLogic P5x30 - Dimensions and Weight

Dimension and weight

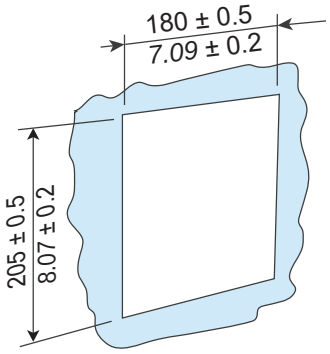
Dimensions	mm	in
Height	180	7.08
Width	152.4	6
Depth	224	8.82
Weight	**kg**	**lb**
Weight	2.5 to 3.5	5.5 to 7.7

DM107168



Flush mounting with accessory

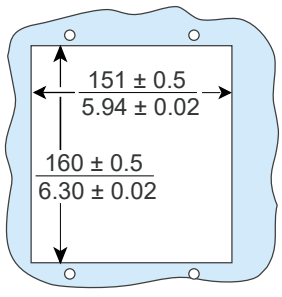
DM107199



Cut-out dimensions	mm	in
Height	205 ± 0.5	8.07 ± 0.02
Width	180 ± 0.5	7.09 ± 0.02

Flush mounting without accessory

DM107199B



Cut-out dimensions	mm	in
Height	160 ± 0.5	6.30 ± 0.02
Width	151 ± 0.5	5.94 ± 0.02

More info on installation accessories page 98

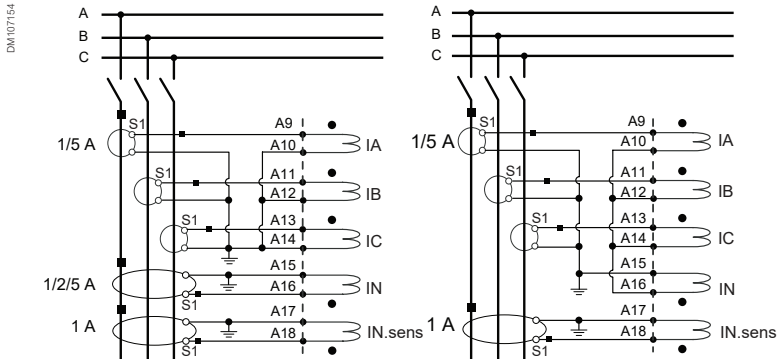
NOTE 1: PowerLogic P5 relays can be mounted in rack. Please consult User Guide for more details.
NOTE 2: Please see the appropriate Safety Guide or User Guide for correct installation information.

Connection Diagrams

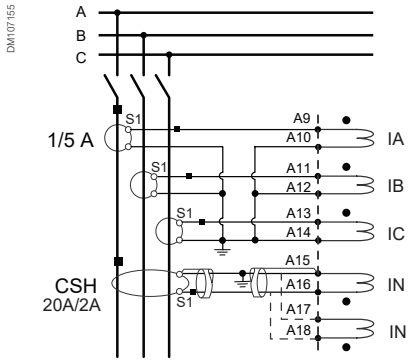
Current Transformers (and LPCT)

CT and LPCT connection – slot A

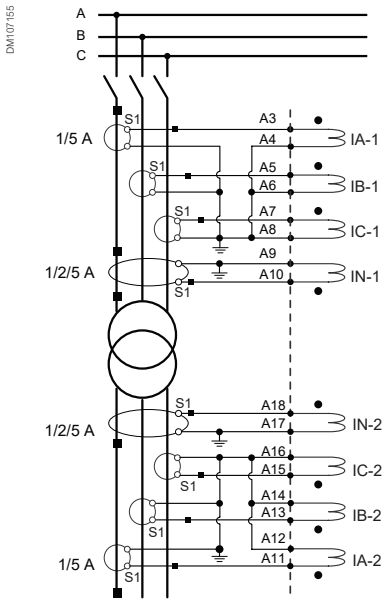
Model with 3 phase CT + 2 residual CT inputs



