

2020 Catalog



Easergy P3

Network Protection Relays

easergy.schneider-electric.com

Life Is On

Schneider
Electric

Protection functions	ANSI code	Feeder (P3U)		Motor (P3U)		Advanced (P3x)						
		P3U10 P3U20	P3U30	P3U10 P3U20	P3U30	P3F30	P3L30	P3M30	P3M32	P3G30	P3G32	P3T32
Distance	21	-	-	-	-	-	1	-	-	-	-	-
Under-impedance	21G	-	-	-	-	-	-	-	-	2	2	-
Fault locator	21FL	-	1	-	1	1	1	-	-	-	-	-
Overfluxing	24	-	-	-	-	-	-	-	-	1	1	1
Synchro-check	25	-	2	-	2	2	2	2	2	2	2	2
Undervoltage	27	-	3	-	3	3	3	3	3	3	3	3
Positive sequence undervoltage	27P	-	-	-	-	-	-	-	-	2	2	-
Directional active underpower	32	-	2	-	2	2	2	2	2	2	2	2
Phase undercurrent	37	1	1	1	1	-	-	1	1	-	-	-
Temperature monitoring	38/49T	12 ⁽⁰⁾⁽¹⁾	12 ⁽¹⁾	12 ⁽⁰⁾⁽¹⁾	12 ⁽¹⁾	12 ⁽¹⁾	12 ⁽¹⁾	12 ⁽¹⁾	12 ⁽¹⁾	12 ⁽¹⁾	12 ⁽¹⁾	12 ⁽¹⁾
Loss of field	40	-	-	-	-	-	-	-	-	1	1	-
Under-reactance	21/40	-	-	-	-	-	-	-	-	2	2	-
Negative sequence overcurrent (motor, generator)	46	-	-	2	2	-	-	2	2	2	2	2
Incorrect phase sequence	46	-	-	1	1	-	-	1	1	-	-	-
Cur. unbalance, broken conductor	46BC	1	1	-	-	1	1	-	-	-	-	-
Negative sequence overvoltage protection	47	-	3	-	3	3	3	3	3	3	3	3
Excessive start time, locked rotor	48/51LR	-	-	1	1	-	-	1	1	-	-	-
Thermal overload	49	1	1	1	1	1	1	1	1	1	1	1
Phase overcurrent	50/51	3	3	3	3	3	3	3	3	3	3	3
Earth fault overcurrent	50N/51N	5	5	5	5	5	5	5	5	5	5	5
Breaker failure	50BF	1	1	1	1	1	1	1	1	1	1	1
Switch On To Fault (SOTF)	50HS	1	1	1	1	1	1	1	1	1	1	1
Capacitor bank unbalance	51C	2	2	2	2	2	2	2	2	2	2	2
Voltage dependant overcurrent	51V	-	1	-	1	1	1	-	-	1	1	-
Overvoltage	59	-	3	-	3	3	3	3	3	3	3	3
Capacitor overvoltage	59C	1	1	-	-	1	1	-	-	-	-	-
Neutral voltage displacement	59N	3	3	3	3	2	2	2	2	2	2	2
CT supervision	60	1	1	1	1	1	1	1	1	1	2	2
VT supervision	60FL	-	1	-	1	1	1	1	1	1	1	1
Restricted earth fault (low imped.)	64REF	-	-	-	-	-	-	-	-	-	1	1
Stator earth fault	64S	-	-	-	-	-	-	-	-	1	1	-
Frequent start inhibition	66	-	-	1	1	-	-	1	1	-	-	-
Directional phase overcurrent	67	-	4	-	4	4	4	4	4	4	4	4
Directional earth-fault o/c	67N	3	3	3	3	3	3	3	3	3	3	3
Transient intermittent	67NI	1	1	-	-	1	1	-	-	-	-	-
Magnetizing inrush detection	68F2	1	1	1	1	1	1	1	1	1	1	1
Fifth harmonic detection	68H5	1	1	1	1	1	1	1	1	1	1	1
Pole slip	78PS	-	-	-	-	-	-	-	-	1	1	-
Auto-recloser	79	5	5	-	-	5	5	-	-	-	-	-
Over or under frequency	81	-	2/2	-	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2
Rate of change of frequency	81R	-	1	-	1	1	1	1	1	1	1	1
Under frequency	81U	-	2	-	2	2	2	2	2	2	2	2
Lockout	86	1	1	1	1	1	1	1	1	1	1	1
Line differential	87L	-	-	-	-	-	2	-	-	-	-	-
Machine differential	87M	-	-	-	-	-	-	-	2	-	2	-
Transformer differential	87T	-	-	-	-	-	-	-	-	-	-	2
Programmable stages	99	8	8	8	8	8	8	8	8	8	8	8
Arc-flash detection (AFD)		-	-	-	-	8	8	8	8	8	8	8
Cold load pick-up (CLPU)		1	1	1	1	1	1	1	1	1	1	1
Programmable curves		3	3	3	3	3	3	3	3	3	3	3
Setting groups ⁽³⁾		4	4	4	4	4	4	4	4	4	4	4

(0) No temperature sensors for P3U10 and 12 optional for P3U20

(1) Using external RTD module

(2) P3U10 and P3U20 offer one voltage input. Function availability depends on the connection of the voltage input

(3) Not all protection functions have 4 setting groups. See details in the manual.

Control functions	Standard (P3U)		Advanced (P3x)						
	P3U10 P3U20	P3U30	P3F30	P3L30	P3M30	P3M32	P3G30	P3G32	P3T32
Switchgear control and monitoring	1/6	6	6	6	6	6	6	6	6
Switchgear monitoring only	2	2	2	2	2	2	2	2	2
Programmable switchgear interlocking	•	•	•	•	•	•	•	•	•
Local control on single-line diagram	•	•	•	•	•	•	•	•	•
Local control with O/I keys	•	•	•	•	•	•	•	•	•
Local/remote function	•	•	•	•	•	•	•	•	•
Function keys	2	2	2	2	2	2	2	2	2
Custom logic (logic equations)	•	•	•	•	•	•	•	•	•
Control with Smart App	•	•	•	•	•	•	•	•	•
Measurement									
RMS current values	•	•	•	•	•	• ⁽¹⁾	•	• ⁽¹⁾	• ⁽¹⁾
RMS voltage values	•	•	•	•	•	•	•	•	•
RMS active, reactive and apparent power	-	•	•	•	•	•	•	•	•
Frequency	•	•	•	•	•	•	•	•	•
Fundamental frequency current values	•	•	•	•	•	• ⁽¹⁾	•	• ⁽¹⁾	• ⁽¹⁾
Fundamental frequency voltage values	-	•	•	•	•	•	•	•	•
Fundamental frequency active, reactive and apparent power values	-	•	•	•	•	•	•	•	•
Power factor	-	•	•	•	•	•	•	•	•
Energy values active and reactive	-	•	•	•	•	•	•	•	•
Energy transmitted with pulse outputs	-	•	•	•	•	•	•	•	•
Demand values: phase currents	•	•	•	•	•	•	•	•	•
Demand values: active, reactive, apparent power and power factor	-	•	•	•	•	•	•	•	•
Min and max demand values: phase currents	•	•	•	•	•	•	•	•	•
Min and max demand values: RMS phase currents	•	•	•	•	•	•	•	•	•
Min and max 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	-	•	•	•	•	•	•	•	•
Max and min values: currents	•	•	•	•	•	•	•	•	•
Max and min values: voltages	•	•	•	•	•	•	•	•	•
Max and min values: frequency	•	•	•	•	•	•	•	•	•
Max and min values: active, reactive, apparent power and power factor	-	•	•	•	•	•	•	•	•
Harmonic values of phase current and THD ⁽²⁾	•	•	•	•	•	• ⁽¹⁾	•	• ⁽¹⁾	• ⁽¹⁾
Harmonic values of voltage and THD ⁽²⁾	-	•	•	•	•	•	•	•	•
Voltage sags and swells	-	•	•	•	•	•	•	•	•
Records									
Sequence of event record (50~2000 records)	•	•	•	•	•	•	•	•	•
Disturbance record (12 records, up to 12 channels/record)	•	•	•	•	•	•	•	•	•
Tripping context record	•	•	•	•	•	•	•	•	•
Monitoring functions									
Trip circuit supervision (ANSI 74)	1	1	1	1	1	1	1	1	1
Circuit breaker monitoring	1	1	1	1	1	1	1	1	1
Relay monitoring	•	•	•	•	•	•	•	•	•

