

NA90 PHASE & RESIDUAL OVERCURRENT, PHASE & GROUND DIRECTIONAL,
THERMAL IMAGE, PHASE UNDER/OVERVOLTAGE, RESIDUAL OVERVOLTAGE
WITH TWO INDEPENDENT RESIDUAL CURRENT INPUTS

□ Application

The relay type NA90 can be typically used in radial or meshed MV and LV networks as feeder or power transformer protection:

- On radial, ring and parallel feeders of any length in solidly grounded, ungrounded, Petersen coil and/or resistance grounded systems.
- On parallel connected generators and transformer on the same busbar.
- For ground fault protection on both sides of power MV-LV transformers.

Moreover undervoltage, overvoltage and automatic reclosing functions are provided.

□ Protective functions

27 Undervoltage

49 Thermal image (for lines and transformers)

50/51 Phase overcurrent

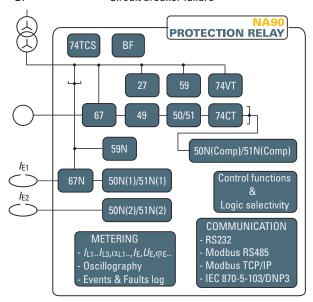
50N(1)/51N(1) Measured residual overcurrent 50N(2)/51N(2) Measured residual overcurrent 50N(Comp)/51N(Comp) Computed residual overcurrent

59 Overvoltage

59N Residual overvoltage

67 Directional phase overcurrent 67N Directional earth fault overcurrent

79 Automatic reclosing BF Circuit breaker failure



☐ Firmware updating

The use of flash memory units allows on-site firmware updating.

Measuring inputs

- Three phase current inputs and one residual current input (I_{E1}), with nominal currents independently selectable at 1 A or 5 A through DIP-switches.
- One residual current input (/E2), with nominal current at 1 A.
- Three phase voltage inputs with programmable nominal voltages within range 50...130 V (U_R = 100 V) or 200...520 V (U_R = 400 V).

□ Construction

According to the hardware configurations, the NA90 protection relay can be shipped in various case styles depending on the required mounting options (flush, projecting mounting, rack or with separate operator panel).





■ Modular design

In order to extend I/O capability, the NA90 hardware can be customized through external auxiliary modules:

- MRI Output relays and LEDs
- . MID16 Binary inputs
- MCI 4...20 mA converters
- MPT Pt100 thermal probes.



Binary inputs

Two binary inputs are available with programmable active state (active-ON/active-OFF) and programmable timer (active to OFF/ON or ON/OFF transitions).

Several presettable functions can be associated to each input.

□ Blocking input/outputs

One output blocking circuit and one input blocking circuit are provided.

The output blocking circuits of one or several Pro_N relays, shunted together, must be connected to the input blocking circuit of the protection relay, which is installed upstream in the electric plant. The output circuit works as a simple contact, whose condition is detected by the input circuit of the upstream protection relay.

Use of suitable pilot wire to fiber optic converters (BFO) allows to perform fast and reliable accelerated logic selectivity on radial and closed ring networks.

□ Output relays

Six output relays are available (two changeover, three make and one break contacts); each relay may be individually programmed as normal state (normally energized, de-energized or pulse) and reset mode (manual or automatic).

A programmable timer is provided for each relay (minimum pulse width). The user may program the function of each relay according to a matrix (tripping matrix) structure.

■ MMI (Man Machine Interface)

The user interface comprises a membrane keyboard, a backlight LCD alphanumeric display and eight LEDs.

The green ON LED indicates auxiliary power supply and self diagnostics, two LEDs are dedicated to the Start and Trip (yellow for Start, red for Trip) and five red LEDs are user assignable.



□ Communication

Multiple communication interfaces are implemented:

- One RS232 local communication front-end interface for communication with ThySetter setup software.
- Two back-end interfaces for communication with remote monitoring and control systems by:
- RS485 port using ModBus® RTU, IEC 60870-5-103 or DNP3 protocol.
- Ethernet port (RJ45 or optical fiber) using ModBus/TCP protocol.

Programming and settings

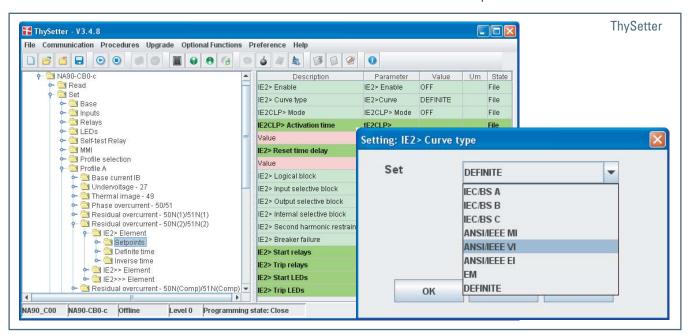
All relay programming and adjustment operations may be performed through MMI (Keyboard and display) or using a Personal Computer with the aid of the ThySetter software.

The same PC setup software is required to set, monitor and configure all Pro_N devices.

Full access to the available data is provided:

- Read status and measures.
- Read/edit settings (on-line or off-line edit).

Two session level (User or Administrator) with password for sensible data access are provided.





□ Control and monitoring

Several predefined functions are implemented:

- · Activation of two set point profiles.
- Phase CTs and VTs monitoring (74CT and 74VT).
- · Logic selectivity.
- Cold load pickup (CLP) with block or setting change.
- Trip circuit supervision (74TCS).
- Second harmonic restraint (inrush).
- · Remote tripping.
- · Circuit Breaker commands and diagnostic.

User defined logic may be customized according to IEC 61131-3 standard protocol (PLC).

Circuit Breaker

Several diagnostic, monitoring and control functions are provided:

- Health thresholds can be set; when the accumulated duty (ΣI or ΣI²t), the number of operations or the opening time exceeds the threshold an alarm is activated.
- Breaker failure (BF); breaker status is monitored by means 52a-52b and/or through line current measurements.
- Trip circuit supervision (74TCS).
- Breaker control; opening and closing commands can be carried out locally or remotely.

Cold Load Pickup (CLP)

Cold load pickup element prevents unwanted tripping in case of temporary overcurrents produced when a feeder is being connected after an extended outage (e.g. motor starting).

Two different operating modes are provided:

- Each protective element may be blocked for a programmable time.
- Each threshold can be increased for a programmable time.

Second harmonic restraint

To prevent unwanted tripping of the protective functions on transformer inrush current, the protective elements can be blocked when the ratio between the second harmonic current and the relative fundamental current is larger than a user programmable threshold.

The function can be programmed to switch an output relay so as to cause a blocking protection relays lacking in second harmonic restraint.

Logic selectivity

With the aim of providing a fast selective protection system some protective functions may be blocked (pilot wire accelerated logic). To guarantee maximum fail-safety, the relay performs a run time monitoring for pilot wire continuity and pilot wire shorting. Exactly the output blocking circuit periodically produces a pulse, having a small enough width in order to be ignored as an effective blocking signal by the input blocking circuit of the upstream protection, but suitable to prove the continuity of the pilot wire.

Furthermore a permanent activation (or better, with a duration longer than a preset time) of the blocking signal is identified, as a warning for a possible short circuit in the pilot wire or in the output circuit of the downstream protection.

■ Self diagnostics

All hardware and software functions are repeatedly checked and any anomalies reported via display messages, communication interfaces, LEDs and output relays.

Anomalies may refer to:

- Hw faults (auxiliary power supply, output relay coil interruptions, MMI board...).
- Sw faults (boot and run time tests for data base, EEPROM memory checksum failure, data BUS,...).
- · Pilot wire faults (break or short in the wire).
- · Circuit breaker faults.

■ Metering

NA90 provides metering values for phase and residual currents, phase and residual voltage, making them available for reading on a display or to communication interfaces.

Input signals are sampled 24 times per period and the RMS value of the fundamental component is measured using the DFT (Discrete Fourier Transform) algorithm and digital filtering.

With DFT the RMS value of 2nd, 3rd, 4th and 5th harmonic of phase current are also measured.

On the base of the direct measurements, several calculated (min, max, average,...), phase, sequence, power, harmonic, demand and energy measures are processed.

Measures can be displayed with reference to nominal values or directly expressed in amperes and volts.

□ Event storage

Several useful data are stored for diagnostic purpose; the events are stored into a non volatile memory.

They are graded from the newest to the older after the "Events reading" command (ThySetter) is issued:

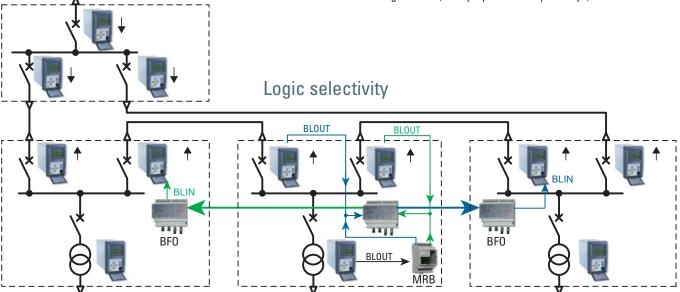
- Sequence of Event Recorder (SER).

 The event recorder rupe centique
 - The event recorder runs continuously capturing in circular mode the last three hundred events upon trigger of binary input/output.
- Sequence of Fault Recorder (SFR).
 - The fault recorder runs continuously capturing in circular mode the last twenty faults upon trigger of binary input/output and/or element pickup (start-trip).
- Trip counters.

□ Digital Fault Recorder (Oscillography)

Upon trigger of tripping/starting of each function or external signals, the relay records in COMTRADE format:

- Oscillography with instantaneous values for transient analysis.
- RMS values for long time periods analysis.
- Logic states (binary inputs and output relays).