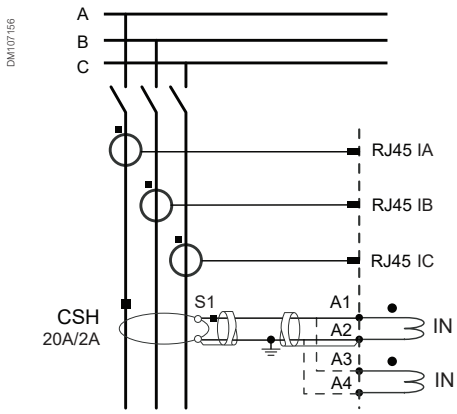
Model with 3 phase CT + 1 CSH inputs



Model with 6 phase CT + 2 residual CT inputs



Model with 3 phase LPCT + 1 CSH inputs



NOTE:
Please see the appropriate Safety Guide or User Guide for correct installation information.

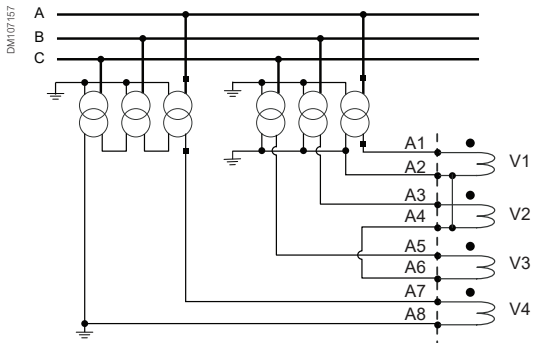
Connection Diagrams

Voltage Transformers (and LPVT)

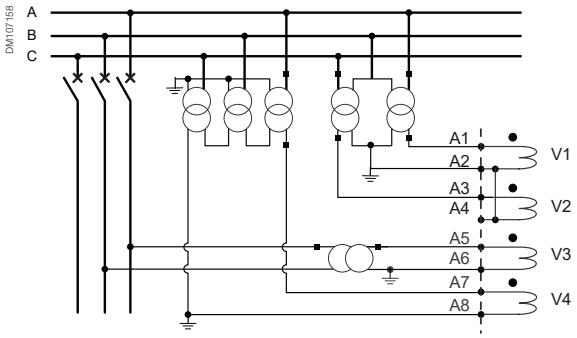
Slot A - VT and LPVT connection

Model with 4 VT inputs

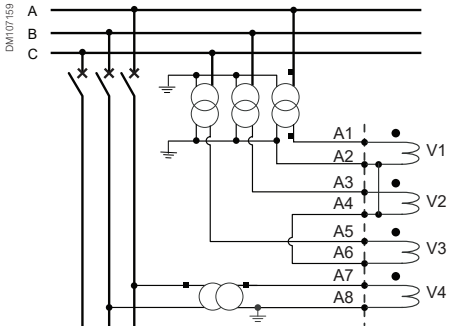
3 phase-to-ground voltages and 1 neutral voltage



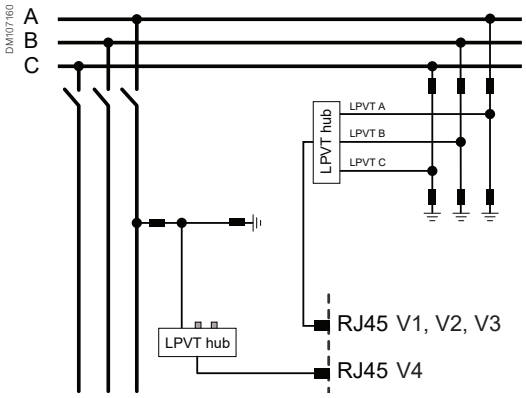
2 phase-to-phase voltages + 1 neutral voltage + 1 additional phase-to-phase voltage