(1) Function available on both sets of CT inputs

(2) Individual harmonics up to 15th

Communication

Data exchanged between
Easergy P3 and SCADA

Ethernet ports

Protocol	IEC 61850	Ethernet/IP	FTP
Real-time data			
Measurement	•	•	-
Alarms and status	•	•	-
Controls	•	•	-
Time-stamped events	•	•	-
Historical data			
Disturbance records	•	-	•
Setting management			
Setting group change	•	•	-

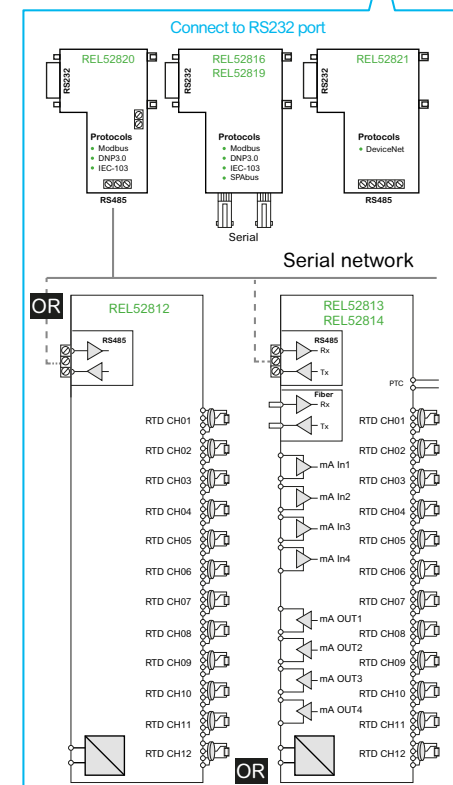
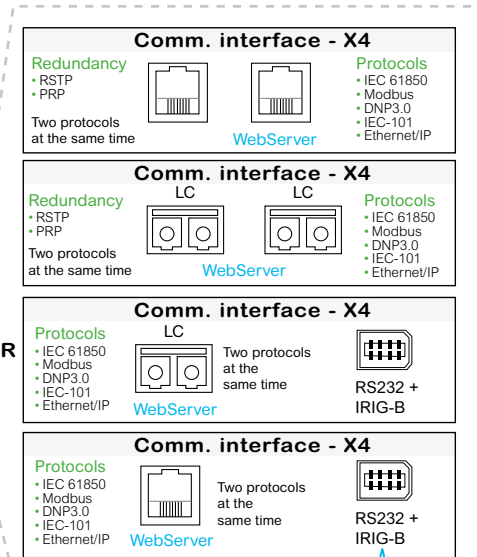
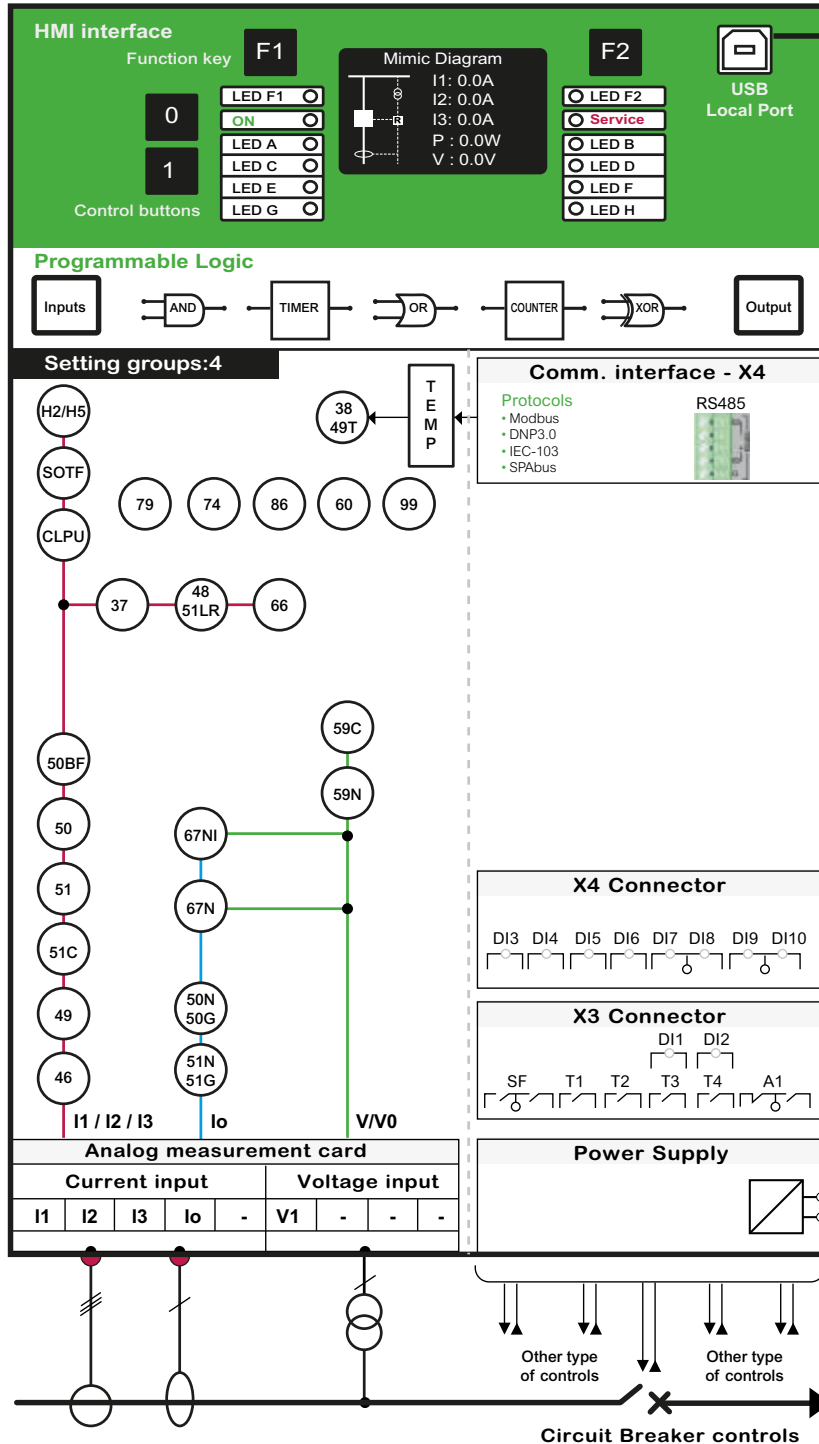
- All-in-one box with feeder, transformer, and motor protections
- All communication protocols embedded on serial and Ethernet links including IEC 61850 ed.1 and ed. 2