THYTRONIC

SPECIFICATIONS

	GENERAL		INPUT CIRCUITS
	Mechanical data Mounting: flush, projecting, rack or separated operator panel Mass (flush mounting case) 2.0 kg		Nominal value (range) 2448 Vac/dc 115230 Vac/110220 Vdc Operative range (each one of the above nominal values) 1960 Vac/dc
П	$\begin{array}{lll} \textbf{Insulation tests} \\ \textbf{Reference standards} & \textbf{EN 60255-5} \\ \textbf{High voltage test 50Hz} & 2 \text{ kV 60 s} \\ \textbf{Impulse voltage with stand (1.2/50 } \mu\text{s}) & 5 \text{ kV} \\ \textbf{Insulation resistance} & >100 \text{M}\Omega \\ \end{array}$	_	85265 Vac/75300 Vdc Power consumption: • Maximum (energized relays, Ethernet TX) • Maximum (energized relays, Ethernet FX) 10 W (20 VA) 15 W (25 VA)
_	Voltage dip and interruption Reference standards EN 61000-4-29		Phase current inputs Nominal current I_n 1 A or 5 A selectable by DIP Switches Permanent overload Thermal overload (1s) Rated consumption (for any phase)
	EMC tests for interference immunity 1 MHz damped oscillatory wave EN 60255-22-1 1 kV-2.5 kV Electrostatic discharge EN 60255-22-2 8 kV Fast transient burst (5/50 ns) EN 60255-22-4 4 kV Conducted radio-frequency fields EN 60255-22-6 10 V Radiated radio-frequency fields EN 60255-4-3 10 V/m High energy pulse EN 61000-4-5 2 kV Magnetic field 50 Hz EN 61000-4-8 1 kA/m Damped oscillatory wave EN 61000-4-12 2.5 kV Ring wave EN 61000-4-12 2 kV Conducted common mode (0150 kHz) EN 61000-4-16 10 V		Nominal current I_{En} 1 A or 5 A selectable by DIP Switch Permanent overload 25 A Thermal overload (1s) 500 A Rated consumption $\leq 0.006 \text{ VA} \ (I_{En} = 1 \text{ A}) \leq 0.012 \text{ VA} \ (I_{En} = 5 \text{ A})$ Residual current input I_{En} 1 A
	Emission Reference standards EN 61000-6-4 (ex EN 50081-2) Conducted emission 0.1530 MHz Class A Radiated emission 301000 MHz Class A		
	Climatic tests Reference standards IEC 60068-x, ENEL R CLI 01, CEI 50 Mechanical tests Reference standards EN 60255-21-1, 21-2, 21-3		Reference voltage $U_{\rm R}$ Nominal voltage $U_{\rm n}$ 50130 V or 200520 V adjustable via sw Permanent overload 1.3 $U_{\rm R}$ 2 $U_{\rm R}$
			Rated consumption (for any phase) ≤ 0.5 VA Binary inputs
	Safety requirements Reference standards EN 61010-1 Pollution degree 3 Reference voltage 250 V		Quantity 2 Type dry inputs Max permissible voltage 19265 Vac/19300 Vdc Max consumption, energized 3 mA
	Overvoltage III Pulse voltage 5 kV Reference standards EN 60529 Protection degree: • Front side IP52		Block input (Logic selectivity) Quantity 1 Type polarized wet input (powered by internal isolated supply) Max consumption, energized 5 mA
_	Rear side, connection terminals IP20 Environmental conditions		OUTPUT CIRCUITS Output relays K1K6
	Ambient temperature -25+70 °C Storage temperature -40+85 °C Relative humidity 1095 % Atmospheric pressure 70110 kPa		Ouantity • Type of contacts K1, K2 • Type of contacts K3, K4, K5 • Type of contacts K6 Nominal current
	Certifications Product standard for measuring relays CE conformity • EMC Directive • Low Voltage Directive Type tests Certifications EN 50263 EN 5		Nominal voltage/max switching voltage Breaking capacity: • Direct current (L/R = 40 ms) 50 W • Alternating current (λ = 0,4) 1250 VA Make 1000 W/VA Short duration current (0,5 s) 30 A
	COMMUNICATION INTERFACES		Quantity 1
	Local PC RS232 19200 bps Network: RS485 120057600 bps Ethernet 100BaseT 100 Mbps Protocol ModBus® RTU/IEC 60870-5-103/DNP3-TCP/IP		Type optocoupler LEDs 8 Quantity 8 • ON/fail (green) 1 • Start (yellow) 1 • Trip (red) 1 • Allocatable (red) 5



U<< Element **GENERAL SETTINGS** Definite time • 27 Second threshold definite time (U<<def) 0.05...1.10 U_n/E_n □ Rated values • U<<def Operating time (tu<<def) 0.03...100.0 s 50, 60 Hz Relay nominal frequency (f_n) Relay phase nominal current (I_n) 1 A. 5 A Note 1: With U_{ph-ph} setting all threshold are in p.u. U_n Phase CT nominal primary current (I_{np}) 1 A...10 kA with U_{ph-n} setting all threshold are in p.u. E_n Relay residual nominal current (IE1n) 1 A, 5 A Note 2: The mathematical formula for INVERSE curves is:: Relay residual nominal current (IE2n) 1 A Residual CT nominal primary current (IE1np) 1 A...10 kA $t = 0.75 \cdot t_{\text{U}} <_{\text{inv}} / [1 - (U/U <_{\text{inv}})]$ Residual CT nominal primary current (IE2np) 1 A...10 kA where: t = operating time (in seconds) Relay nominal voltage (phase-to-phase) (U_n) 50...130 V or 200...520 V $t_{U}<_{inv}$ = operating time setting (in seconds) Relay nominal voltage (phase-to-ground) $E_n = U_n/\sqrt{3}$ U = input voltage Line VT primary nominal voltage (phase-to-phase) (U_{np}) 50 V..500 kV U<inv = threshold setting Relay residual nominal voltage (computed measure) (U_{ECn}) $U_{\text{ECn}} = \sqrt{3} \cdot U_{\text{n}} = 3 \cdot E_{\text{n}}$ ☐ Thermal image - 49 Residual primary nominal voltage (phase-to-phase) $\cdot \sqrt{3}$ ($U_{\rm Enp}$) Common configuration: 50 V...500 kV • Initial thermal image $\Delta\theta_{IN}$ (Dth_{IN}) $0.0...1.0 \Delta \theta_{B}$ Relay nominal active power (P_n) $P_n = \sqrt{3} \cdot U_n \cdot I_n = 3 \cdot E_n \cdot I_n$ Reduction factor at inrush (KINR) 1.0...3.0 Relay nominal reactive power (Q_n) $Q_n = \sqrt{3} \cdot U_n \cdot I_n = 3 \cdot E_n \cdot I_n$ • Thermal time constant τ (T) 1...200 min Relay nominal apparent power (S_n) $S_n = \sqrt{3} \cdot U_n \cdot I_n = 3 \cdot E_n \cdot I_n$ DthIN Activation time (t_{dthCLP}) 0.00...100.0 s ■ Binary input timers DthAL1 Element ON delay time (IN1 toN, IN2 toN) 0.00...100.0 s 49 First alarm threshold $\Delta\theta_{AL1}$ (*Dth*_{AL1}) $0.3...1.0 \Delta \theta_{B}$ OFF delay time (IN1 toff, IN2 toff) 0.00...100.0 s Active-ON/Active-OFF Logic DthAL2 Element 49 Second alarm threshold $\Delta\theta_{AL2}$ (*Dth*_{AL2}) $0.3...1.0 \Delta \theta_{B}$ □ Relay output timers Minimum pulse width 0.000...0.500 s Dth> Element 49 Trip threshold $\Delta\theta$ (*Dth*>) $1.2 \Delta \theta_B$ **FUNCTIONS** Phase overcurrent - 50/51 ■ Base current IB [1] I> Element Base current (IB) 0.10...2.50 In • I> Curve type (I>Curve) **DEFINITE** Note 1: the basic current IB represents the nominal current of the line or IEC/BS A, B, C transformer, referred to the nominal current of the CT's for thermal im-ANSI/IEEE MI, VI, EI age protection. If the secondary rated current of the line CT's equals RECTIFIER, I2t or EM the rated current ofthe relay, as usually happens, the IB value is the I_{CLP}> Activation time (t_{CLP}>) 0.00...100.0 s ratio between therated current of the protected element and the primary I> Reset time delay (t>RES) 0.00...100.0 s rated current of the CT's Definite time • 50/51 First threshold definite time (/>def) 0.100...40.0 In ☐ Thermal with PT100 thermometric probes - 26 [2] I>def within CLP (I_{CLP>def}) 0.100...40.0 In PT1 probe: I>def Operating time (t>def) 0.04...200 s Inverse time ThAL1 Alarm • 50/51 First threshold inverse time (/>inv) 0.100...40.0 *I*_n • PT1 Alarm threshold (ThAL1) 0...200 °C I>inv within CLP (I_{CLP>inv}) 0.100...40.0 In ThAL1 Operating time (t_{ThAL1}) 0...100 s I>inv Operating time (t>inv) 0.02...60.0 s • PT1 Trip threshold (Th>1) 0...200 °C I>> Element • Th>1 Operating time (t_{Th>1}) 0...100 s • Type characteristic (I>>Curve) **DEFINITE** PT2...8: probe l2t 0.00...100.0 s I_{CLP}>> Activation time (t_{CLP>>}) ThAI 2...8 Alarm • PT2...8 Alarm threshold (ThAL2...8) 0...200 °C I>> Reset time delay (t>>RES) 0.00...100.0 s • ThAL2...8 Operating time (t_{ThAL2...8}) Definite time 0...100 s 50/51 Second threshold definite time (/>>_{def}) 0.100...40.0 In Th>2...8 Trin />>def within CLP (/CLP>>def) 0.100...40.0 In 0...200 °C PT2...8 Trip threshold (*Th>2...8*) I>>def Operating time (t>>def) 0.03...10.00 s • Th>2...8 Operating time (t_{Th>2...8}) 0.100 sInverse time • 50/51 Second threshold inverse time (/>>inv) 0.100...20.00 In Note 2: the element is available when the MPT module, connected to the • />>inv within CLP (/CLP>>inv) 0.100...20.00 In Thybus, is enabled I>>_{inv} Operating time (t>>_{inv}) 0.02...10.00 s □ Undervoltage - 27 I>>> Element Common configuration: • I_{CLP>>>} Activation time (t_{CLP>>>}) 0.00...100.0 s • Voltage measurement type for 27 (Utype27) [1] $U_{\rm ph-ph}/U_{\rm ph-n}$ I>>> Reset time delay (t>>>RES) 0.00...100.0 s • 27 Operating logic (Logic27) AND/OR Definite time U< Element • 50/51 Third threshold definite time (/>>>def) 0.100...40.0 In • U< Curve type (U<Curve) **DEFINITE** I>>>def within CLP (ICLP>>>def) 0.100...40.0 In INVERSE [2] I>>>_{def} Operating time (t>>>_{def}) 0.03...10.00 s

NA90 - Flayer - 03 - 2009

I_{F1}> Element

0.05...1.10 U_n/E_n

 $0.05...1.10 U_{\rm n}/E_{\rm n}$

0.03...100.0 s

0.10...100.0 s

Residual overcurrent - 50N(1)/51N(1)

• IE1> Curve type (IE1>Curve)

Definite time

Inverse time

• 27 First threshold definite time (U<def)

• 27 First threshold inverse time (U<inv)

U<def Operating time (t_U<def)

U<_{inv} Operating time (t_U<_{inv})