3 phase-to-ground voltages + 1 additional phase-to-phase voltage



Model with 4 LPVT inputs



$V4 = V_B - V_A$ or
$V4 = V_A$
according to setting

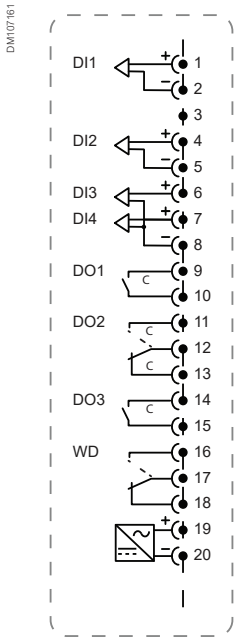
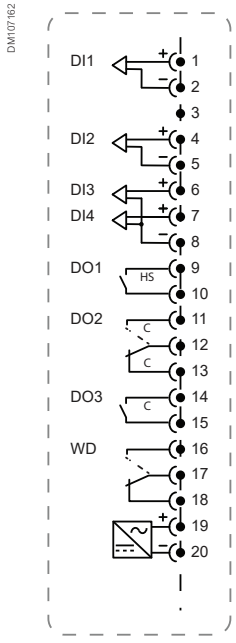
NOTE 1:
Please see the appropriate Safety Guide or User Guide for correct installation information.

NOTE 2:
LPVT hub shall be ordered separately with ref. EMS59573.

Connection Diagrams

Power supply, Inputs and Outputs

Slot B - Power supply and digital I/O

P5x20	P5x30
	
	
24 to 250 V supply + 4 DI + 3 DO + WD	48 to 250 V supply + 4 DI + 3 DO + WD or 24 to 48 V supply + 4 DI + 3 DO + WD
DI1 to DI4: universal digital inputs	DI1 to DI4: universal digital inputs
DO1, DO2 and DO3: control relay outputs	DO1: high-speed/high-break output DO2 and DO3: control relay outputs
Watchdog (WD): signaling relay output	Watchdog (WD): signaling relay output

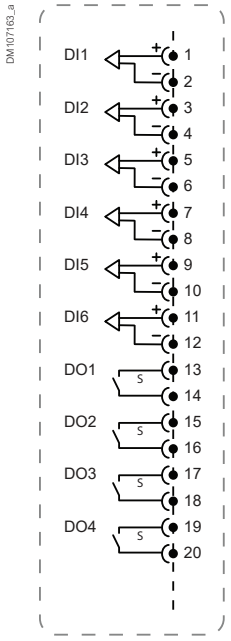
NOTE:
Please see the appropriate Safety Guide or User Guide for correct installation information.

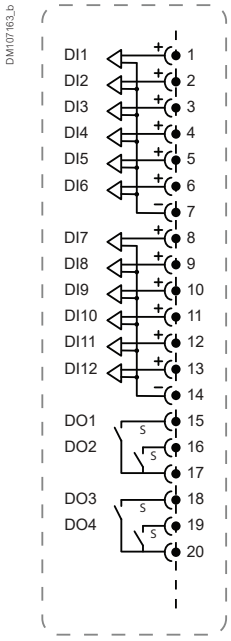
Connection Diagrams

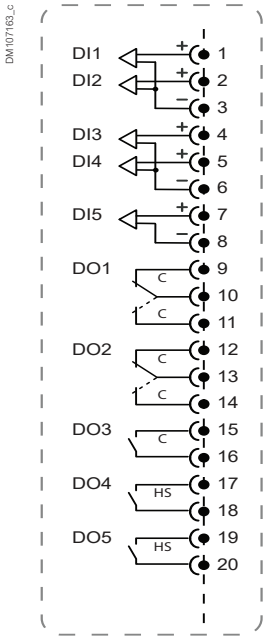
Power supply, Inputs and Outputs

Slot C - Additional digital I/O

P5x20 and P5x30







6 DI + 4 DO	12 DI + 4 DO	5 DI + 5 DO
DI1 to DI6: universal digital inputs	DI1: motor speed detection input (1)	DI1 to DI5: universal digital inputs
DO1 to DO4: signaling relay outputs	DI2 to DI12: universal digital inputs	DO1 to DO3: control relay outputs
	DO1 to DO4: signaling relay outputs	DO4 to DO5: high-speed/high-break outputs

(1) DI1 can be used as universal input

NOTE:
Please see the appropriate Safety Guide or User Guide for correct installation information.