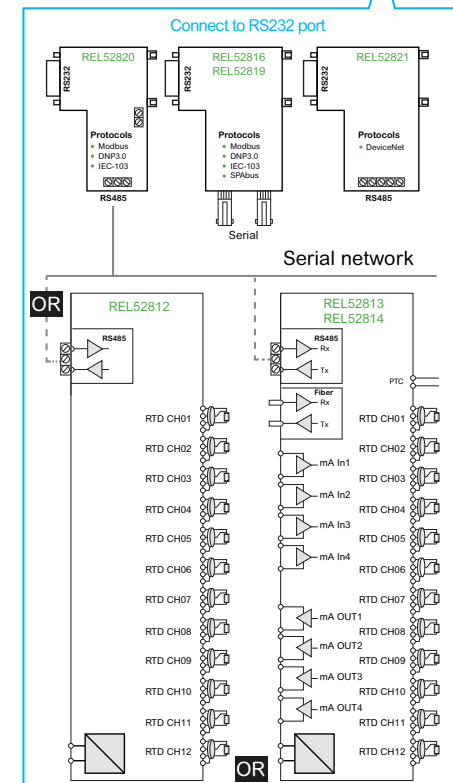
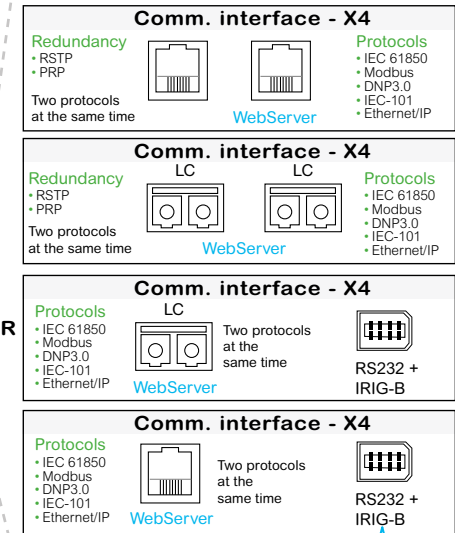
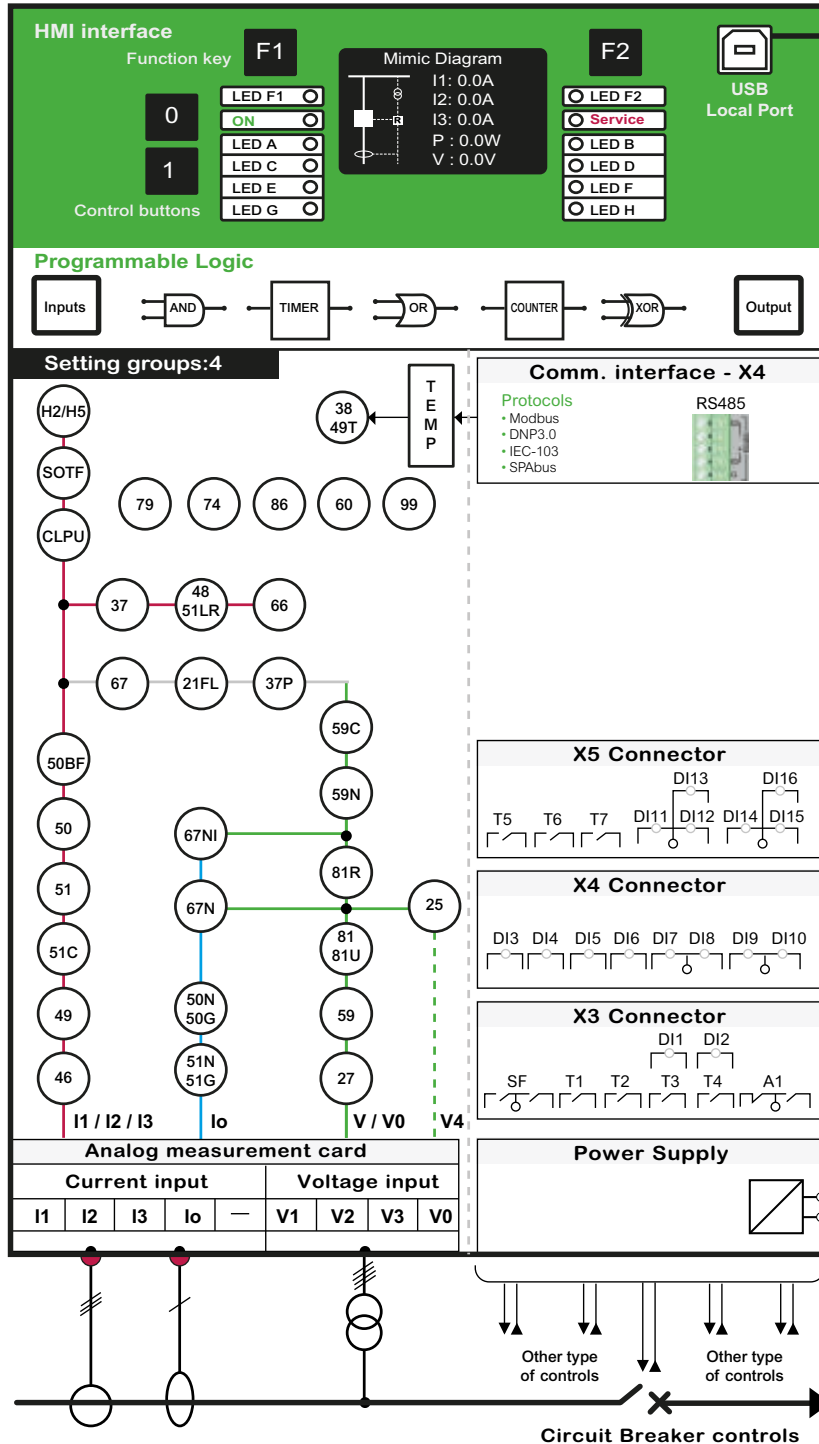
Serial Ports

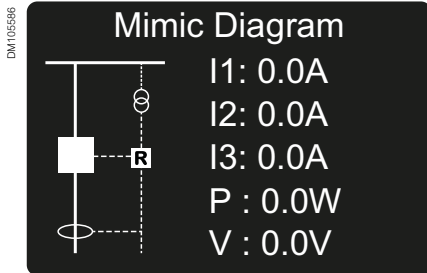
Protocol	IEC 60870-5-103	DeviceNet	Profibus	SPAbus
Real time data				
Measurement	•	•	•	•
Alarms and status	•	•	•	•
Controls	•	•	•	•
Time-stamped events	•	•	•	•
Historical data				
Disturbance records	•	-	-	-
Sequence of event record files	•	-	-	-
Setting management				
Setting group change	•	•	•	•
Settings	-	-	-	•

Ethernet or Serial ports

Protocol	DNP3	IEC 60870-5-101	Modbus
Real-time data			
Measurement	•	•	•
Alarms and status	•	•	•
Controls	•	•	•
Time-stamped events	•	•	•
Setting management			
Setting group change	•	•	•







Single-line diagram of the power system

Comprehensive data for fast and easier operation

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

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

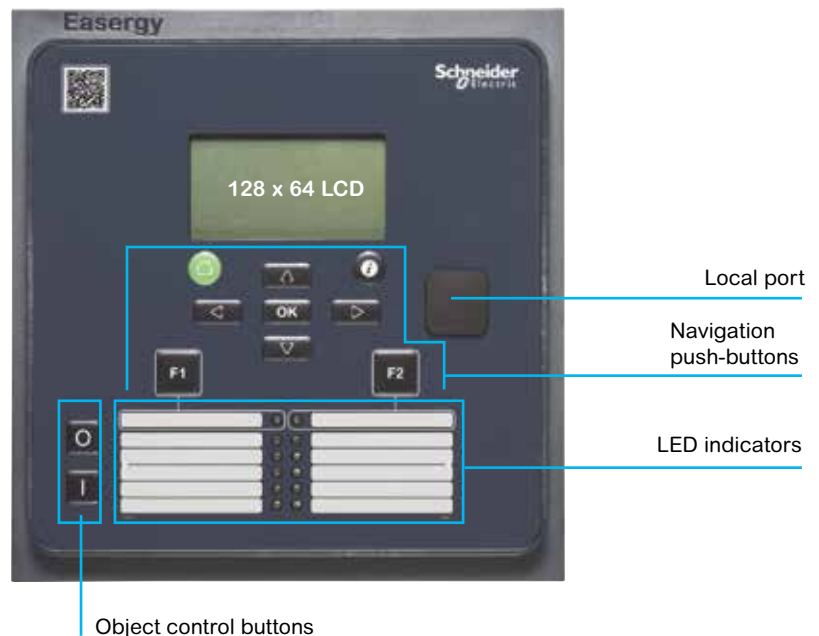
Ergonomic data presentation

- Keypad keys identified by pictograms for intuitive navigation
- Graphical 128x64 LCD screen to display any character or symbol
- Excellent display quality under all lighting conditions
- Control buttons (0/1) to operate the circuit breaker and/or other controlled object
- 8 freely programmable LEDs to identify easily the message showed
- Labels are printed on a transparent film allowing customization of the relay
- Programmable function key (F1 / F2)

Front panel: Control and push-buttons

	INFO push-button for viewing additional information, entering the password view, and adjusting the LCD contrast
F1	Programmable function push-button
F2	Programmable function push-button
OK	ENTER push-button for activating or confirming a function
	UP navigation push-button for moving up in the menu or increasing a numerical value
	DOWN navigation push-button for moving down in the menu or decreasing a numerical value
	LEFT navigation push-button for moving backwards in a parallel menu or selecting a digit in a numerical value
	RIGHT navigation push-button for moving forwards in a parallel menu or selecting a digit in a numerical value
	Circuit breaker OFF push-button
	Circuit breaker ON push-button
	HOME/CANCEL push-button for returning to the previous menu. To return to the first menu item in the main menu, press the button for at least three seconds

PM106367



Working language

All the texts and messages displayed on the Easergy P3U are available in two languages at the same time. Consult us for availability.