DEFINITE

IEC/BS A, B, C

ANSI/IEEE MI, VI, EI



	• I _{E1CLP} > Activation time (t _{E1CLP} >)	0.00100.0 s	IFC>> Element	
	• I_{E1} > Reset time delay (I_{E1} > Res)	0.00100.0 s	 I_{ECCLP}>> Activation time (t_{ECCLP}>>) 	0.00100.0 s
	Definite time		• I _{EC} >> Reset time delay (t _{EC} >> _{RES})	0.00100.0 s
	• 50N(1)/51N(1) First threshold definite time (/E1>dei	f) 0.00210.00 / _{E1n} 0.00210.00 / _{F1n}	 Definite time 50N(Comp)/51N(Comp) Second thres. def. time (/E2>>def.) 0.10040.0 / ₀
	 I_{E1>def} within CLP (I_{E1CLP>def}) I_{E1>def} Operating time (I_{E1>def}) 	0.00210.00 /E1n 0.04200 s	• /E2>>def within CLP (/E2CLP>>def)	0.10040.0 <i>I</i> _n
	Inverse time		• $I_{E2}>_{def}$ Operating time ($I_{E2}>_{def}$)	0.0310.00 s
		• 50N(1)/51N(1) First threshold inverse time ($I_{E1}>_{inv}$) 0.0022.00 I_{E1n}		
	 I_{E1>inv} within CLP (I_{E1CLP>inv}) I_{E1>inv} Operating time (I_{E1>inv}) 	0.0022.00 / _{E1n} 0.0260.0 s	• /E2CLP>>> Activation time (te2CLP>>>)	0.00100.0 s
	I _{F1} >> Element	0.0200.0	 I_{E2CLP}>>> Reset time delay (t_{E2}>>>_{RES}) Definite time 	0.00100.0 s
	 I_{E1CLP>>} Activation time (t_{E1CLP>>}) 	0.00100.0 s	• 50N(Comp)/51N(Comp) Third thres. def. time (/E2>>>def)	0.10040.0 <i>I</i> _n
	• /E1>> Reset time delay (tE1>>RES)	0.00100.0 s	• /E2CLP>>>def within CLP (/E2CLP>>>def)	0.10040.0 / _n
	 Definite time 50N(1)/51N(1) Second threshold def. time (I_{E1}>>_{def}) 	0.002 10.00 /E1p	• / _{E2CLP} >>> _{def} Operating time (t _{E2} >>> _{def})	0.0310.00 s
	 I_{E1}>>_{def} within CLP (I_{E1CLP>>def}) 	0.00210.00 / _{E1n} 0.0310.00 s	Note 1: the computed residual current I _{EC} is employed (vector phase currents)	oriai suili oi ule
	• $I_{E1}>>_{def}$ Operating time ($t_{E1}>>_{def}$)			
	I _{E1} >>> Element	0.00 100.0	Overvoltage - 59	
	 /E1CLP>>> Activation time (tE1CLP>>>) /E1CLP>>> Reset time delay (tE1>>>RES) 	0.00100.0 s 0.00100.0 s	Common configuration: • Voltage measurement type for 59 (Utype59) [1]	$U_{\rm ph-ph}/U_{\rm ph-n}$
	Definite time	0.00100.00	• 59 Operating logic (<i>Logic</i> 59)	AND/OR
	• 50N(1)/51N(1) Third threshold def. time ($I_E >>>_{def}$)		U> Element	
	 I_{E1CLP}>>>_{def} within CLP (I_{E1CLP}>>>_{def}) I_{E1CLP}>>>_{def} Operating time (I_{E1}>>>_{def}) 	0.00210.00 <i>I</i> _{E1n} 0.0310.00 s	 U> Curve type (U>Curve) 	DEFINITE
_	- TEICLY CONTROL OF TAKING LINE (TEINS GET)	0.0010.00 3	Definite time	INVERSE [2]
	Residual overcurrent - 50N(2)/51N(2)			01.50 <i>U</i> _n / <i>E</i> _n
	I _{E2} > Element • I _{E2} > Curve type (I _{E2} >Curve)	DEFINITE	• U > _{def} Operating time (t _U > _{def})	0.03100.0 s
	7E2> Curve type (7E2>Curve)	IEC/BS A, B, C	Inverse time • 59 First threshold inverse time (U>inv) 0.5	01.50 <i>U</i> _n / <i>E</i> _n
	AN	SI/IEEE MI, VI, EI	• U >inv Operating time (t_U >inv)	0.10100.0 s
	a La caractería de Artica de Caractería de C	EM	U>> Element	
	 I_{E2CLP}> Activation time (t_{E2CLP}>) I_{E2}> Reset time delay (t_{E2}>_{RES}) 	0.00100.0 s 0.00100.0 s	Definite time	
			 59 Second threshold definite time (U>>_{def}) U>>_{def} Operating time (t_U>>_{def}) 	01.50 <i>U</i> _n / <i>E</i> _n 0.03100.0 s
	Definite time • 50N(2)/51N(2) First threshold definite time (/E2>dei	₁\n nn2 1n nn /⊏25	Note 1: With U_{ph-ph} setting all threshold are in p.u. U_n	0.03100.0 3
	• /E2>def within CLP (/E2CLP>def)	0.00210.00 /E2n	with U_{ph-n} setting all threshold are in p.u. E_n	
	• I_{E2} _{def} Operating time (t_{E2} _{def})	0.04200 s	Note 2: The mathematical formula for INVERSE curves is:	
	Inverse time • 50N(2)/51N(2) First threshold inverse time (I _{E2>inv}	.) 0 002 2 00 /525	$t = 0.5 \cdot t_{\text{U}>\text{inv}} / [1 - (U/U_{\text{>inv}})]$	
	• $I_{\text{E2}>\text{inv}}$ within CLP ($I_{\text{E2CLP}>\text{inv}}$)	0.0022.00 /E2n	where: t = operating time (in seconds)	
	• $I_{E2>_{inv}}$ Operating time ($t_{E2>_{inv}}$)	0.0260.0 s	$t_{\text{U}>\text{inv}}$ = operating time setting (in seconds)	
	I _{E2} >> Element	0.00 100.0	U = input voltage U> _{inv} = threshold setting	
	 I_{E2CLP}>> Activation time (t_{E2CLP>>}) I_{E2}>> Reset time delay (t_{E2}>>_{RES}) 	0.00100.0 s 0.00100.0 s	U> _{INV} = unesticia setting	
	Definite time	0.00100.0 3	☐ Residual overvoltage - 59N ^[1]	
	• 50N(2)/51N(2) Second threshold def. time (/E2>>def)		Common configuration: Residual voltage measurement for 59N - compute	ed <i>U</i> EC
	 /E2>>def within CLP (/E2CLP>>def) /E2>>def Operating time (/E2>>def) 	0.00210.00 <i>I</i> _{E2n} 0.0310.00 s	 59N Operating mode from 74VT internal (74VTint59) 	
	I _{E2} >>> Element	0.0010.00 3	 59N Operating mode from 74VT external (74VText55) 	
	• IE2CLP>>> Activation time (te2CLP>>>)	0.00100.0 s	U _E > Element	
	• /E2CLP>>> Reset time delay (te2>>>RES)	0.00100.0 s	 U_E> Curve type (U_E>Curve) 	DEFINITE INVERSE [2]
	 Definite time 50N(1)/51N(1) Third threshold def. time (/E2>>>def)0 002 10 00 <i>l</i> =2-	• U_{E} > Reset time delay ($t_{UE>RES}$)	0.00100.0 s
	• /E2CLP>>>def within CLP (/E2CLP>>>def)	0.00210.00 /E2n	Definite time	
	• $I_{E2CLP}>>>_{def}$ Operating time ($t_{E2}>>>_{def}$)	0.0310.00 s		0.010.70 <i>U</i> _{En} 0.07100.0 s
\Box	Residual overcurrent - 50N(Comp)/51N(Co	omn)	• $U_{E>_{def}}$ Operating time ($t_{UE>_{def}}$) Inverse time	0.07100.0 S
	I _{EC} > Element ^[1]	p,	 59N First threshold inverse time (U_{E>inv}) 	0.010.50 <i>U</i> En
	• I _{EC} > Curve type (I _{EC} >Curve)	DEFINITE	 U_E>_{inv} Operating time (t_{UE}>_{inv}) 	0.10100.0 s
	ΛΝΙ	IEC/BS A, B, C SI/IEEE MI, VI, EI	U _E >> Element U_E>> Reset time delay (t_{UE>>RES}) 	0.00100.0 s
	AN	SI/IEEE IVII, VI, EI	• 59N Second threshold definite time ($U_{\text{E}}>>_{\text{def}}$)	0.010.70 <i>U</i> En
	 I_{ECCLP}> Activation time (t_{ECCLP}>) 	0.00100.0 s	• $U_{E>>def}$ Operating time ($t_{UE}>>def$)	0.07100.0 s
	• I_{EC} > Reset time delay (t_{EC} > $_{RES}$)	0.00100.0 s	Note 1: The computed residual voltage U _{EC} is employed (vector	orial sum of the
	Definite time		phase voltages	
	• 50N(Comp)/51N(Comp) First threshold def. time (/E2>		Note 2: The mathematical formula for INVERSE curves is:	
	• /EC>def within CLP (/ECCLP>def)	0.10040.0 / _n	$t = 0.5 \cdot t_{\text{UE}>\text{inv}} / \left[(U_{\text{EC}}/U_{\text{E}}>_{\text{inv}}) - 1 \right]$ where:	
	• I _{EC>def} Operating time (t _{EC>def}) Inverse time	0.04200 s	t = operating time (in seconds)	
	• 50N(Comp)/51N(Comp) First threshold inv. time (/EC>		tue>inv = operating time setting (in seconds)	
	• /EC>inv within CLP (/ECCLP>inv)	0.10020.00 / _n	U _{EC} = computed residual voltage U _{E>inv} = threshold setting	
	 Operating time (t_{EC}>_{inv}) 	0.0260.0 s	OLYMN - amound dotting	