Technical Characteristics

Electrical Characteristics

Power supply		
Rated voltage	P5x20	24-250 Vdc; 100-230 Vac
	P5x30	24-48 Vdc
		48-250 Vdc; 100-230 Vac
Variation		-20% / +20%
Typical burden (1)	P5x20	4 W ; 10 VA at 230 Vac
	P5x30	8 W ; 15 VA at 230 Vac
Maximum burden	P5x20	6 W ; 15 VA at 230 Vac
	P5x30	11 W ; 22 VA at 230 Vac
Maximum interruption time		100 ms

Measurement Inputs	
Rated frequency	50/60 Hz
Phase CT and standard earth/ground fault CT inputs	
Rated current	1 A / 5 A
Input impedance	< 0.02 Ohm
Thermal withstand, continuous	20 A
Thermal withstand, 1 s	500 A
Very sensitive earth/ground fault CT input	
Rated current	1 A
Input impedance	< 0.02 Ohm
Thermal withstand, continuous	4 A
Thermal withstand, 1 s	100 A
CSH input (for 470/1 dedicated sensors)	
Rated current	2 A / 20 A (primary value)
Input impedance	< 0.02 Ohm
Thermal withstand, continuous	300 A (primary value)
Thermal withstand, 1 s	20 kA (primary value)
LPCT inputs	
Rated voltage	22.5 mV
Extended rated voltage	0.25 to 31.5 rated voltage
Input impedance	2 MOhms / 500 pF
Maximum voltage withstand	60 V
VT inputs	
Rated voltage	200 V
Input impedance	> 100 kOhms
Voltage withstand, continuous	1.2 rated voltage
LPVT inputs	
Rated voltage	3.25 V/√3
Extended rated voltage	0.25 to 1.5 rated voltage
Input impedance	10 MOhms / 15 pF
Maximum voltage withstand	25 V

(1) According to configuration

Technical Characteristics

Electrical Characteristics

Digital inputs	
Rated voltage	240 V DC or AC
Switching threshold voltage	10 to 200 V, settable
Current drain	< 2 mA

Digital outputs (relays)	
Control relay outputs	
Rated voltage	240 V DC or AC
Continuous current	8 A
Making current	30 A, 200 ms
Breaking capacity (L/R < 40 ms)	50 W (24 to 127 V) / 30W (240 V) (2)
Signaling relay output	
Rated voltage	240 V DC or AC
Continuous current	2 A
Breaking capacity (L/R < 20 ms)	2 A (24 V) / 1 A (48 V) / 0.2 A (127 V) / 0.1 A (240 V)
High-speed and high-break output	
Rated voltage	240 V DC or AC
Continuous current	10 A
Making current	30 A, 200 ms
Breaking capacity (L/R < 40 ms)	10 A (24 to 240 V)
Closing / opening time	1 ms / 20 ms

(1) According to configuration
(2) 50 W at 24 V with additional customer protection (RC or zener diode)