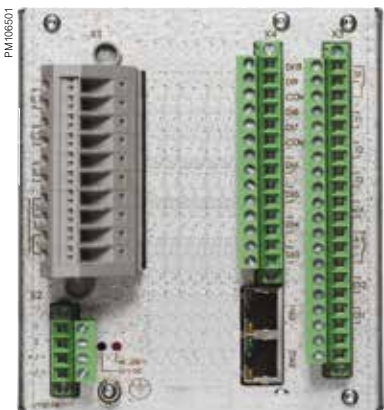
Base unit presentation

Rear panel connections

Rear panels views



Easergy P3U10

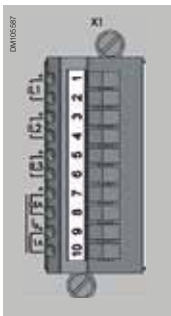


Easergy P3U20

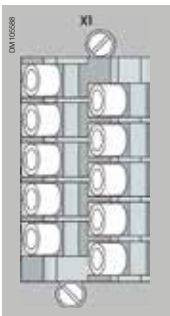


Easergy P3U30

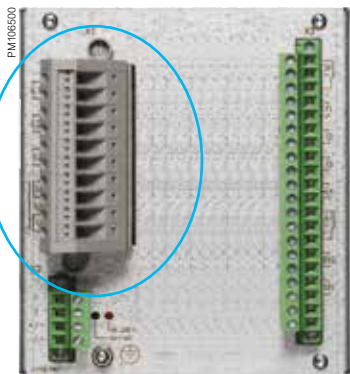
Withdrawable connectors



Optional terminal X1:
Screw clamp connector



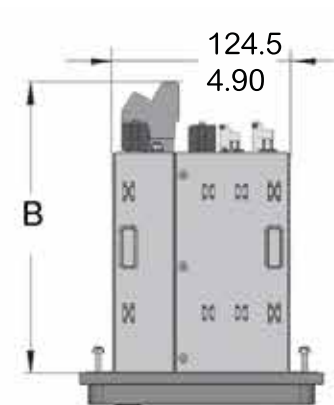
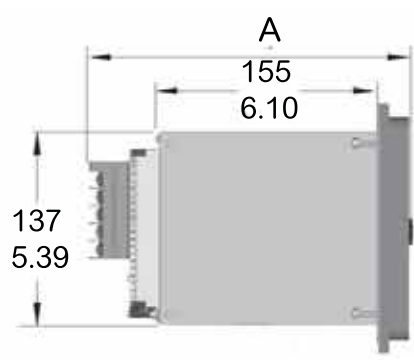
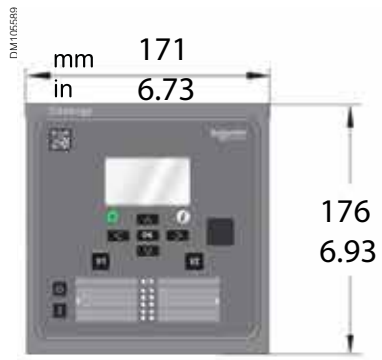
Optional terminal X1:
Ring-lug connector



Withdrawable CT connector with shorting

Base unit dimensions

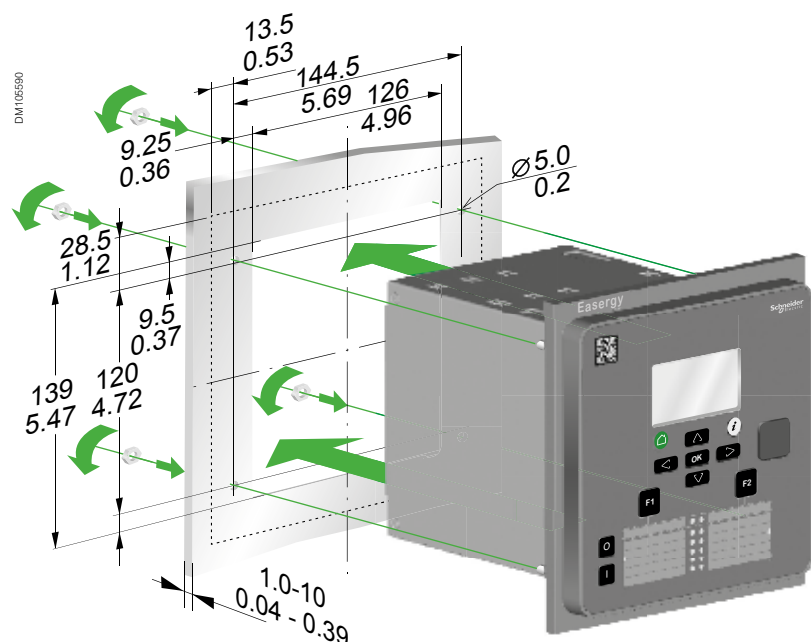
Dimensions



	A	B
With screw connector	214 mm / 8.43"	192 mm / 7.6"
With ring-lug connector	226 mm / 8.90"	204 mm / 8.0"

Cut-out and mounting

Cut-out accuracy must be complied with to ensure good withstand.



Weight (maximum)
Easergy P3U10 / P3U20 / P3U30 2.5 Kg (5.519 lb)
Degree of protection (IEC 60529)
IP54 Front panel / IP20 Rear side

Analog inputs

	Measuring range	Input Impedance	Consumption	Rated thermal withstand	1-second overload	10-second overload
Phase Current Input 5A CT Configurable for CT secondaries 1 to 10A	0.05 – 250 A	0.003 Ohm	0.075 VA	20 A (Continuously)	500 A	100 A
Residual Current Input (IO) 5A CT Configurable for CT secondaries 0.1 to 10A	0.015 – 50 A	0.003 Ohm	0.075 VA	20 A (Continuously)	500 A	100 A
Residual Current Input (IO) 1A CT Configurable for CT secondaries 0.1 to 10.0A	0.003 – 10 A	0.02 Ohm	0.02 VA	4 A (Continuously)	100 A	20 A
Residual Current Input (IO) 0.2A CSH sensor Configurable for CT secondaries 0.1 to 10.0A	0.0006 – 2 A	0.02 Ohm	0.02 VA	0.8 A (Continuously)	20 A	4 A
Voltage Input Configurable for VT secondaries 50 to 120V	0.5 – 190 V (100 V / 110 V)	n.a.	< 0.5 VA	100 V	250V (Continuously)	600 V

Analog temperature input and Analog output

Type of temperature sensor	Pt100	Ni100	Ni120	Cu10
Maximum distance between sensor and module	up to 2,000 m ⁽¹⁾	up to 2,000 m ⁽¹⁾	up to 2,000 m ⁽¹⁾	up to 2,000 m ⁽¹⁾
Analog Output	0 mA			
Minimum current	20 mA			
Maximum current				
Operating temperature:	0°C (32°F) to +55°C (131°F)			
Power supply	24 to 230 Vac/dc, 50/60 Hz			
	24 Vdc			
	48 to 230 ac/dc, 50/60 Hz			