THYTRONIC

• 67 Operating logic (<i>Logic</i> 67) • 67 Operating mode from 74VT internal (<i>74VTint67</i>) • 67 Operating mode from 74VT external (<i>74VTint67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating mode from 74VT external (<i>74VText67</i>) • 67 Operating time (<i>1</i> PD>Curve) • 67 Operating time (<i>1</i> PD>Curve) • 67 Operating time (<i>1</i> PDCLP>) • 67 Operating time (<i>1</i> PDCLP	Affinite time N First threshold definite time ($I_{ED}>_{def}$ - $U_{ED}>_{def}$) Residual current pickup value Residual voltage pickup value Characteristic angle Half operating sector $I_{ED}>_{def}$ within CLP ($I_{EDCLP}>_{def}$) $I_{ED}>_{def}$ Operating time ($I_{ED}>_{def}$) Residual current pickup value N First threshold inverse time ($I_{ED}>_{inv}$ - $U_{ED}>_{inv}$) Residual current pickup value Residual voltage pickup value Characteristic angle Half operating sector $I_{ED}>_{inv}$ within CLP ($I_{EDCLP}>_{inv}$) $I_{ED}>_{inv}$ within CLP ($I_{EDCLP}>_{inv}$) $I_{ED}>_{inv}$ Operating time ($I_{ED}>_{inv}$) $I_{ED}>_{inv}$ Ono100 $I_{ED}>>_{inv}$ Operating time ($I_{ED}>_{inv}$) $I_{ED}>>_{inv}$ Operating time ($I_{ED}>_{inv}$) $I_{ED}>>_{inv}$ Ono100 $I_{ED}>>_{inv}$ Ono100 $I_{ED}>>_{inv}$ Ono100 $I_{ED}>>_{inv}$ Ono100 $I_{ED}>>_{inv}$ Ono100
• 67 Operating mode from 74VT internal (74VTint67) OFF/Block/Not directional • 67 Operating mode from 74VT external (74VText67) OFF/Block/Not directional IPD> Element • IPD> Curve type (IPD>Curve) OFF/Block/Not directional IPD> Element • IPD> Curve type (IPD>Curve) OFF/Block/Not directional IPD> Element • IPD> Curve type (IPD>Curve) OFF/Block/Not directional IPD> Element • IPD> Curve type (IPD>Curve) OFF/Block/Not directional IPD> Element • IPD> Curve type (IPD>Curve) OFF/Block/Not directional IPD> Element • IPD> Curve type (IPD>Curve) OFF/Block/Not directional IPD> ELEMENT OFF/Block/Not directional IPD> OFF/Block/Not directional IPD ELEMENT OFF/Block/Not directional IPD ELEMENT OFF/Block/Not directional IPD> OFF/Block/Not directional IPD> OFF/Block/Not directional IPD OFF/Block/PopSoff IPD OFF/Block/PopSoff IPD OFF/Block/PopSoff IPD OFF/Block/PopSoff IPD OFF/Block/PopSoff IPD OFF/	Residual current pickup value Residual voltage pickup value Characteristic angle Half operating sector $(E_D)_{\text{def}}$ within CLP $(I_{\text{EDCLP}})_{\text{def}}$ 0.00210.00 $(E_D)_{\text{def}}$ within CLP $(I_{\text{EDCLP}})_{\text{def}}$ 0.00210.00 $(E_D)_{\text{def}}$ 0.00210.00 $(E_D)_{\text{def}}$ 0.00520 $(E_D)_{\text{def}}$ 0.0022.00 $(E_D)_{\text{inv}}$ 0.0022.00 $(E_D)_{\text{inv}}$ 0.0022.00 $(E_D)_{\text{inv}}$ 0.0040.500 $(E_D)_{\text{inv}}$ 0.0022.00 (E_D)
• 67 Operating mode from 74VT external (74VText67) OFF/Block/Not directional PD> Element • IPD> Curve type (IPD>Curve) DEFINITE IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, IPt or EM • IPD>def characteristic angle (ThetapD>inv) • IPD>inv Operating time (IPD>ClP>) • IPD>inv Operating time (IPD>RES) • IPD>Element • IPD>def Urbershold inverse time (IPD>Nes) • IPD>Nest time delay (IPD>RES) • IPD>Nest threshold inverse time (IPD>inv) • IPD>Nest threshold inverse time (IPD>Nest inverse time (IPD>Ne	Residual voltage pickup value $0.0040.500\ U$ Characteristic angle 03 Half operating sector $0.00210.00$ U
• 67 Operating mode from 74VT external (74VText67) OFF/Block/Not directional Ipp> Element • Ipp> Curve type (Ipp>Curve) DEFINITE IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I*t or EM • Ipp> Reset time delay (Ipp>RES) • Ipp> Reset time delay (Ipp>RES) • Ipp> Activation time (Ipp> Ipp) • Ipp> Ipp> Ipp> Inverse time • 67 First threshold inverse time (Ipp> Ipp> Ipp> Ipp> Ipp> Ipp> Ipp> Ipp	Characteristic angle 03 Half operating sector 11 $I_{\text{ED} > \text{def}}$ within CLP ($I_{\text{EDCLP} > \text{def}}$) 0.00210.00 $I_{\text{ED} > \text{def}}$ Operating time ($I_{\text{ED} > \text{def}}$) 0.00520 $I_{\text{Verse time}}$ N First threshold inverse time ($I_{\text{ED} > \text{inv}}$ - $I_{\text{ED} > \text{inv}}$) Residual current pickup value 0.0022.00 $I_{\text{EB} > \text{inv}}$ Ohracteristic angle 0.0040.500 $I_{\text{ED} < \text{inv}}$ Ohracteristic angle 03 Half operating sector 11 $I_{\text{ED} > \text{inv}}$ within CLP ($I_{\text{ED} < \text{LP} > \text{inv}}$) 0.0022.00 $I_{\text{ED} > \text{inv}}$ Operating time ($I_{\text{ED} > \text{inv}}$) 0.022.00 $I_{\text{ED} > \text{Element}}$ 0.0260 $I_{\text{ED} > \text{Element}}$ 0.0260 $I_{\text{ED} > \text{Element}}$ 0.002100 $I_{\text{ED} < \text{LP} > \text{Element}}$ 0.000100 $I_{\text{ED} < \text{LP} > \text{Element}}$ 0.000100 $I_{\text{ED} < \text{LP} > \text{Element}}$ 0.000100
	Half operating sector 11 $I_{\text{ED}>\text{def}}$ within CLP ($I_{\text{EDCLP}>\text{def}}$) 0.00210.00 $I_{\text{ED}>\text{def}}$ 0.00520 I_{CPS} def Operating time ($I_{\text{ED}}>\text{def}$) 0.00520 I_{CPS} derse time N First threshold inverse time ($I_{\text{ED}}>\text{inv}$ - $I_{\text{ED}}>\text{inv}$) Residual current pickup value 0.0022.00 I_{CD} Residual voltage pickup value 0.0040.500 I_{CD} Characteristic angle 03 Half operating sector 11 $I_{\text{ED}}>\text{inv}$ within CLP ($I_{\text{EDCLP}}>\text{inv}$) 0.0022.00 I_{CD} $I_{\text{ED}}>\text{inv}$ 0perating time ($I_{\text{ED}}>\text{inv}$) 0.0260 $I_{\text{ED}}>\text{Element}$ $I_{\text{ED}}>\text{Curve type}$ ($I_{\text{ED}}>>\text{Curve}$) DEFIN IEC/BS A, E ANSI/IEEE MI, VI $I_{\text{EDCLP}}>>$ Activation time ($I_{\text{EDCLP}}>>$) 0.00100 $I_{\text{ED}}>>\text{Reset time delay}$ ($I_{\text{ED}}>>\text{RES}$) 0.00100
	$I_{ED} > def$ within CLP ($I_{EDCLP} > def$) $0.00210.00$ $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.0520 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.0520 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.002200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.002200 $I_{ED} > def$ Operating sector 0.0040500 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.002200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.002200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.002200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.002200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.002200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200 $I_{ED} > def$ Operating time ($I_{ED} > def$) 0.00200
* /Pp> Curve type (/Pp>Curve) DEFINITE IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM Image:	$t_{\rm ED>def}$ Operating time ($t_{\rm ED>def}$) 0.0520 (verse time) N First threshold inverse time ($t_{\rm ED>inv}$ - $t_{\rm ED>inv}$) Residual current pickup value 0.0022.00 (Residual voltage pickup value 0.0040.500 (Characteristic angle 03) Half operating sector 11 ($t_{\rm ED>inv}$) 0.0022.00 ($t_{\rm ED>inv}$) 0.0260 ($t_{\rm ED>Element}$) 0.0260 ($t_{\rm ED>Curve}$) 0.0260 ($t_{\rm ED>Curve}$) 0.002100 ($t_{\rm EDCLP}$) 0.00100 ($t_{\rm EDCLP}$) 0.00100 ($t_{\rm ED>Reset}$) 0.00100 ($t_{\rm ED>Reset}$) 0.00100
IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM	Verse time N First threshold inverse time ($I_{ED}>_{inv}$ - $U_{ED}>_{inv}$) Residual current pickup value Residual voltage pickup value Characteristic angle Half operating sector $(E_D>_{inv}$ within CLP ($I_{ED}C_{LP}>_{inv}$) $(E_D>_{inv}$ 0.0022.00 $(E_D>$
IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM	N First threshold inverse time ($I_{ED}>_{inv}$ - $U_{ED}>_{inv}$) Residual current pickup value Residual voltage pickup value Characteristic angle Half operating sector $I_{ED}>_{inv}$ within CLP ($I_{EDCLP}>_{inv}$) $I_{ED}>_{inv}$ O.0022.00 $I_{ED}>_{inv}$ O.0022.00 $I_{ED}>_{inv}$ O.0022.00 $I_{ED}>_{inv}$ O.0022.00 $I_{ED}>_{inv}$ O.00260 $I_{ED}>_{inv}$ O.00260 $I_{ED}>_{inv}$ O.00260 $I_{ED}>_{inv}$ O.002100 $I_{ED}>_{inv}$ O.00100 $I_{ED}>_{inv}>_{inv}$ O.00100 $I_{ED}>_{inv}>_$
ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM • $I_{PDCLP} >$ Activation time ($I_{PDCLP} >$) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES) • $I_{PD} >$ Reset time delay ($I_{PD} >$ RES)	Residual current pickup value Residual voltage pickup value Characteristic angle Half operating sector $(E_D > i_{DV})$ within CLP $(I_{EDCLP} > i_{DV})$ $(E_D > i_{DV})$ 0.0022.00 $(E_D > i_{DV})$ 0.00100 $(E_D > i_{DV})$ 0.002100 $(E_D > i_{DV})$ 0.002100
RECTIFIER, I²t or EM **IpDCLP> Activation time ($t_{PDCLP>}$) 0.00100.0 s **IpD> Reset time delay ($t_{PD>RES}$) 0.00100.0 s **Definite time** **67 First threshold definite time ($I_{PD}>_{def}$) 0.10040.0 I_{n} **IpD>def characteristic angle ($Theta_{PD>def}$) 0.10040.0 I_{n} **IpD>def within CLP ($I_{PDCLP>def}$) 0.10040.0 I_{n} **IpD>def Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD>inv characteristic angle ($Theta_{PD>inv}$) 0.10010.0 I_{n} **IpD>inv operating time ($t_{PD}>_{inv}$) 0.10010.0 I_{n} **IpD> Element** **IpD> Element** **IpD> Activation time ($t_{PDCLP>niv}$) 0.00100.0 s **IpD> Reset time delay ($t_{PD}>_{RES}$) 0.00100.0 s **IpD> Reset time delay ($t_{PD}>_{RES}$) 0.00100.0 s **IpD> Activation time ($t_{PDCLP>>def}$) 0.10040.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10040.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10040.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10040.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10040.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10040.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n} **IpD> Adef Operating time ($t_{PD}>_{def}$) 0.10010.0 I_{n}	Residual voltage pickup value $0.0040.500 \ U$ Characteristic angle 03 Half operating sector $(E_D)_{inv}$ within CLP ($(E_D)_{inv}$) $0.0022.00 \ U$ $(E_D)_{inv}$
• $I_{PDCLP}>$ Activation time ($I_{PDCLP}>$) • $I_{PD}>$ Reset time delay ($I_{PD}>$ Res) Definite time • 67 First threshold definite time ($I_{PD}>$ def) • $I_{PD}>$ def characteristic angle ($I_{PD}>$ def) • $I_{PD}>$ def within CLP ($I_{PDCLP}>$ def) • $I_{PD}>$ def within CLP ($I_{PDCLP}>$ def) • $I_{PD}>$ def Operating time ($I_{PD}>$ def) • $I_{PD}>$ def Operating time ($I_{PD}>$ def) • $I_{PD}>$ def Operating time ($I_{PD}>$ def) • $I_{PD}>$ der Operating time ($I_{PD}>$ def) • $I_{PD}>$ def Operating time ($I_{PD}>$ def) • $I_{PD}>$ der Within CLP ($I_{PD}>$ def) • $I_{PD}>$ der Operating time ($I_{PD}>$ der Operating	Characteristic angle 03 Half operating sector 11 $(E_D) = I_{ED} = I$
• /PD> Reset time delay (fPD>RES) Definite time • 67 First threshold definite time (/PD>def) • /PD>def characteristic angle (ThetaPD>def) • /PD>def within CLP (/PDCLP>def) • /PD>inverse time • 67 First threshold inverse time (/PD>inv) • /PD>inv characteristic angle (ThetaPD>inv) • /PD>inv Operating time (fPD>inv) • /PD>inv Operating time (fPD>inv) • /PD>Neset time delay (fPD>Nese) • /PD>Neset time (fPDCLP>Nese) • /PD>Neset time (fPDCLP>Neset) • /PD>Neset time delay (fPD>Neset) • /PD>Nes	Half operating sector 11 $(E_D)_{inv}$ within CLP $(I_{EDCLP})_{inv}$ 0.0022.00 $(E_D)_{inv}$ 0.0260 $(E_D)_{inv}$ 0.0260 $(E_D)_{inv}$ 0.0260 $(E_D)_{inv}$ 0.0260 $(E_D)_{inv}$ 0.0260 $(E_D)_{inv}$ 0.00260 $(E_D)_{inv}$ 0.00260 $(E_D)_{inv}$ 0.00260 $(E_D)_{inv}$ 0.00260 $(E_D)_{inv}$ 0.00100 $(E_D)_{inv}$ 0.00100 $(E_D)_{inv}$ 0.00100
Definite time • 67 First threshold definite time ($I_{PD}>_{def}$) • $I_{PD}>_{def}$ characteristic angle ($Theta_{PD}>_{def}$) • $I_{PD}>_{def}$ within CLP ($I_{PDCLP}>_{def}$) • $I_{PD}>_{def}$ Within CLP ($I_{PDCLP}>_{def}$) • $I_{PD}>_{def}$ Operating time ($I_{PD}>_{lot}$) • $I_{PD}>_{lot}$ within CLP ($I_{PDCLP}>_{lot}$) • $I_{PD}>_{lot}$ within C	$I_{ED>inv}$ within CLP ($I_{EDCLP>inv}$) 0.0022.00 $I_{ED>inv}$ 0.0022.00 0.0260 0.0022.00 0.0022.00 0.00260 0.002000 0.0020002000 0.002000 0.002000 0.002000 0.002000 0.002000 0.002000 0.00200