Technical Characteristics

Environmental Characteristics

Electromagnetic compatibility	Standard	Level / Class	Value
Emission Tests			
Conducted emission	CISPR 11	Class A	0.15 to 0.5 MHz: 79 dBµV (quasi peak)
	CISPR 32	Class A	0.5 to 30 MHz: 73 dBµV (quasi peak)
	IACS E10		0.15 MHz to 0.3 MHz: 80 to 50 dBµV/m
Radiated emission	CISPR 32	Class A	30 MHz to 230 MHz: 40 dBµV (quasi peak)
			0.3 MHz to 100 MHz: 60 to 54 dBµV/m
	IACS E10		100 MHz - 2000 MHz, 54 dBµV/m except for: 156 MHz - 165 MHz, 24 dBµV/m
Immunity tests – radiated disturbances			
Electrostatic discharge	IEC 61000-4-2	Class 4	15 kV air / 8 kV contact
	ANSI C37.90.3		15 kV air / 8 kV contact
Radiated electromagnetic energy	IEC 61000-4-3	Level 3	10 V/m, 80 MHz to 2.7 GHz, 80% AM (1 KHz)
	ANSI C37.90.2		20 V/m, 80 MHz to 1 GHz, 80% AM (1 KHz)
	GOST 32137		10 V/m, 80 MHz to 1 GHz, 80% AM (1 KHz) and pulse 200 Hz
	GOST 30804.4.3		30 V/m, 800 to 960 MHz & 1.4 to 2 GHz
	IACS E10		10 V/m, 80 MHz to 1 GHz
Magnetic fields at power frequency	IEC 61000-4-8	Level 5	100 A/m continuous, 1000 A/m, 3 s
Pulse magnetic fields	IEC 61000-4-9	Level 5	1000 A/m
Oscillatory magnetic fields	IEC 61000-4-10	Level 5	100 A/m, 100 kHz and 1 MHz, 2 s
Immunity tests – conducted disturbances			
Radio frequency disturbances	IEC 61000-4-6	Level 3	10 V CM, 0.15 MHz to 80 MHz
Slow damped oscillatory waves	IEC 61000-4-18	Level 3	2.5 kV CM, 1 kV DM, 100 kHz & 1 MHz
	ANSI C37.90.1		2.5 kV, 1 MHz, CM and TM
	IEC 61000-4-12 GOST30804.4.12		2 kV CM, 1 kV DM, 100 kHz Source impedance: 12 Ω
Fast damped oscillatory waves	IEC 61000-4-18	Level 3	2 kV CM, 3MHz, 10MHz, 30MHz
Conducted disturbances 0 to 150 kHz	IEC 61000-4-16	Level 4	300 V CM, 150 V DM, 0 to 150 kHz 30 V, continuous at power frequency
Electrical fast transient or burst	IEC 61000-4-4	Level 4	4 kV CM, 5 kHz and 100 kHz
	ANSI C37.90.1		4 kV, 5 kHz CM and TM
	IACS E10		2 kV power supply, 1 kV digital I/Os, 5min
Surge	IEC 61000-4-5	Level 4	4 kV CM, 2 kV DM Communication ports: 2 kV CM, 1 kV DM

Technical Characteristics

Other Characteristics

Safety	Standard	Value
General safety		IEC 60255-27
Creepage distances and clearances	IEC 60255-27	Pollution degree 2 overvoltage category III
High voltage withstand	IEC 60255-27	2 kV rms, 1mn 1 kV rms, 1mn across opened contacts
	ANSI C37.90	1.5 kV rms 1 mn across opened contacts of control relays
Impulse voltage withstand	IEC 60255-27	5 kV, 1.2 µs/50 µs
Insulation	IEC 60255-27	Insulation resistance > 100 MΩ at 500 Vdc

Electromagnetic compatibility	Standard	Level / Class	Value
Disturbances on the power supply			
Voltage dips	IEC 61000-4-11		0%, 5/6 cycles min
			40%, 10/12 cycles
			70%, 25/30 cycles
	IEC 61000-4-29		0%, 100 ms min
			40%, 200 ms
			70%, 500 ms
Interruption	IEC 61000-4-11		0%, 250/300 cycles
	IEC 61000-4-29		0%, 5 s
Voltage variations	IEC 61000-4-14	Class 3	±12 % Un
Frequency variations	IEC 61000-4-28	Level 4	±15 % of frequency variation
Ripples	IEC 61000-4-17		15%, 100 Hz to 120 Hz
Gradual shutdown	IEC 61000-4-27		
Reverse of DC power supply	IEC 61000-4-27		