Digital Input⁽²⁾

Nominal operation voltage	DI1 to DI16	24 to 230 V ac/dc	110 to 230 V ac/dc	220 to 230 V ac/dc
Typical switching threshold		12 V dc	75 V dc	155 V dc
Input limit voltage	At state 1	≥ 19.2 V dc	≥ 88 V dc	≥ 176 V dc
	At state 0	< 10.0 V dc	< 60 V dc	< 140 V dc
Frequency		45 to 65 Hz	45 to 65 Hz	45 to 65 Hz
Typical consumption		<4 mA (typical approx. 3 mA)		
Voltage withstand		255 V ac/dc		

Digital Output⁽²⁾

Type of contact		Control and Trip contact, Tx	Signal contact, A1	Signal Contact, SF
Rated Voltage		250 V ac/dc	250 V ac/dc	250 V ac/dc
Continuous current		5 A	5 A	5 A
Breaking capacity	AC	2.000 VA	2.000 VA	2.000 VA
	DC (L/R=40ms)	at 48 V dc	1 A	1 A
		at 110 V dc	0.3 A	0.3 A
		at 220 V dc	0.15 A	0.15 A
Making capacity	< 0.5 s	30 A	30 A	-
	< 3.0 s	15 A	15 A	-
Minimum making capacity		100 mA @ 24 Vac/dc	100 mA @ 24 Vac/dc	100 mA @ 24 Vac/dc
Typical operation time		<8 ms	-	-
Contact material		AgNi 90/10	AgNi 0.15 gold plated	AgNi 0.15 gold plated

Power supply

Nominal Voltage		48 to 230 Vac/dc	24 Vdc
Range		-20% / +10% (40 to 253 Vac/dc)	-20% / +20% (19.2 to 28.8 Vdc)
Inrush current (DC)		25 A with time constant of 1000 µs	
		25 A with time constant of 750 µs	
		15 A with time constant of 500 µs	
Power consumption	Normal conditions	<15 W (<30 VA)	
	Output relays activated	<25 W (<50 VA)	
Acceptable momentary outages		<50 ms (110 V dc)	

(1) 78,750 in

(2) P3U20: 10DI+5DO+SF
P3U30: 16DI+8DO+SF

Electromagnetic compatibility

	Standard and test class/level	Test value
Emission tests		
Conducted	EN 55022, Class A / CISPR 22	0.15 – 30 MHz
Emitted	EN 55011, Class A / CISPR 11	30 – 1000 MHz
Immunity		
1 Mhz damped oscillatory wave	IEC/EN 61000-4-18	±2.5kVp CM ±2.5kVp DM
Static discharge (ESD)	IEC/EN 61000-4-2 Level 4	±8 kV contact ±15 kV air
Emitted HF field	IEC/EN 61000-4-3 Level 3	80 - 2700 MHz, 10 V/m
Fast transients (EFT)	IEC/EN 61000-4-4 Level 4	±4 kV, 5/50 ns, 5 kHz
Surge	IEC/EN 61000-4-5 Level 3	±2 kV, 1.2/50 µs, CM ±1 kV, 1.2/50 µs, DM
Conducted HF field	IEC/EN 61000-4-6 Level 3	0.15 - 80 MHz, 10 Vrms
Power-frequency magnetic field	IEC/EN 61000-4-8	300 A/m (continuous) 1000 A/m 1 – 3s
Pulse magnetic field	IEC/EN 61000-4-9 Level 5	1000A/m, 1.2/50 µs
ac and dc voltage dips	IEC/EN 61000-4-29, IEC/EN 61000-4-11	0% of rated voltage - ac: ≥ 0.5 cycle - dc: ≥ 10 ms 40% of rated voltage - ac: 10 cycles - dc: 200 ms 70% of rated voltage - ac: 25 cycles - dc: 500 ms
ac and dc voltage interruptions	IEC/EN 61000-4-29, IEC/EN 61000-4-11	100% interruption - ac: 250 cycles - dc: 5 s
Voltage alternative component	IEC/EN 61000-4-17	15% of operating voltage (dc) / 10 min

Mechanical robustness

	Standard and test class/level	Test value
In operation		
Vibrations	IEC 60255-21-1, Class II / IEC 60068-2-6, Fc	1 Gn, 10 Hz – 150 Hz
Shocks	IEC 60255-21-2, Class II / IEC 60068-2-27, Ea	10 Gn / 11 ms
Seismic	IEC 60255-21-3 Method A, Class II	2G horizontal / 1G vertical , 1–35 Hz
De-energized		
Vibrations	IEC 60255-21-1, Class II / IEC 60068-2-6, Fc	2 Gn, 10 Hz – 150 Hz
Shocks	IEC 60255-21-2, Class II / IEC 60068-2-27, Ea	30 Gn / 11 ms
Bump	IEC 60255-21-2, Class II / IEC 60068-2-27, Ea	20 Gn / 16 ms

Environmental conditions

Ambient temperature, in-service	-40 – 60°C (-40 – 140°F)	
Ambient temperature, storage	-40 – 70°C (-40 – 158°F)	
Relative air humidity	< 95%, no condensation allowed	
Maximum operating altitude	2000 m (6561.68 ft)	

Environment tests

	Standard and test class/level	Test value
In operation		
Dry heat	EN / IEC 60068-2-2, Bd	70°C (158°F)
Cold	EN / IEC 60068-2-1, Ad	-40°C (-40°F)
Damp heat, cyclic	EN / IEC 60068-2-30, Db	From 25°C (77°F) to 55°C (131°F) From 93% RH to 98% RH Testing duration: 6 days
Damp heat, static	EN / IEC 60068-2-78, Cab	40°C (104°F) 93% RH Testing duration: 10 days
Change of temperature	IEC / EN 60068-2-14, Nb	Lower temp -40°C (-40°F) Upper temp 70°C (158°F) 5 cycles
In storage		
Dry heat	EN / IEC 60068-2-2, Bb	70°C (158°F)
Cold	EN / IEC 60068-2-1, Ab	-40°C (-40°F)

Safety

	Standard and test class/level	Test value
Electrical safety tests		
Impulse voltage withstand	IEC/EN 60255-27	5 kV, 1.2/50 µs, 0.5 J 1 kV, 1.2/50 µs, 0.5 J Communication
Dielectric test	IEC/EN 60255-27	2 kV, 50 Hz 0.5 kV, 50 Hz Communication
Insulation resistance	IEC/EN 60255-27	
Protective bonding resistance	IEC/EN 60255-27	
Clearance and creepage distance	Design criteria for distances as per IEC 60255-27 Annex C (pollution degree 2, overvoltage category 3)	
Power supply burden	IEC 60255-1	

Protection Elements Setting Range

Protection element	Threshold setting range	Delay time setting range
I> (51)	0.05 - 5.00 xI _N or I _{MOT}	DT 0.04 - 300.00s or IDMT (IEC EI, VI, NI, LTI...) k=0.05 - 20.0
I>> (50)	0.10 - 20.00 xI _N or I _{MOT}	DT 0.04 - 1800.00s
I>>> (50)	0.10 - 40.00 xI _N or I _{MOT}	DT 0.03 - 300.00s
I ₀ > (51N)	0.05 - 20.0 pu (I _{0Calc}) or 0.005 - 8.00 pu (I ₀)	DT 0.04 - 300.00s or IDMT (IEC EI, VI, NI, LTI...) k=0.05 - 20.0
I ₀ >> (50N)	0.05 - 20.0 pu (I _{0Calc}) or 0.01 - 8.00 pu (I ₀)	DT 0.04 - 300.00s
I ₀ >>> (50N)	0.05 - 20.0 pu (I _{0Calc}) or 0.01 - 8.00 pu (I ₀)	DT 0.04 - 300.00s
U< (27)	20 - 120% U _N	DT 0.08 - 300.00s
U<< (27)	20 - 120% U _N	DT 0.06 - 300.00s
U<<< (27)	20 - 120% U _N	DT 0.04 - 300.00s
U> (59)	50 - 150% U _N	DT 0.08 - 300.00s
U>> (59)	50 - 150% U _N	DT 0.06 - 300.00s
U>>> (59)	50 - 160% U _N	DT 0.04 - 300.00s
U ₀ > (59N)	1 - 60% U _{0N}	DT 0.3 - 300.0s
U ₀ >> (59N)	1 - 60% U _{0N}	DT 0.08 - 300.0s
U ₀ >>> (59N)	1 - 60% U _{0N}	DT 0.04 - 300.0s

Easergy P3 Standard can be connected to networks, thus providing access to the following type of data:

- Events
- Status information
- Measurements
- Control commands
- Clock synchronizing
- Settings (SPA-bus and embedded SPA-bus only)



Easergy SmartApp.