• 67 First threshold definite time ($I_{PD}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ characteristic angle ($Theta_{PD}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PDCLP}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ characteristic angle ($Theta_{PD}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ within CLP ($I_{PDCLP}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ within CLP ($I_{PDCLP}>_{inv}$) 0.00260.0 s • $I_{PD}>_{inv}$ Element • $I_{PD}>_{inv}$ DEFINITE • $I_{PD}>_{inv}$ DEFINITE • $I_{PD}>_{inv}$ DEFINITE • $I_{PD}>_{inv}$ DEFINITE • $I_{PD}>_{inv}$ PRESE time delay ($I_{PD}>_{RES}$) 0.00100.0 s • $I_{PD}>_{inv}$ Activation time ($I_{PD}>_{inv}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ characteristic angle ($I_{PD}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PD}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PD}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PD}>_{def}$) 0.10010.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PD}>_{def}$) 0.10010.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PD}>_{def}$) 0.10010.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PD}>_{def}$) 0.10010.0 I_{n} • $I_{PD}>_{def}$ within CLP ($I_{PD}>_{def}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ within CLP ($I_{PD}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ within CLP ($I_{PD}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ within CLP ($I_{PD}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ within CLP ($I_{PD}>_{inv}$) 0.00100.0 s • $I_{PD}>_{inv}$ within CLP ($I_{PD}>_{inv}$) 0.00100.0 s • $I_{PD}>_{inv}$ within CLP ($I_{PD}>_{inv}$) 0.00100.0 s • $I_{PD}>_{inv}$ within CLP ($I_{PD}>_{inv}$) 0.00100.0 s • $I_{PD}>_{inv}$ operating time ($I_{PD}>_{inv}$) 0.00100.0 s • $I_{PD}>_{inv}$ operating time ($I_{PD}>_{inv}$) 0.00100.0 s • $I_{PD}>_{inv}$ operating time ($I_{PD}>$	$I_{ED>inv}$ within CLP ($I_{EDCLP>inv}$) 0.0022.00 $I_{ED>inv}$ 0.0022.00 0.0260 0.0022.00 0.0022.00 0.00260 0.002000 0.0020002000 0.002000 0.002000 0.002000 0.002000 0.002000 0.002000 0.00200
Pp>def characteristic angle (Thetapp>def)	$I_{ED>inv}$ Operating time ($I_{ED>inv}$) 0.0260 $I_{D>>}$ Element $I_{ED}>$ Curve type ($I_{ED}>>$ Curve) DEFIN IEC/BS A, E ANSI/IEEE MI, VI $I_{EDCLP}>>$ Activation time ($I_{EDCLP}>>$) 0.00100 $I_{ED}>>$ Reset time delay ($I_{ED}>>$ Res) 0.00100
IpD>def Within CLP (IpDCLP>def)	$t_{ED}>$ Curve type ($t_{ED}>$ Curve) DEFIN IEC/BS A, E ANSI/IEEE MI, VI $t_{EDCLP}>>$ Activation time ($t_{EDCLP}>>$ 0.00100 $t_{ED}>>$ Reset time delay ($t_{ED}>>$ 0.00100
IpD>def Operating time (IpD>def) 0.05200 s Inverse time	$f_{ED}>$ Curve type ($f_{ED}>>$ Curve) DEFIN IEC/BS A, E ANSI/IEEE MI, VI $f_{EDCLP}>>$ Activation time ($f_{EDCLP}>>$) $f_{ED}>>$ Reset time delay ($f_{ED}>>$ RES) DEFIN 0.00100 0.00100
Inverse time 67 First threshold inverse time ($I_{PD}>_{inv}$) 0.10010.0 I_{n} $I_{PD}>_{inv}$ characteristic angle ($Theta_{PD>inv}$) 0359° $I_{PD}>_{inv}$ within CLP ($I_{PDCLP>inv}$) 0.10010.0 I_{n} 0259° $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) 0.10010.0 I_{n} 0.0260.0 s $I_{PD}>>$ Element 0.0260.0 s $I_{PD}>>$ Element 0.00100.0 s $I_{PD}>>$ Element 0.00100.0 s $I_{PD}>>$ Activation time ($I_{PD}>_{PD}>>$ 0.00100.0 s $I_{PD}>>$ Reset time delay ($I_{PD}>>_{RES}$) 0.00100.0 s $I_{PD}>>$ Reset time delay ($I_{PD}>>_{RES}$) 0.10040.0 I_{n} $I_{PD}>_{def}$ characteristic angle ($I_{PD}>_{def}$) 0.10040.0 I_{n} $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) 0.10040.0 I_{n} $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) 0.10010.0 I_{n} $I_{PD}>_{inv}$ characteristic angle ($I_{PD}>_{inv}$) 0.10010.0 I_{n} $I_{PD}>_{inv}$ operating time ($I_{PD}>_{inv}$) 0.10010.0 I_{n} $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) 0.10010.0 I_{n} $I_{PD}>>_{inv}$ Operating time ($I_{PD}>_{inv}$) 0.00100.0 s $I_{PD}>>_{inv}$ 0.100100.0 s 0.00100.0 s	IEC/BS A, E ANSI/IEEE MI, VI $t_{\rm EDCLP}>>$ Activation time ($t_{\rm EDCLP}>>$) $t_{\rm ED}>>$ Reset time delay ($t_{\rm ED}>>$ Res
• 67 First threshold inverse time $(I_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ characteristic angle $(Theta_{PD}>_{inv})$ 0359° • $I_{PD}>_{inv}$ within CLP $(I_{PDCLP}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.0260.0 s • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.0260.0 s • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.0260.0 s • $I_{PD}>_{inv}$ Curve type $(I_{PD}>>_{inv})$ 0.00100.0 s • $I_{PD}>_{inv}$ Activation time $(t_{PDCLP}>>)$ 0.00100.0 s • $I_{PD}>_{inv}$ Activation time $(t_{PD}>_{inv})$ 0.10040.0 I_n • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.10040.0 I_n • $I_{PD}>_{inv}$ Characteristic angle $(Theta_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ characteristic angle $(Theta_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ characteristic angle $(Theta_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ operating time $(t_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ operating time $(t_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.00100.0 s • $I_{PD}>>>$ Reset time delay $(t_{PD}>>_{inv})$ 0.10040.0 I_n • $I_{PD}>>$ Reset time delay $(t_{PD}>>_{inv})$ 0.10040.0 I_n • $I_{PD}>>$ Reset time delay $(t_{PD}>>_{$	ANSI/IEEE MI, VI $t_{\rm EDCLP}>>$ Activation time ($t_{\rm EDCLP}>>$) 0.00100 $t_{\rm ED}>>$ Reset time delay ($t_{\rm ED}>>$ RES) 0.00100
• $I_{PD>inv}$ characteristic angle $(Theta_{PD>inv})$ 0359° • $I_{PD>inv}$ within CLP $(I_{PDCLP>inv})$ 0.10010.0 I_n • $I_{PD>inv}$ Operating time $(t_{PD>inv})$ 0.0260.0 s • $I_{PD>inv}$ Operating time $(t_{PD>inv})$ 0.0260.0 s • $I_{PD>Element}$ 0.0260.0 s • $I_{PD>Element}$ 0.00100.0 s • $I_{PD>Element}$ 1.00100.0 s • $I_{PD>CLP>>}$ Activation time $(t_{PDCLP>>})$ 0.00100.0 s • $I_{PD>P>$ Reset time delay $(t_{PD}>_{RES})$ 0.00100.0 s • $I_{PD>>}$ Reset time delay $(t_{PD}>_{RES})$ 0.0010040.0 I_n • $I_{PD>>_{def}}$ characteristic angle $(Theta_{PD>>_{def}})$ 0.10040.0 I_n • $I_{PD>>_{def}}$ 0.10010.0 I_n • $I_{PD>>_{inv}}$ characteristic angle $(Theta_{PD>>_{inv}})$ 0.10010.0 I_n • $I_{PD>>_{inv}}$ characteristic angle $(Theta_{PD>>_{inv}})$ 0.10010.0 I_n • $I_{PD>>_{inv}}$ 0perating time $(t_{PD>>_{inv}})$ 0.10010.0 s • $I_{PD>>>_{inv}}$ 0perating time $(t_{PD>>_{inv}})$ 0.00100.0 s	f_{EDCLP} Activation time (f_{EDCLP}) 0.00100 f_{ED} Reset time delay (f_{ED} Reset time delay (f_{ED} 0.00100
• $I_{PD}>_{inv}$ within CLP ($I_{PDCLP>inv}$) • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ Within CLP ($I_{PDCLP}>_{inv}$) • $I_{PD}>_{inv}$ Ono100.0 s • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ Ono100.0 s • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ Ono100.0 s • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ Ono100.0 s • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ Ono100.0 s	t_{EDCLP} Activation time (t_{EDCLP}) 0.00100 t_{ED} Reset time delay (t_{ED} Reset time delay (t_{ED}
• $I_{PD>inv}$ within CLP ($I_{PDCLP>inv}$) • $I_{PD>inv}$ Operating time ($I_{PD>inv}$) • $I_{PD>inv}$ Operating time ($I_{PD>inv}$) • $I_{PD>}$ Element • $I_{PD}>$ Curve type ($I_{PD}>$ Curve)	$t_{ED}>> Reset time delay (t_{ED}>> Reset time delay (t_{ED}> Reset $
• $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.0260.0 s $I_{PD}>>$ Element • $I_{PD}>$ Curve type $(I_{PD}>>$ Curve) DEFINITE IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I_{1}^{2} to rEM • $I_{PD}>_{DE}$ Reset time delay $(t_{PD}>_{DE})$ 0.00100.0 s • $I_{PD}>_{DE}$ Reset time delay $(t_{PD}>_{RE})$ 0.00100.0 s Definite time • 67 Second threshold definite time $(I_{PD}>_{def})$ 0.10040.0 I_{DE} • $I_{PD}>_{def}$ characteristic angle $(Theta_{PD}>_{def})$ 0.10040.0 I_{DE} • $I_{PD}>_{def}$ Operating time $(t_{PD}>_{def})$ 0.10040.0 I_{DE} • $I_{PD}>_{def}$ Operating time $(t_{PD}>_{def})$ 0.10010.0 I_{DE} • $I_{PD}>_{inv}$ characteristic angle $(Theta_{PD}>_{inv})$ 0.10010.0 I_{DE} • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.10010.0 I_{DE} • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.00100.0 s $I_{PD}>>>$ Element • $I_{PD}>_{DE}$ Reset time delay $I_{PD}>_{DE}$ 0.00100.0 s $I_{PD}>>>$ Reset time delay $I_{PD}>_{DE}$ 0.00100.0 s $I_{PD}>>>$ Reset time delay $I_{PD}>_{DE}$ 0.10040.0 I_{DE} • $I_{PD}>>>$ Reset time delay $I_{PD}>_{DE}$ 0.10040.0 I_{DE} • $I_{PD}>>>$ Reset time delay $I_{PD}>_{DE}$ 0.10040.0 I_{DE} • $I_{PD}>>>$ Reset time delay $I_{PD}>>$ 0.10040.0 I_{DE}	
$ P_{\text{PD}}\rangle Element$ • $ P_{\text{PD}}\rangle Curve \text{ type } (P_{\text{PD}}\rangle\rangle Curve)$ DEFINITE $ EC/BS \text{ A, B, C}\rangle$ ANSI/IEEE MI, VI, EI RECTIFIER, $ P_{\text{T}}\rangle Curve$ • $ P_{\text{DDCLP}}\rangle Curve$ • $ P_{DD$	
• I_{PD} > Curve type (I_{PD} >>Curve) IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM I_{PDCLP}>> Activation time ($I_{PDCLP}>>$) 0.00100.0 s I_{PD}>> Reset time delay ($I_{PD}>_{RES}$) 0.00100.0 s I_{PD}>> Reset time delay ($I_{PD}>_{RES}$) 0.10040.0 $I_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I$	efinite time
IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM IEC/BS A, B, C IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM IEC/BS A, B, C IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM IEC/BS A, B, C IEC/BS A, B, C ANSI/IEEE MI, VI, EI RECTIFIER, I²t or EM IEC/BS A, B, C ANSI/IEEE MI, VI, EI IEC/BS A, B, C IEC	N Second threshold definite time ($I_{ED}>>_{def}$ - $U_{ED}>>_{def}$)
ANSI/IEEE MI, VI, EI RECTIFIER, I^2t or EM • $I_{PDCLP}>>$ Activation time ($I_{PDCLP}>>$) • $I_{PD}>>$ Reset time delay ($I_{PD}>>$ Reset time ($I_{PD}>>$ Reset time delay ($I_{PD}>>$ Reset time delay ($I_{PD}>>$ Reset time ($I_{PD}>>$ Reset time ($I_{PD}>>$ Reset time delay ($I_{PD}>>$ Reset time ($I_{PD}>>$ Reset time delay ($I_{PD}>>$ Reset time delay ($I_{PD}>>$ Reset time ($I_$	Residual current pickup value 0.00210.00
**RECTIFIER, l^2t or EM **IPDCLP>> Activation time ($t_{PDCLP>>}$) 0.00100.0 s **IpD>> Reset time delay ($t_{PD}>_{RES}$) 0.00100.0 s **Definite time **67 Second threshold definite time ($l_{PD}>_{def}$) 0.10040.0 l_n **IPD>>def characteristic angle ($T_{PD}>_{def}$) 0.10040.0 l_n **IPD>>def within CLP ($l_{PDCLP}>_{def}$) 0.10040.0 l_n **IPD>>def Operating time ($t_{PD}>_{def}$) 0.04200 s **Inverse time **67 Second threshold inverse time ($l_{PD}>_{inv}$) 0.10010.0 l_n **IPD>>inv characteristic angle ($T_{PD}>_{inv}$) 0.10010.0 l_n **IPD>>inv within CLP ($l_{PDCLP}>_{inv}$) 0.10010.0 l_n **IPD>>> Element **IPDCLP>> Activation time ($t_{PD}>_{inv}$) 0.00100.0 s **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.00100.0 s **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.00100.0 s **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 l_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n **IPD>>> Reset time delay ($t_{PD}>_{NES}$) 0.10040.0 t_n	Residual voltage pickup value 0.0040.500 <i>U</i>
• $I_{PDCLP}>>$ Activation time ($I_{PDCLP}>>$) 0.00100.0 s • $I_{PD}>>$ Reset time delay ($I_{PD}>_{RES}$) 0.00100.0 s • $I_{PD}>>$ Reset time delay ($I_{PD}>_{RES}$) 0.00100.0 s • $I_{PD}>>$ def characteristic angle ($I_{PD}>_{def}$) 0.10040.0 $I_{I_{PD}}>_{def}$ 0.10010.0 $I_{I_{PD}}>_{def}$ 0.10010.0 $I_{I_{PD}}>_{def}$ 0.10010.0 $I_{I_{PD}}>_{def}$ 0.10010.0 $I_{I_{PD}}>_{def}$ 0.10010.0 $I_{I_{PD}}>_{def}>_{def}$ 0.10010.0 $I_{I_{PD}}>_{def}>_$	Characteristic angle 03