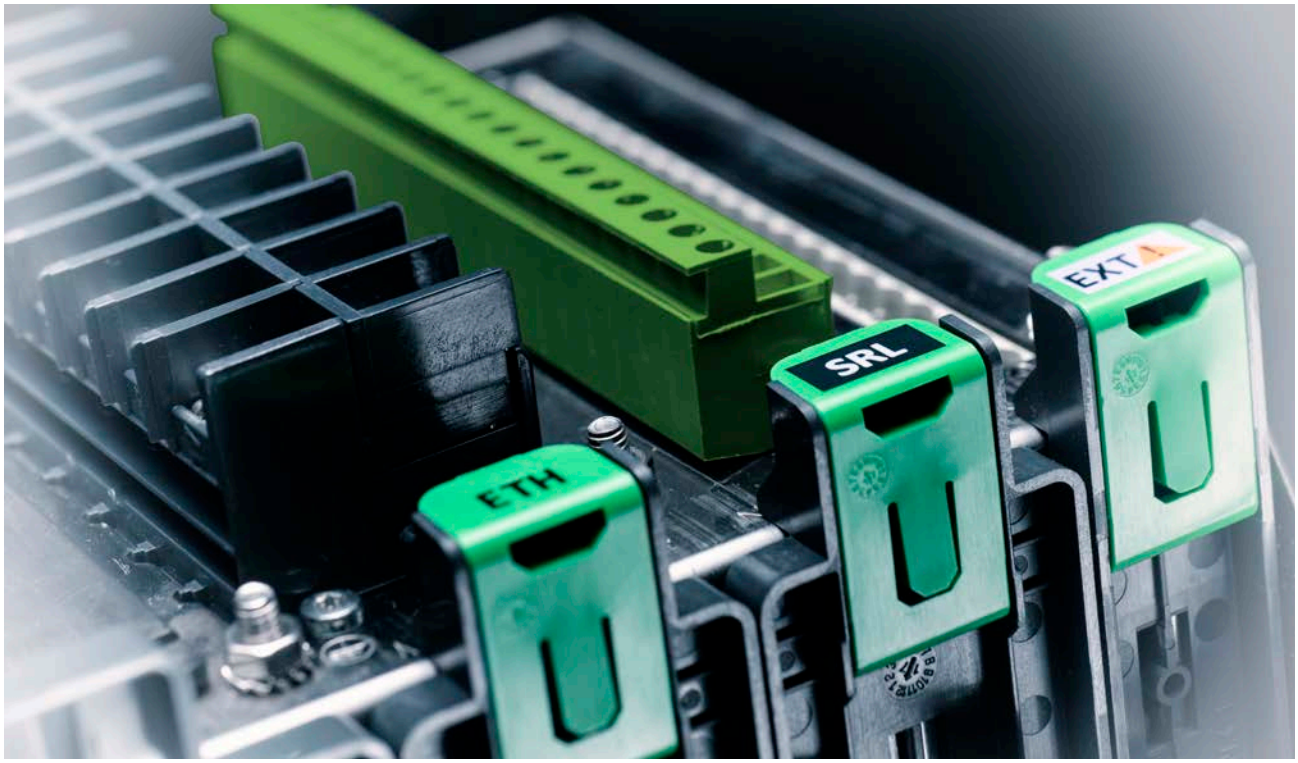
AM : Amplitude Modulation / CM : Common Mode / DM : Differential Mode / TM : Transversal Mode

Enlosure	Standard	Level / Class	Value
Local panel	IEC 60529	IP54	Front panel
		IP54	Mounted in panel with flush mounting accessory
		IP41	Mounted without flush mounting accessory
	NEMA	Type 12	-
Case	IEC 60529	IP30	-
Rear panel	IEC 60529	IP20	Except area with ring terminal connection (analogue inputs)

Base Unit Description

Other Characteristics

Mechanical robustness	Standard	Level / Class	Value
In operation			
Vibrations	IEC 60255-21-1	Class 2	1 Gn, 10 Hz to 200 Hz
	GOST 17516.1		0,015 mm peak, 0,5 Hz to 57,6 Hz 1 Gn 57,6 Hz to 150 Hz
	IACS E10		13.2 Hz to 100 Hz – acceleration ± 0.7 g
Shocks	IEC 60255-21-2	Class 2	10 Gn / 11 ms
Earthquakes	IEC 60255-21-3	Class 2	2 Gn horizontal / 1 Gn vertical
De-energized			
Vibrations	IEC 60255-21-1	Class 2	2 Gn ; 10 Hz - 150 Hz
Shocks	IEC 60255-21-2	Class 2	30 Gn / 11 ms
Jolts	IEC 60255-21-2	Class 2	20 Gn / 16 ms