Easergy web-HMI

Main protocols

Easergy P3 Standard can be connected directly to serial and/or Ethernet protocols with two different protocols at the same time, selected by eSetup Easergy Pro software.

Communication protocols:

Serial protocols - RS232 / RS485 / serial Fiber Optic (*) port

Modbus RTU

DNP3.0

IEC 60870-5-101

IEC 60870-5-103

DeviceNet (*)

ProfibusDP (*)

SPA-Bus (*)

Ethernet protocols - RJ45 / LC port

IEC61850 ed1 & ed2

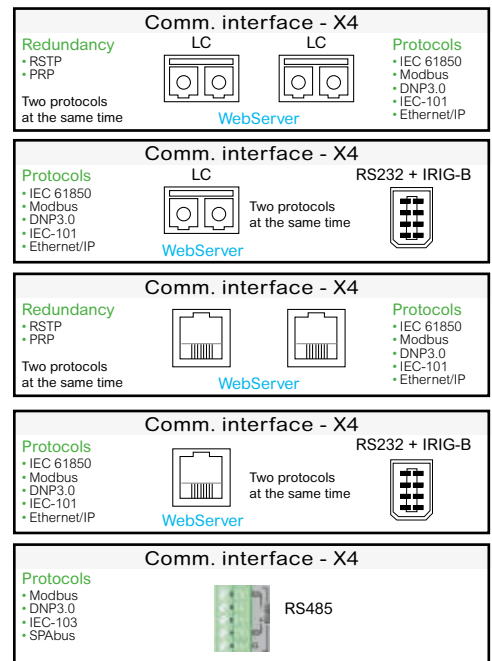
Modbus TCP

DNP3.0

IEC60870-5-101

Ethernet IP

Communication ports:



*Need external accessories to connect.

Redundancy protocols (RSTP or PRP)

When the devices are connecting in Ethernet link and demand for higher availability, Easergy P3 Standard can use Rapid Spanning Tree Protocol (RSTP) or Parallel Redundancy Protocol (PRP) to recover from a network failure.

Easergy P3 web-HMI

A webserver is available in Easergy P3 Standard to get information from the device to monitor all data, send commands, and change protection settings.

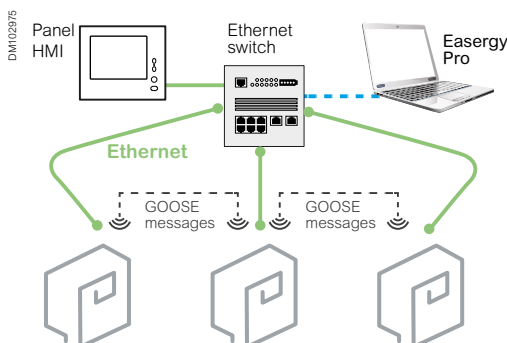
Architecture example

Switchboard internal network

This architecture allows fast GOOSE communication between Easergy protection relays of the 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 Easergy Pro.



With Easergy P3 Standard, you get intuitive functionality to protect your electrical network system.

Main CB functions are:

- Trip circuit supervision (ANSI 74)
- CT/VT supervision (ANSI 60/60FL)
- Latching (ANSI 86)
- CB close/open order
- Number of operations
- Cumulative breaking current
- Personalized functions

Maximize circuit breaker control

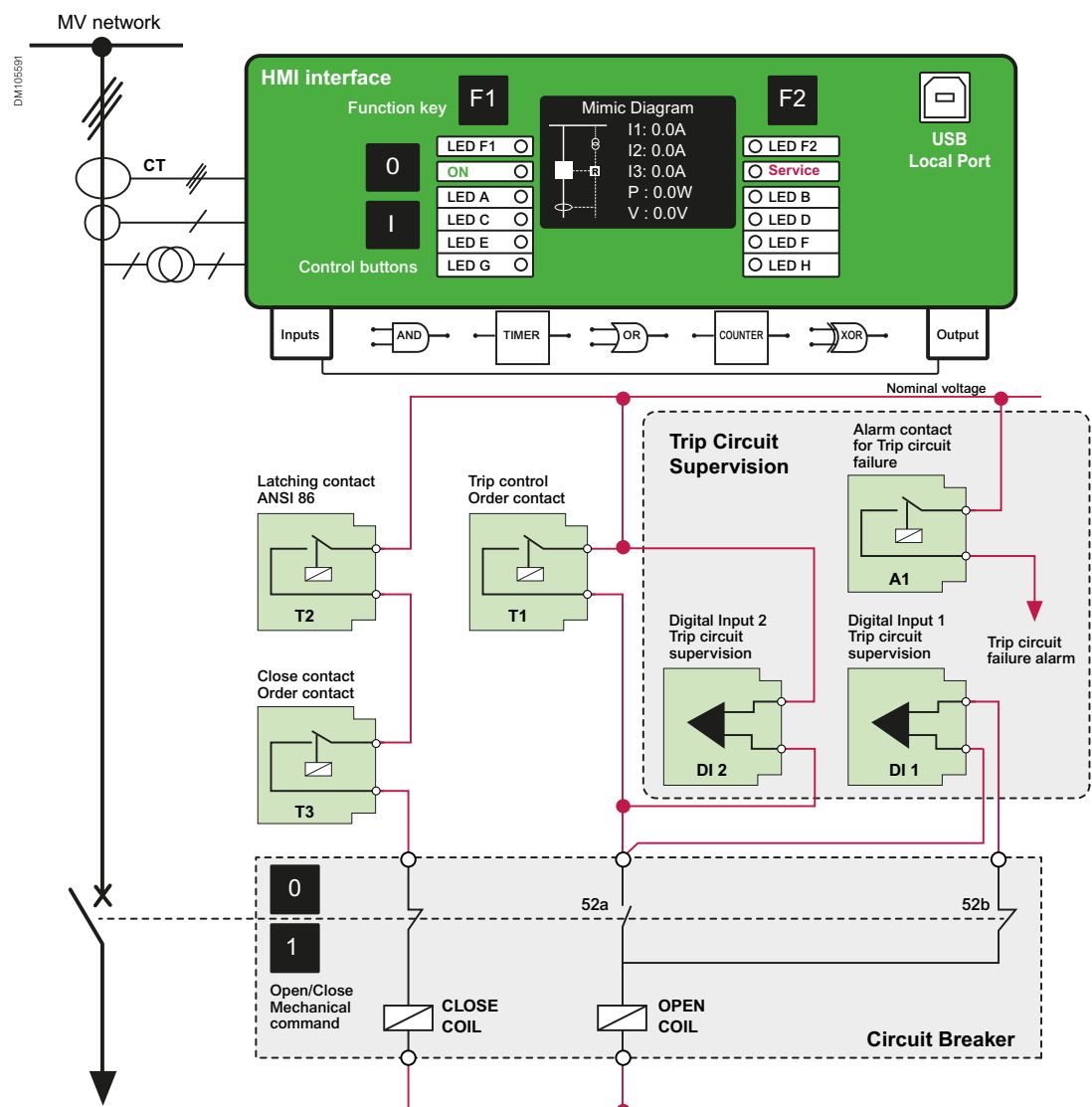
Easergy P3 Standard is a simple protection relay with a single-line diagram with control buttons (open and close), two personalized function keys, and eight configurable tricolor LEDs.

You can manage the control without external or additional component.

Example of implementation

The schematic is structured for typical use in MV switchgears, 100% adapted for your use case. You are free to change the internal logic to adapt the Easergy P3 Standard to follow your needs.