* /PDCLP>> Activation time (PDCLP>>) * /PD>> Reset time delay ($t_{PD}>_{RES}$) * Definite time * 67 Second threshold definite time ($I_{PD}>_{def}$) * /PD>>def characteristic angle ($T_{PD}>_{def}$) * /PD>>def characteristic angle ($T_{PD}>_{def}$) * /PD>>def Operating time ($T_{PD}>_{def}$) * /PD>>def Operating time ($T_{PD}>_{def}$) * /PD>>inv characteristic angle ($T_{PD}>_{inv}$) * /PD>>inv characteristic angle ($T_{PD}>_{inv}$) * /PD>>inv within CLP ($T_{PDCLP}>_{inv}$) * /PD>>inv within CLP ($T_{PDCLP}>_{inv}$) * /PD>>> Element * /PDCLP>> Activation time ($T_{PD}>_{inv}$) * /PD>>> Reset time delay ($T_{PD}>_{inv}$) * /PD>>> Reset time ($T_{PD}>_{inv}$) * /PD>>> Reset time delay ($T_{PD}>_{inv}$) * /PD>>> Reset time delay ($T_{PD}>_{inv}$) * /PD>>> Reset time delay ($T_{PD}>_{inv}$) * /PD>>> Reset time ($T_{PD}>_{inv}$)	
Definite time • 67 Second threshold definite time $(I_{PD})_{def}$ 0.10040.0 I_n • $I_{PD}>_{def}$ characteristic angle $(Theta_{PD})_{def}$ 0.10040.0 I_n • $I_{PD}>_{def}$ within CLP $(I_{PDCLP}>_{def})$ 0.10040.0 I_n • $I_{PD}>_{def}$ 0.10040.0 I_n • $I_{PD}>_{def}$ 0.04200 s Inverse time • 67 Second threshold inverse time $(I_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ characteristic angle $(Theta_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ within CLP $(I_{PDCLP}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ 0.0260.0 s I $I_{PD}>>> Element$ • $I_{PDCLP}>>>$ Activation time $(I_{PD}>_{inv})$ 0.00100.0 s • $I_{PD}>>>$ Reset time delay $(I_{PD}>_{PD}>_{inv})$ 0.00100.0 s • $I_{PD}>>>$ Reset time delay $(I_{PD}>_{PD}>_{inv})$ 0.10040.0 I_n • $I_{PD}>>>$ Reset time delay $(I_{PD}>_{PD}>_{inv})$ 0.10040.0 I_n • $I_{PD}>>>$ Reset time delay $(I_{PD}>_{PD}>_{inv})$ 0.10040.0 I_n • $I_{PD}>>>$ Reset time delay $(I_{PD}>_{PD}>_{PD}>_{inv})$ 0.10040.0 I_n • $I_{PD}>>>$ Reset time delay $(I_{PD}>_{PD}>_{PD}>_{inv})$ 0.10040.0 I_n • $I_{PD}>>>$ Reset time delay $(I_{PD}>_{PD}>_{PD}>_{PD}>_{Inv}>_$	
• 67 Second threshold definite time $(I_{PD})_{def}$ 0.10040.0 I_{n} 67 $I_{PD})_{def}$ characteristic angle $(T_{PD})_{def}$ 0.10040.0 I_{n} 0359° 67 $I_{PD})_{def}$ within CLP $(I_{PDCLP})_{def}$ 0.10040.0 I_{n} 0.10040.0 I_{n} 0.10040.0 I_{n} 0.10040.0 I_{n} 0.10040.0 I_{n} 0.10040.0 I_{n} 0.10010.0 I_{n} 0.10010.0 I_{n} 0.10010.0 I_{n} 0.10010.0 I_{n} 0.10010.0 I_{n} 0.000100.0 I_{n} 0.10010.0 I_{n} 0.10010.0 I_{n} 0.000100.0 I_{n} 0.10010.0 I_{n} 0.10010.0 I_{n} 0.000100.0 I_{n} 0.100100.0 I_{n} 0.100100100.	$\langle ED \rangle_{def}$ within CLP ($\langle EDCLP \rangle_{def}$) 0.00210.00
• $l_{PD}>_{def}$ characteristic angle ($Theta_{PD}>_{def}$) • $l_{PD}>_{def}$ characteristic angle ($Theta_{PD}>_{def}$) • $l_{PD}>_{def}$ within CLP ($l_{PDCLP}>_{def}$) • $l_{PD}>_{def}$ Quantum time ($t_{PD}>_{def}$) • $l_{PD}>_{def}$ Qperating time ($t_{PD}>_{def}$) • $l_{PD}>_{def}$ Qperating time ($t_{PD}>_{def}$) • $l_{PD}>_{def}$ Quantum time ($l_{PD}>_{def}$) • $l_{PD}>_{inv}$ characteristic angle ($l_{PD}>_{inv}$) • $l_{PD}>_{inv}$ Qperating time ($l_{PD}>_{inv}$) • $l_{PD}>_{inv}$ Qperating time ($l_{PD}>_{inv}$) • $l_{PD}>>_{inv}$ Qperating time ($l_{PD}>_{inv}$) • $l_{PD}>>>$ Element • $l_{PDCLP}>>>$ Activation time ($l_{PD}>_{log$	$t_{\rm ED}>>_{\rm def}$ Operating time ($t_{\rm ED}>>_{\rm def}$) 0.0510.0
• $I_{PD}>_{def}$ characteristic angle ($T_{PD}>_{def}$) 0359° • $I_{PD}>_{def}$ within CLP ($I_{PDCLP}>_{def}$) 0.10040.0 I_{n} • $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) 0.04200 s **Inverse time* • 67 Second threshold inverse time ($I_{PD}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ characteristic angle ($T_{PDCLP}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ within CLP ($I_{PDCLP}>_{inv}$) 0.10010.0 I_{n} • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) 0.0260.0 s **I_{PD}>>> Element* • $I_{PDCLP}>>>$ 0.00100.0 s • $I_{PD}>>>$ Reset time delay ($I_{PD}>>>_{RES}$) 0.00100.0 s **Definite time* • 67 Third threshold definite time ($I_{PD}>>>_{def}$) 0.10040.0 I_{n} • $I_{PD}>>>_{def}$ Characteristic angle ($I_{PD}>>>_{def}$) 0.10040.0 I_{n}	verse time
• $I_{PD}>_{def}$ within CLP ($I_{PDCLP}>_{def}$) • $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) • $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) • $I_{PD}>_{def}$ Operating time ($I_{PD}>_{def}$) • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ characteristic angle ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ within CLP ($I_{PDCLP}>_{inv}$) • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>>_{inv}$ Operating time ($I_{PD}>>_{inv}$) • $I_{PD}>>_{inv}$ Operating time ($I_{PD}>>_{inv}$) • $I_{PD}>>_{inv}$ Operating time ($I_{PD}>>_{inv}$) • $I_{PD}>>_{inv}$	N Second threshold inverse time ($I_{ED}>>_{inv}$ - $U_{ED}>>_{inv}$)
• $I_{PD}>_{def}$ Operating time $(t_{PD}>_{def})$ 0.04200 s • $I_{INVerse \ time}$ • 67 Second threshold inverse time $(I_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ characteristic angle $(T_{IPD}>_{inv})$ 0359° • $I_{PD}>_{inv}$ within CLP $(I_{PDCLP}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.0260.0 s • $I_{PD}>>> Element$ • $I_{PDCLP}>>> Activation time (t_{PDCLP}>>) 0.00100.0 s • I_{PD}>>> Reset time \ delay \ (t_{PD}>>>_{RES}) 0.00100.0 s • I_{PD}>>> Reset time \ delay \ (t_{PD}>>>_{def}) 0.10040.0 I_n • I_{PD}>>>_{def} \ characteristic angle \ (Theta_{PD}>>>_{def}) 0.10040.0 I_n$	Residual current pickup value 0.0022.00 /
Inverse time • 67 Second threshold inverse time $(I_{PD}>_{inv})$ • $I_{PD}>_{inv}$ characteristic angle $(Theta_{PD}>_{inv})$ • $I_{PD}>_{inv}$ within CLP $(I_{PDCLP}>_{inv})$ • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ • $I_{PD}>>> Element$ • $I_{PDCLP}>>>$ Activation time $(t_{PDCLP}>>)$ • $I_{PD}>>>$ Reset time delay $(t_{PD}>>_{RES})$ • $I_{PD}>>>$ Reset time • 67 Third threshold definite time $(I_{PD}>>>_{old})$ • $I_{PD}>>>_{old}$	Residual voltage pickup value 0.0040.500 <i>U</i>
• 67 Second threshold inverse time $(I_{PD}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ characteristic angle $(Theta_{PD}>_{inv})$ 0359° • $I_{PD}>_{inv}$ within CLP $(I_{PDCLP}>_{inv})$ 0.10010.0 I_n • $I_{PD}>_{inv}$ Operating time $(t_{PD}>_{inv})$ 0.0260.0 s $I_{ED}>_{inv}>_{in$	Characteristic angle 03
• I/PD>>inv characteristic angle ($Theta_{PD}>inv$) • I/PD>>inv within CLP ($I_{PDCLP}>inv$) • I/PD>>inv Operating time ($I_{PD}>inv$) • I/PD>>> Element • I/PDCLP>>> Activation time ($I_{PD}>inv$) • I/PD>>> Reset time delay ($I_{PD}>inv$) • I/PD>>> Reset time ($I_{PD}>inv$)	Half operating sector 11
• $I_{PD}>>_{inv}$ within CLP ($I_{PDCLP>>inv}$) • $I_{PD}>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>>_{inv}$ Operating time ($I_{PD}>_{inv}$) • $I_{PD}>>>$ Element • $I_{PDCLP}>>>$ Activation time ($I_{PDCLP}>>>$) • $I_{PD}>>>$ Reset time delay ($I_{PD}>>>_{RES}$) • $I_{PD}>>>$ Reset time delay ($I_{PD}>>>_{RES}$) • $I_{PD}>>>_{Inv}$ O.00100.0 s • $I_{PD}>>>_{Inv}$ O.00100.0 s • $I_{PD}>>>_{Inv}$ O.00100.0 s • $I_{PD}>>>_{Inv}$ O.10040.0 I_{ID}	$I_{\text{ED}>\text{inv}}$ within CLP ($I_{\text{EDCLP}>>\text{inv}}$) 0.0022.00
• $I_{PD}>>_{inv}$ Operating time $(I_{PD}>>_{inv})$ • $I_{PD}>>_{inv}$ Operating time $(I_{PD}>>_{inv})$ • $I_{PD}>>>$ Element • $I_{PDCLP}>>>$ Activation time $(I_{PDCLP}>>>)$ • $I_{PD}>>>$ Reset time delay $(I_{PD}>>>_{RES})$ • $I_{PD}>>>$ Reset time delay $(I_{PD}>>>_{RES})$ • $I_{PD}>>>_{Inv}$	$t_{\text{ED}>\text{inv}}$ Operating time ($t_{\text{ED}}>\text{inv}$) 0.0260
$I_{PD}>>> Element$ • $I_{PDCLP}>>> Activation time (t_{PDCLP}>>>)$ • $I_{PD}>>> Reset time delay (t_{PD}>>>_{RES})$ • $I_{PD}>>> Reset time (t_{PD}>>>_{RES})$ • $I_{PD}>>> Reset time (t_{PD}>>>_{RES})$ • $I_{PD}>>>_{RES}$	
• $I_{PDCLP}>>$ Activation time ($I_{PDCLP}>>$) 0.00100.0 s • $I_{PD}>>$ Reset time delay ($I_{PD}>>$ 0.00100.0 s • $I_{PD}>>$ 0.00100.0 s • $I_{PD}>>$ 0.00100.0 s • $I_{PD}>>$ 0.10040.0 $I_{PD}>>$ 0.10040.0 $I_{PD}>>$ 0.10040.0 $I_{PD}>>>$ 0.10040.0 $I_{PD}>>>>>$ 0.10040.0 $I_{PD}>>>>>>>>>>>>>>>>>>>$ 0.10040.0 $I_{PD}>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>$	>>> Element
• $I_{PD}>>>$ Reset time delay $(t_{PD}>>_{RES})$ 0.00100.0 s Definite time • 67 Third threshold definite time $(I_{PD}>>_{def})$ 0.10040.0 I_n • $I_{PD}>>_{def}$ 0.10040.0 I_n • $I_{PD}>>_{def}$ 0.359°	$\langle EDCLP \rangle >> Activation time (teDCLP \rangle >> 0.00100$
 I_{PD}>>> Reset time delay (t_{PD}>>>_{RES}) Definite time 67 Third threshold definite time (I_{PD}>>>_{def}) I_{DD}>>>_{def} characteristic angle (Thetapp>>>_{def}) I_{DD}>>>_{def} characteristic angle (Thetapp>>>_{def}) 	$\langle ED>>> Reset time delay (teD>>> Reset time delay (teD>> Reset time delay (teD>>> Reset time delay (teD>> Reset time delay (teD>>> Reset time delay (teD>> Reset time delay (teD>>$
Definite time • 67 Third threshold definite time (I _{PD} >>> _{def}) • I _{PD} >>> _{def} characteristic angle (Theta _{PD} >>> _{def}) • I _{PD} >>> _{def} Characteristic angle (Theta _{PD} >>> _{def}) • I _{PD} >>> _{def} Characteristic angle (Theta _{PD} >>> _{def})	efinite time
• 67 Third threshold definite time (I _{PD} >>> _{def}) 0.10040.0 I _n	N Third threshold definite time ($I_{ED}>>>_{def}$ - $U_{ED}>>>_{def}$)
• /pn>>>dot characteristic angle (Thetapn>>>dot) 0359° • 1	Residual current pickup value 0.00210.00 /
- 1PD>>>def characteristic angle (Thetapp>>>det)	Residual voltage pickup value 0.0040.500 <i>U</i>
• /PD>>>def within CLP (/PDCLP>>>def) 0.10040.0 /n	Characteristic angle 03
• 7PD>>>def Within CLI (7PDCLP>>>def) 0.10040.0 /n	Half operating sector 11
- 170///del Operating time (170///del)	$I_{ED}>>_{def}$ within CLP ($I_{EDCLP}>>>_{def}$) 0.00210.00 $I_{ED}>>>_{def}$
	$t_{\text{ED}} >> t_{\text{def}} = t_{\text{CED}} >> t_{\text{def}} = t_{\text{CED}} >> t_{\text{def}} = t_{\text{CED}} >> t_{\text{ED}} >> $
• /pncip>>>> Activation time (tpncip>>>> 0.00 100.0 s	
• /pn>>> Reset time delay (tpn>>>prs) 0.00 100.0 s	>>>> Element
Definite time	$\ell_{\text{EDCLP}} >>> \text{Activation time } (t_{\text{EDCLP}} >>>>) $ 0.00100
• 67 Fourth threshold definite time ($I_{PD}>>>_{def}$) 0.10040.0 I_{D}	$I_{ED}>>> $ Reset time delay ($t_{ED}>>>$ RES) 0.00100
• IPD>>>>def characteristic angle (ThetaPD>>>>def) 0359°	finite time
• $I_{PD}>>>_{def}$ within CLP ($I_{PDCLP}>>>_{def}$) 0.10040.0 I_{n}	N Fourth threshold definite time ($I_{ED}>>>_{def}$ - $U_{ED}>>>_{def}$)
	Residual current pickup value 0.00210.00
	Residual voltage pickup value 0.0040.500 <i>U</i>
- 1	Characteristic angle 03
Directional earth fault overcurrent - 0714 ···	Half operating sector 11
Common Comgulation.	/ED>>>>def within CLP (/EDCLP>>>>def) 0.00210.00 /
on operating mode (<i>modeonty</i>)	(ED) >>> def within GEF ($(ED) <=>>> def$) 0.00210.00 $(ED) >>>> def$) 0.0510.0
- nesidual voltage measurement type for only - direct calculated	the contraction of the contracti
(3VoType67N) UEC Note 1:	the computed residual voltage U_{EC} (vectorial sum of the phase v
• 67N Multiplier of threshold for insensitive zone (M) 1.510.0	res) and measured residual current l _{E1} are employed
• 67N Operating mode from 74VT internal (74VTint67N)	oo, and mododrod rooidadi odirontiel die employed
OFF/Block/Not directional	I d II I BICOVO
• 67N Operating mode from 74VT external (74VText67N)	elective block - BLOCK2
OFF/Block/Not directional	lective block IN:
I _{FD} > Element	BLIN Max activation time for phase protections (t_{B-IPh})
TED > LIGHTCHE	0.1010.0
• /ED> Curve type DEFINITE	5.1010.0
1E0/D3 A, D, C	BLIN Max activation time for ground protections (to 15)
ANSI/IEEE MI, VI, EI	BLIN Max activation time for ground protections ($t_{ extsf{B-IE}}$)
EM	BLIN Max activation time for ground protections ($t_{ m B-IE}$) 0.1010.0