Base Unit Description

Other Characteristics

Climatic withstand	Standard	Level / Class	Value
In operation - Operating condition: -40°C to +70°C (-40°F to +158°F)			
Operating conditions			-40°C to +70°C (-40°F to +158°F)
Exposure to cold	IEC 60068-2-1	Ad	-40°C (-40°F) ; 96 h
Exposure to dry heat	IEC 60068-2-2	Bd	+70°C (+158°F), 96 h +85°C (+185°F), 16 h
Exposure to damp heat	IEC 60068-2-78	Cab	93% RH without condensation, 40°C (104°F), 56 days
	IEC 60068-2-30	Db	93-95% RH, 25°C to 55°C (77°F to 131°F), 6 cycles (12 + 12 hours)
Temperature variation	IEC 60068-2-14	Nc	-40°C to +70°C (-40°F to +158°F) 10°C/mn (18°F/mn)
In storage			
Storage conditions			-40°C to +85°C (-40°F to +185°F)
Exposure to cold	IEC 60068-2-1	Ab	-40°C (-40°F) ; 96 h
Exposure to dry heat	IEC 60068-2-2	Bb	+85°C (+185°F) ; 96 h
Exposure to damp heat	IEC 60068-2-78	Cab	93% RH to 95% RH, 40°C (104°F), 56 days
Corrosive atmosphere			
Salt mist	IEC 60068-2-52	Kb / 1	
Corrosive 2 and 4 gas tests	IEC 60068-2-60	Ke	• Method 1; 0,5 ppm H_2S; 1 ppm SO_2 • Method 4; – 2.1 ppm H2S, 1.56 ppm NO_2, – 0.1 ppm CL_2, 1.85 ppm SO_2
	IEC 60721-3-3	3C3	21 days

Cybersecurity

	Standard
Certification	Achilles, Level I
Certificate number	453-071119
Certification	Achilles, Level II
Certificate number	500-101420
Certification Certificate number	IEC 62443 4-2 Security Level 1 968/FSP 2168.00/21

Marine

	Standard
Certification	Mutual Recognition, Bureau Veritas
Certificate number	DE 68975/A1 EU-MR BV

Marking and homologations

Standard	Value	
EN 60255-27 EN 60255-26 EN IEC 63000	LV Directive 2014/35/EU EMC Directive 2014/30/EU RoHS Directive 2011/65/EU incl. 2015/863/EU	CE
UL508 ANSI/IEEE C37.90 CAN/CSA C22.2 No.14	File E354250, NRGU	c UL us
EAC Eurasian Customs Union	Certificate number: EAЭC RU C-FR.HA46.B.05269/22	EAC
BS EN 60255-27 BS 60255-26 BS EN IEC 63000	SI 2016 No. 1101 SI 2016 No. 1091 SI 2012 No. 3032	UK CA

Order information

Protection relay

For ordering, please visit www.se.com and use PowerLogic P5 Product Selector. Alternatively, please contact Customer Care Center stating a complete model number (according to below table) and quantity.