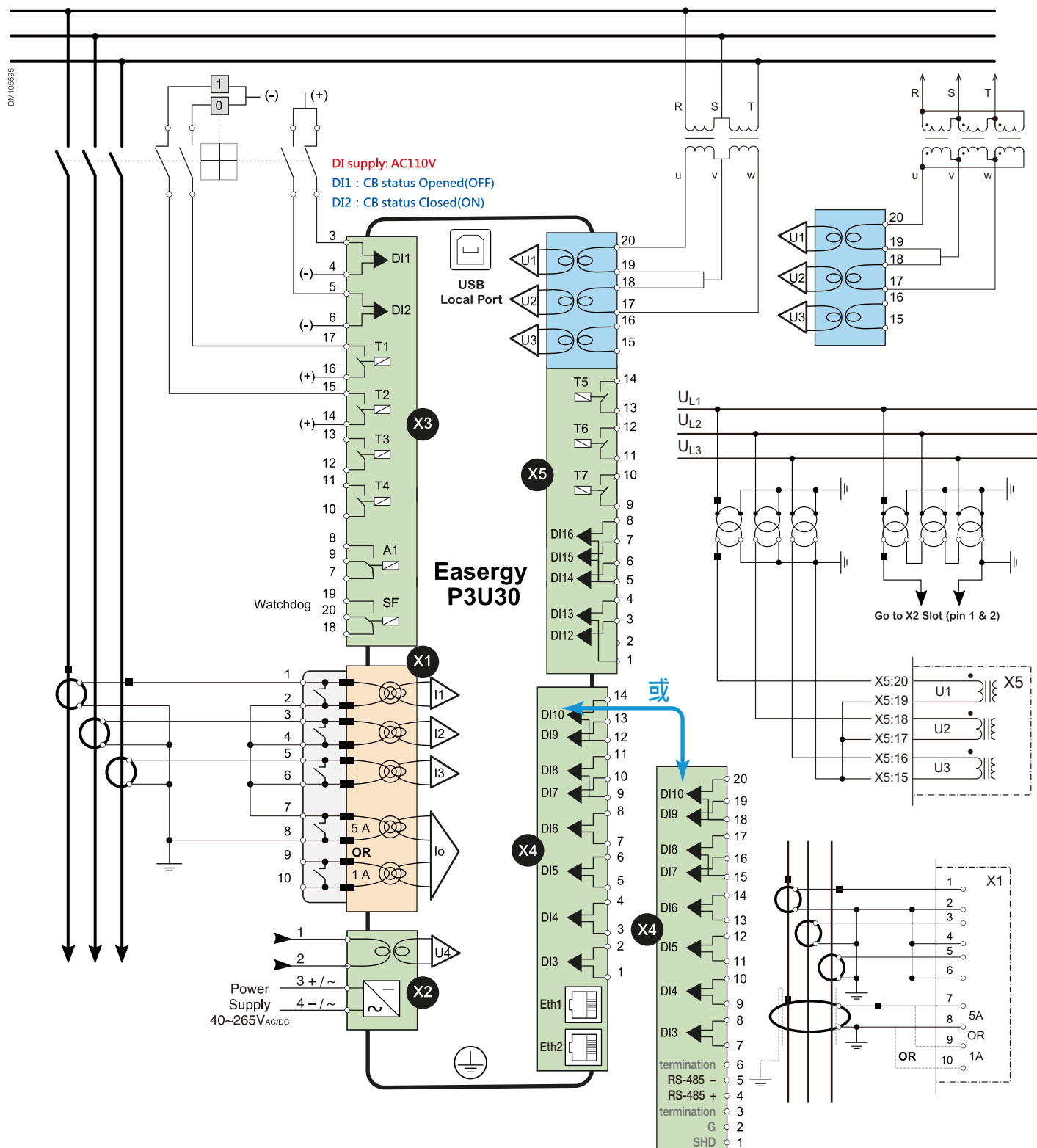
If a problem occurs, clear and complete information puts you able to make the right decisions immediately.



This electrical schematic can facilitate the IEC 61850 implementation because all the logics are determined by the protection unit that will make the decisions and if necessary can send GOOSE messages to other units.

- 14 -

Application with 3 phase CTs, 1 earth CT,
4 VTs and CB control



IEC dependent operate time

The operate time depends on the measured value and other parameters according to Equation 5.1. Actually this equation can only be used to draw graphs or when the measured value I is constant during the fault. A modified version is implemented in the relay for real time usage.

Equation 5.1:

$$t = \frac{k A}{\left(\frac{I}{I_{START}} \right)^B - 1}$$

t = Operation delay in seconds

k = User's multiplier

I = Measured value

I_{START} = Start setting

A, B = Constants parameters according

There are three different dependent delay types according to IEC 60255-3, Normal inverse (NI), Extremely inverse (EI), Very inverse (VI) and a VI extension. In addition, there is a de facto standard Long time inverse (LTI).

Table 5.3: Constants for IEC dependent delay equation

Delay type		Parameter	
		A	B
NI	Normal inverse	0.14	0.02
EI	Extremely inverse	80	2
VI	Very inverse	13.5	1
LTI	Long time inverse	120	1

Example of the delay type "Normal inverse (NI)":

$k = 0.50$

$I = 4$ pu (constant current)

$I_{PICKUP} = 2$ pu

$A = 0.14$

$B = 0.02$

$$t = \frac{0.50 \cdot 0.14}{\left(\frac{4}{2} \right)^{0.02} - 1} = 5.0$$

The operate time in this example is 5 seconds. The same result can be read from Figure 5.9