Selective block OUT: • BLOUT Dropout time delay for phase protections (t _{F-IPh})		Phase: • Displacement angle of I_{L1} respect to U_{L1} Ph	niL1
0.001.00 s • BLOUT Drop-out time delay for ground protections ($t_{\rm F-IE}$)		• Displacement angle of I_{L2} respect to U_{L2}	niL2 niL3
• BLOUT Drop-out time delay for phase and ground protections $(t_{F-IPh/IE})$ 0.001.00 s		 Displacement angle of I_{L1} respect to U₂₃ Displacement angle of I_{L2} respect to U₃₁ Displacement angle of I_{L3} respect to U₁₂ Displacement angle of I_{L3} respect to U₁₂<	ha2 ha3
Internal selective block - BLOCK4 • Output internal selective block dropout time for phase protections (t _{F-IPh}) • Output internal selective block dropout time for ground protections (t _{F-IE}) • O.0010.00 s		 Displacement angle of U_{EC} respect to I_{E1} Phile Sequence: Positive sequence current Negative sequence current Negative sequence current/positive sequence current ratio I₂ Negative sequence voltage 	iEC I ₁ I ₂ 2/I ₁ U ₂
Breaker failure - BF BF Phase current threshold ($I_{\rm BF}$) 0.051.00 $I_{\rm n}$ BF Residual current threshold from $I_{\rm E1}$ input ($I_{\rm E1BF}$) 0.012.00 $I_{\rm E1n}$ BF Residual current threshold from $I_{\rm E2}$ input ($I_{\rm E2BF}$) 0.012.00 $I_{\rm E2n}$ BF Time delay ($I_{\rm BF}$) 0.0610.00 s		Power: • Total active power • Total reactive power • Total apparent power • Power factor cost	
Second Harmonic Restraint - 2ndh-REST Second harmonic restraint threshold ($I_{2ndh}>$) 1050 % $I_{2ndh}>$ Reset time delay ($I_{2ndh}>$ RES) 0.00100.0 s		 Phase active powers Phase reactive powers Power factors Power factors Power factors Possible 2nd harmonics Power factors Power factors Possible 2nd harmonics Power factors Po	Q_{L3}
VT supervision - 74VT 74VT Negative sequence overvoltage threshold ($U_{2VT>}$) 0.050.50 $E_{\rm n}$ 74VT Negative sequence overvoltage threshold ($I_{2VT>}$) 0.050.50 $I_{\rm n}$ 74VT Phase undervoltage threshold ($U_{\rm VT>}$) 0.050.50 $E_{\rm n}$ 74VT Minimum change of current threshold 74VT ($D_{\rm IVT<}$) 0.050.50 $I_{\rm n}$ 74VT Undercurrent inhibition threshold ($I_{\rm VT<}$) 0.10040.0 $I_{\rm n}$ 74VT Alarm time delay ($I_{\rm VT-AL}$) 0.010.0 s		 2nd harmonic: Second harmonic phase currents Maximum of the second harmonic phase currents/fundame tal component percentage ratio 3rd harmonic: Third harmonic phase currents Third harmonic I_{E1} residual current 	en- //L
CT supervision - 74CT74CT Threshold ($S < I$)0.100.9574CT Overcurrent threshold ($I * I$)0.101.00 $I I$ n $S < I$ 0 Operating time ($I \le I$)0.03200 s		 4th harmonic: Fourth harmonic phase currents I_{L1-4th}, I_{L2-4th}, I_{L3-5th}, I_{L2-5th}, I_{L3-5th}, I_{L2-5th}, I_{L3-5th} 	
Circuit Breaker supervisionNumber of CB trips $(N.Open)$ 010000Cumulative CB tripping currents $(Suml)$ 05000 I_n CB opening time for I^2t calculation (t_{break}) 0.051.00 sCumulative CB tripping I^2t $(Suml^22t)$ 05000 I_n^2 -sCB max allowed opening time $(t_{break}>)$ 0.051.00 s		Demand phase currents: • Phase fixed currents demand • Phase rolling currents demand • Phase peak currents demand • Phase minimum currents demand • Phase minimum currents demand Demand power: • Fixed active power demand IL1FIX, IL2FIX, IL3 IL1	ROL 1AX
Pilot wire diagnostic BLOUT1 Diagnostic pulses period (<i>PulseBLOUT1</i>) OFF - 0.1-1-5-10-60-120 s BLIN1 Diagnostic pulses control time interval (<i>PulseBLIN1</i>) OFF - 0.1-1-5-10-60-120 s		 Fixed reactive power demand Rolling active power demand Rolling reactive power demand Peak active power demand Peak reactive power demand Peak reactive power demand 	\mathcal{Q}_{FIX} P_{ROL} \mathcal{Q}_{ROL} P_{MAX} \mathcal{Q}_{MAX}
METERING			MIN
		 Negative active energy Total active energy Positive reactive energy Negative reactive energy 	E _A + E _A - E _Q + E _Q - E _O -
Calculated: • Thermal image • Fundamental RMS phase-to-phase voltages • Fundamental RMS calculated residual voltage U12, U23, U31	_	PT100: • Temperature PT1PT8 T ₁	_
• Fundamental RMS calculated residual voltage • Fundamental RMS calculated residual current • Maximum current between I_{L1} - I_{L2} - I_{L3} • Minimum current between I_{L1} - I_{L2} - I_{L3} • Average current between I_{L1} - I_{L2} - I_{L3} • Maximum voltage between I_{L1} - I_{L2} - I_{L3} • Average voltage between I_{L1} - I_{L2} - I_{L3} • Average voltage between I_{L1} - I_{L2} - I_{L3} • Maximum voltage between I_{L1} - I_{L2} - I_{L3} • Maximum voltage between I_{L1} - I_{L2} - I_{L3} • Average voltage between I_{L3} - I_{L3}		Event storage Sequence of Event Recorder (SER) Number of events Recording mode Trigger: Output relays switching Binary inputs switching Setting changes	.Kx