PowerLogic P5

Schneider Electric

		Slot D	Slot E	Slot B	Slot C		Slot A	Slot L	Slot M	Slot N	Slot P		Model	Firmware	Function	Language
Application																
Feeder protection relay	P5F30 -					-						-				
Motor protection relay	P5M30															
Transformer differential relay	P5T30															
Line differential relay	P5L30															
Universal protection relay	P5U20															
Voltage protection relay	P5V20															
Slot D - Additional I/O in P5x30																
Without		A														
6DI + 4DO		B														
3 Arc sensors + 3DI + 3DO		C														
5DI + 5DO		D														
12DI + 4DO		E														
Slot E - Additional I/O in P5x30																
Without			A													
6DI + 4DO			B													
3 Arc sensors + 3DI + 3DO			C													
5DI + 5DO			D													
12DI + 4DO			E													
Slot B - Power supply																
24 - 250 V DC / 100 - 230 V AC + 4DI + 3DO + WD				B												
48 - 250 V DC / 100 - 230 V AC + 4DI + 3DO + WD				C												
24 - 48 V DC + 4DI + 3DO + WD				D												
Slot C - Additional I/O																
without					A											
6DI + 4DO					B											
5DI + 5DO					D											
12DI + 4DO					E											
Slot A - CT/VT																
3 phase CT + 2 neutral CT (available for P5U20)							B									
3 phase CT + 1 neutral CSH (available for P5U20)							C									
4 VT (available for P5V20)							D									
3 phase CT + 2 neutral CT + 4 VT (available for P5F30, P5M30)							G									
3 phase CT + 1 neutral CSH + 4 VT (available for P5F30, P5M30)							H									
3 LPCT + 1 neutral CSH + 4 LPVT (available for P5F30, P5M30, P5U20)							I									
6 phase CT + 2 neutral CT + 1 VT (available for P5T30)							J									
3 phase CT + 2 neutral CT + 4 VT (available for P5L30)							L									
3 phase CT + 1 neutral CSH + 4 VT (available for P5L30)							M									
Slot L - 2nd Ethernet communicaition port																
Without (except P5L30)								A								
Ethernet TP module with RSTP (2*RJ45) (except P5L30)								B								
InterRelay FO module 1310 nm SM 40 km (2*LC)								D								
InterRelay FO module 1310 nm MM 2 km (2*LC)								E								
Slot M - Ethernet communication port																
Without									A							
Ethernet TP module with RSTP (2*RJ45)									B							
Ethernet FO module with RSTP (2*LC)									C							
Combined Ethernet TP module with HSR/PRP and PTP (2*RJ45) + RS485 serial (2*RJ45)									G							
Combined Ethernet FO module with HSR/PRP and PTP (2*LC) + RS485 serial (2*RJ45)									H							
Slot N - Serial communication port																
Without										A						
RS485 serial line module										E						
RS485 FO serial line module										F						
(Occupied when option G is selected on Slot M)										G						
(Occupied when option H is selected on Slot M)										H						
Slot P - Extension port																
Without											A					
Extension module + Backup memory											H					
Extension module + Backup memory + Wireless Communication + Condition Monitoring											W					
Model version																
Version A - for V01 firmware													A			
Version B - for V02 firmware													B			
Firmware version																
Latest firmware version V02.502														A		
Firmware V01.402 - hardware version A														E		
Firmware V01.500.104 - hardware version A														F		
Function packages																
Cybersecurity Basic - firmware V01.402															A	
Cybersecurity Advanced IEC 62443 4-2 Security Level 1 - firmware V01.402															B	
Cybersecurity Basic & Advanced Logic Engine - firmware V01.402															C	
Cybersecurity Advanced IEC 62443 4-2 Security Level 1 & Advanced Logic Engine - firmware V01.402															D	
Settable cybersecurity (Basic or Advanced IEC 62443 4-2 SL1) - firmware V01.500 and higher															E	
Settable cybersecurity (Basic or Advanced IEC 62443 4-2 SL1) + Advanced Logic Engine - firmware V01.500 and higher															F	
Languages																
English																A
English - Chinese																B
English - French																C
English - Italian																E
English - Polish																F
English - Portuguese																G
English - Russian																H
English - Spanish																I
English - Tr. Chinese																L
English - English ANSI																K

NOTE: For the applicable slot occupation rules for your PowerLogic P5 protection relay ordered, refer to Slot occupation rules, page 703 to get more details.

常用型號參數：

■ 十相一體附RS485/ETHERNET輸出：

P5F30-AACB-GABEA-BAEL

■ 四相一體(CO/LCO)附RS485/ETHERNET輸出：

P5U20-AACA-BABEA-BAEL

■ 六相一體(UV/OV)附RS485/ETHERNET輸出：

P5V20-AACA-DABEA-BAEL

www.se.com

Schneider Electric Industries SAS
35, Rue Joseph Monier
CS 30323
92506 Rueil Malmaison Cedex

RCS Nanterre 954 503 439
Capital social 928 298 512 €
www.se.com

May 2025
PowerLogic™ P5
NRJED313567EN

As standards, specifications and designs develop from time to time, please ask for confirmation of the information given in this document.

Schneider Electric 施耐德電機授權經銷商
東技企業股份有限公司
普得企業股份有限公司
總公司:台北市內湖區行愛路68號6樓
電　話:(02)8791-8588　　中辦處:(04)2296-9388
傳　真:(02)8791-9588　　高辦處:(07)227-2133
E-mail:toyotech@ms37.hinet.net　　網　址:www.toyotech.com.tw

SCDOC1849
2018.10