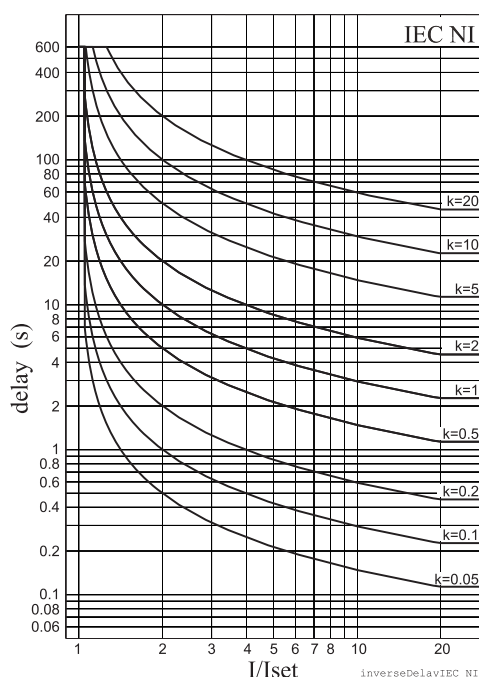


Figure 5.9: IEC normal inverse delay

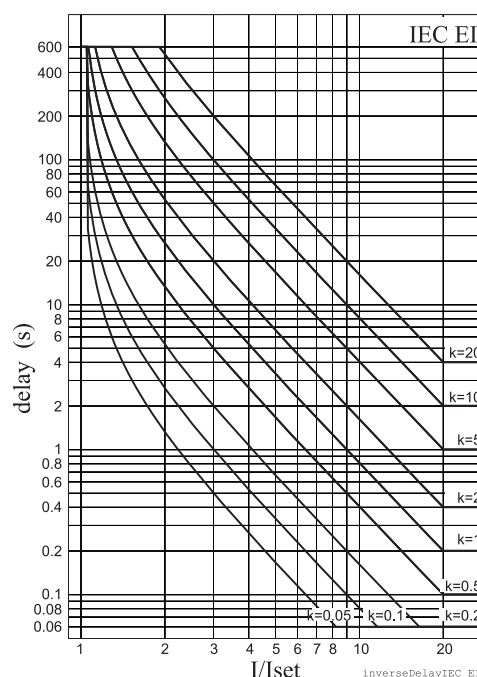


Figure 5.10: IEC extremely inverse delay

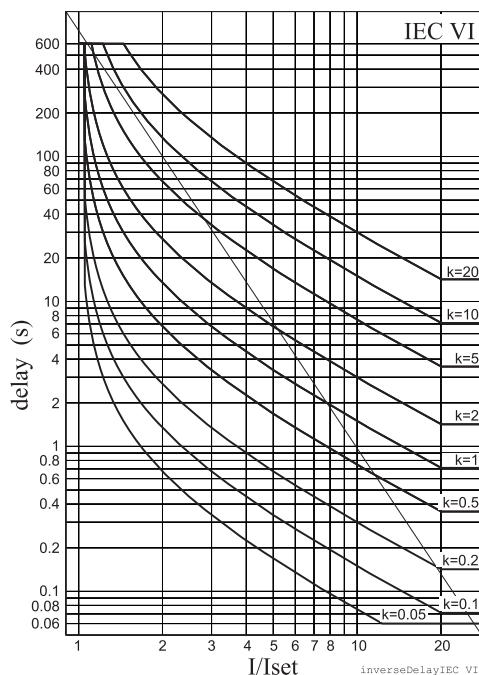


Figure 5.11: IEC very inverse delay

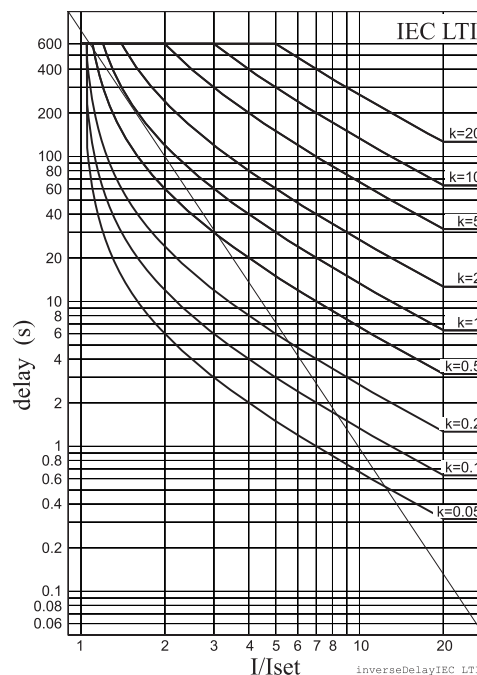


Figure 5.12: IEC long time inverse delay

Easergy P3 Standard

Easergy P3U20 configuration

	U20	Application
	U20	Feeder & Motor, 4xI, 1xU, 2DI, 5DO
X1	6	Phase currents & voltage input, X1
	5	1 A / 5 A & 1U (100/110 V), pluggable clamp connector
	6	1 A / 5 A & 1U (100/110 V), pluggable ring lug connector
X1	A	Earth-fault current input, X1
	A	1 A / 5 A
	B	0,2 A / 1 A
X2	A	Nominal Supply Voltage [V], X2
	A	Power A 48 - 230 V (range: 40 ... 265 Vac/dc)
	B	Power B 24 V (range: 18 ... 36 Vdc)
	A	Future option
	A	None
	2	Digital input treshhold voltage (V)
	1	24 Vac/dc
	2	110 Vac/dc
	3	220 Vac/dc
X5	A	Voltage measurements + I/O, X5
	A	None
X4	C	I/O with comms, X4
	B	RS-485 + 8DI
	C	2 x RJ-45 + 8DI
	D	2 x LC + 8DI
	E	RJ + 232 + 8DI with IRIG-B
	F	LC + 232 + 8DI with IRIG-B
	A	Product version
	A	Version 2.1
	A	Region
	A	International

Easergy P3U30 configuration

	U30	Application
	U30	Feeder & Motor, 4xI, 4xU, 2DI, 5DO
X1	6	Phase currents & voltage input, X1
	5	1 A / 5 A & 1U (100/110 V), pluggable clamp connector
	6	1 A / 5 A & 1U (100/110 V), pluggable ring lug connector
X1	A	Earth-fault current input, X1
	A	1 A / 5 A
	B	0,2 A / 1 A
X2	A	Nominal Supply Voltage [V], X2
	A	Power A 48 - 230 V (range: 40 ... 265 Vac/dc)
	B	Power B 24 V (range: 18 ... 36 Vdc)
	A	Future option
	A	None
	2	Digital input treshhold voltage (V)
	1	24 Vac/dc
	2	110 Vac/dc
	3	220 Vac/dc
X5	B	Voltage measurements + I/O, X5
	B	3U (100 / 110 V) + 6DI + 3DO
X4	C	I/O with comms
	B	RS-485 + 8DI
	C	2 x RJ-45 + 8DI
	D	2 x LC + 8DI
	E	RJ + 232 + 8DI with IRIG-B
	F	LC + 232 + 8DI with IRIG-B
	A	Product version
	A	Version 2.1
	A	Region
	A	International

1. Choose your option

2. Report your choice on the case

3. Check your order code:

Easergy P3	U20	6	A	A	A	2	A	C	A	A	Ethernet (for IEC61850 use)
Slot numbers	X1	X1	X2				X5	X4			
Easergy P3	U20	6	A	A	A	2	A	B	A	A	RS-485 (for Modbus use)
Slot numbers	X1	X1	X2				X5	X4			
Easergy P3	U30	6	A	A	A	2	B	C	A	A	Ethernet (for IEC61850 use)
Slot numbers	X1	X1	X2				X5	X4			
Easergy P3	U30	6	A	A	A	2	B	B	A	A	RS-485 (for Modbus use)
Slot numbers	X1	X1	X2				X5	X4			

Arc point sensors

Comm. Ref	Description	Used on
REL52801	VA1DA-20	Arc sensor 20 m
REL52802	VA1DA-20S-HF	Arc sensor 20 m shielded halogen free
REL52803	VA1DA-20S	Arc sensor 20 m shielded
REL52804	VA1DA-6	Arc sensor 6 m connect cable
REL52805	VA1DA-6S-HF	Arc sensor 6 m shielded halogen free
REL52806	VA1DA-6S	Arc sensor 6 m shielded
REL52807	VA1EH-20	Arc sensor 20 m pipe sensor
REL52808	VA1EH-20S	Arc sensor 20 m pipe sensor shielded
REL52809	VA1EH-6	Arc sensor 6m pipe sensor
REL52810	VA1EH-6S	Arc sensor 6m pipe sensor shielded

P3F3x / P3M3x
P3T3x / P3G3x

RTD Modules

Comm. Ref	Description	Used on
REL52811	VIO12AASE	24-230 V RTD module 12 RTD inputs Optical Tx
REL52812	VIO12ABSE	24-230 V RTD module 12 RTD inputs RS485
REL52813	VIO12ACSE	24V _{DC} RTD module 12 RTD inputs 4/4 mA IN/OUT
REL52814	VIO12ADSE	48-230 V RTD module 12 RTD inputs 4/4 mA IN/OUT

P3Ux0 / P3F3x
P3L3x / P3M3x
P3T3x / P3G3x

Communication Port

Comm. Ref	Description	Used on
REL52815	VPA3CGSE	Profibus interface module
REL52820	VSE002	RS485 module
REL52821	VSE009	DeviceNet module

P3Ux0 / P3F3x
P3L3x / P3M3x
P3T3x / P3G3x

Fiber optic modules

Reference	Description	Used on
REL52816	VSE001-GGSE	Fiber optic module (Glass - Glass)
REL52817	VSE001-GPSE	Fiber optic module (Glass - Plastic)
REL52818	VSE001-PGSE	Fiber optic module (Plastic - Glass)
REL52819	VSE001-PPSE	Fiber optic module (Plastic - Plastic)

P3Ux0 / P3F3x
P3L3x / P3M3x
P3T3x / P3G3x

Others accessories

Reference	Description	Used on
REL52822	USB cable	USB programming cable (Easergy Pro)
REL52828	VYX001	Mounting plate for arc sensor Z-shape
REL52829	VYX002	Mounting plate for arc sensor L-shape
REL52831	VYX301	Wall fastening module for VSE00x
REL52832	Raising frame	Raising frame, 45 mm
REL52823	VX067	Split cable for COM 1-2 & COM 3-4 ports
REL52824	VX072	Profibus cable
REL52834	Raising frame	Raising frame, 45 mm
REL52833	P3UPSC	Panel Seal Cover
REL52825	VX082	RS232 - VSE (1xD9) cable
REL52826	VX083	RS232 - Remote/Ext. (3xD9) cable
REL52827	VX084	RS232 - VPA 3CG cable (Profibus)

P3Ux0 / P3F3x
P3L3x / P3M3x
P3T3x / P3G3x

P3F3x
P3L3x / P3M3x
P3T3x / P3G3x

P3Ux0

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