L1, L2, L3

Data recorded:

• Event counter (resettable by ThySetter) 0...109

Event cause binary input/output relay/setting changes
 Time stamp Date and time

Sequence of Fault Recorder (SFR)

Number of faults 20 Recording mode circular

Trigger:

External trigger (binary inputs)
 Element pickup (OFF-ON transition)
 Start/Trip

Data recorded:

Time stamp
 Fault cause
 Fault counter (resettable by ThySetter)

Date and time start, trip, binary input

 Fault counter (resettable by ThySetter)

• Fundamental RMS phase currents

| L1r, |L2r, |L3r

• Fundamental RMS residual currents I_{E1r} , I_{E2r} , I_{ECr} • Fundamental RMS phase voltages U_{L1r} , U_{L2r} , U_{L3r}

• Fundamental RMS phase-to-phase voltages U_{12r} , U_{23r} , U_{31r}

• Displacement angles (I_{L1}-U_{L1}, I_{L2}-U_{L2}, I_{L3}-U_{L3}) Phi_{L1r}, Phi_{L2r}, Phi_{L3r}

Displacement angles (I_{L1}-U₂₃, I_{L2}-U₃₁, I_{L3}-U_{L3}) Alpha_{1r}, Alpha_{2r}, Alpha_{3r}
 Displacement angle (U_{EC}-I_{E12}) Phi_{ECr}

Thermal image
 Binary inputs state
 Output relays state
 Theta-r
 IN1, IN2...INx
 Cutput relays state
 K1...K6...Kx

• Fault cause info (operating phase)

□ Digital Fault Recorder (Oscillography)

File format COMTRADE
Records depending on setting [1]
Recording mode circular

Sampling rate 24 samples per cycle

Trigger setup:

Pre-trigger time
 Post-trigger time
 Trigger from inputs
 Trigger from outputs
 Manual command
 Tous of the command
 TrySetter

Set sample channels:

Instantaneous currents
 Instantaneous voltages
 IL1, IL2, IL3, IE1, IE2
 IL1, IL2, IL3, IE1, IE2
 IL1, IL2, IL3

Set analog channels (Analog 1...12):

Frequency f
 Fundamental RMS phase currents /L1, /L2, /L3

• Fundamental RMS residual current I_{E1} , I_{E2} • Fundamental RMS phase voltages U_{L1} , U_{L2} , U_{L3}

• Fundamental RMS calculated residual current $I_{\rm EC}$ • Fundamental RMS computed residual voltage $U_{\rm EC}$

Fundamental RMS phase-to-phase voltages
 Displacement angles (L₁. U_{L1}, L₂. U_{L2}, L₃. U_{L3})
 Phi_{L1}, Phi_{L2}, Phi_{L3}

• Displacement angles (h₁-U₂₃, h₂-U₂₁, h₃-U₁₃) Alpha₁, Alpha₂, Alpha₃

Second harmonic phase currents I_{L1-2nd}, I_{L2-2nd}, I_{L3-2nd}
 Maximum of the second harmonic phase currents/fundamen-

tal component percentage ratio I_{-2nd}/I_{\perp} • Temperature T1...T8

Set digital channels (Digital 1...12):

Output relays state
 Binary inputs state
 K1...Kx
 IN1, INx

Note 1 - For instance, with following setting:

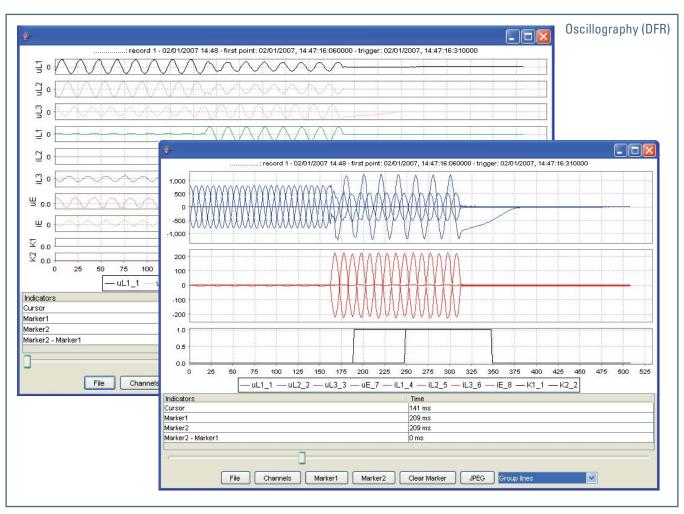
Pre-trigger time
Post-trigger time
0.25 s
0.25 s

• Sampled channels iL1, iL2, iL3, iE1, iE2, UL1, UL2, UL3

• Analog channels | IL1, IL2, IL3, IE1, IE2, UL1, UL2, UL3, UEC

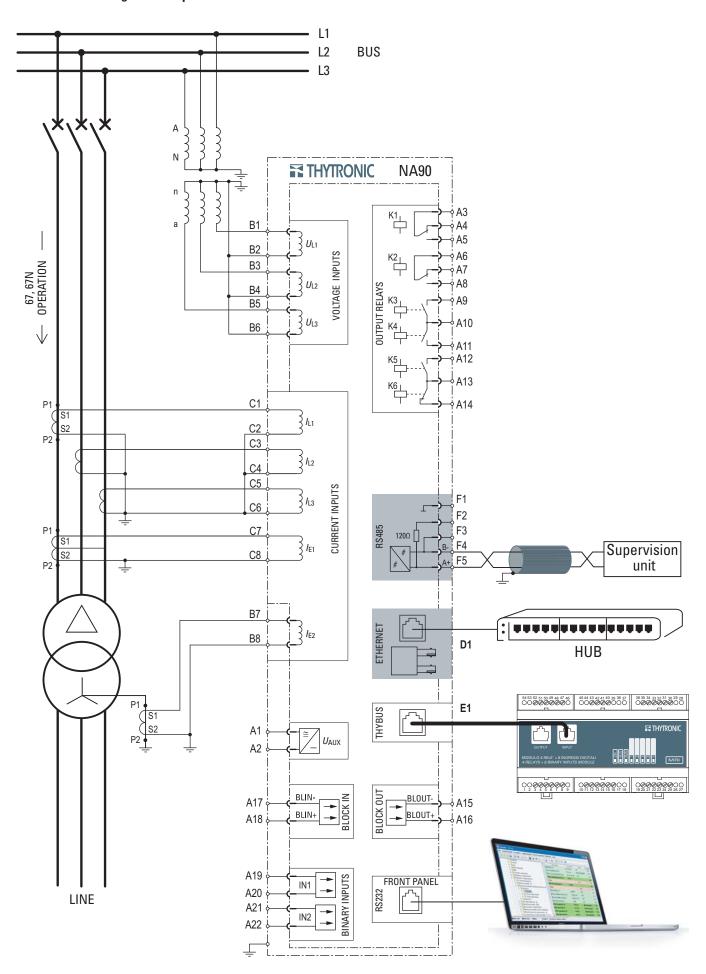
• Digital channels K1, K2, K3, K4, K5, K6, IN1, IN2

More than 270 records can be stored with f = 50 Hz





□ Connection diagram example





DIMENSIONS

FRONT VIEWS

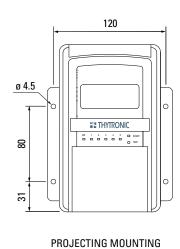
107

™ THYTRONIC

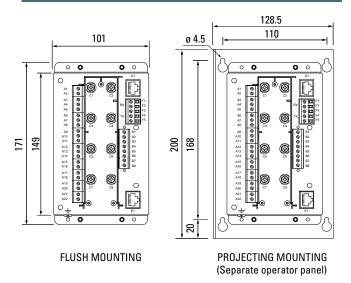
ON 1 2 1 4 5 GRAN

FLUSH MOUNTING

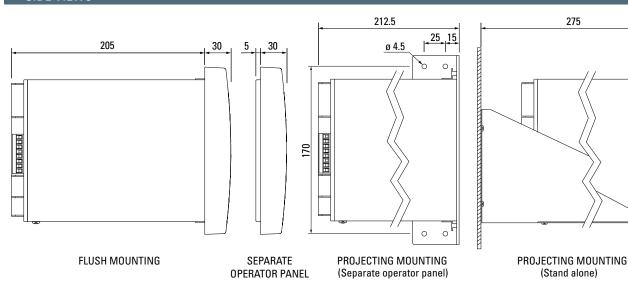
17



REAR VIEWS



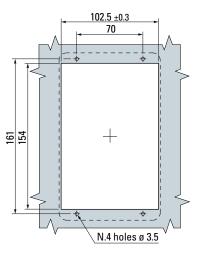
SIDE VIEWS



RACK MOUNTING

482.6 465 0 0 177 (4U) 101.6 THYTRONIC **™** THYTRONIC **™** THYTRONIC THYTRONIC ON 1 2 1 4 1 0 504 ON 1 2 1 4 5 0 STARS ON 1 2 1 4 5 0 5TMR 01 1 2 1 4 5 0 0 0

FLUSH MOUNTING CUTOUT







A PERSONALISED SERVICE OF THE PRODUCTION, A RAPID DELIVERY, A COMPETITIVE PRICE AND AN ATTENTIVE EVALUATION OF OUR CUSTOMERS NEEDS, HAVE ALL CONTRIBUTED IN MAKING US ONE OF THE BEST AND MOST RELIABLE PRODUCERS OF PROTECTIVE RELAYS. FORTY YEARS OF EXPERIENCE HAS MADE STANDARD THESE ADVANTAGES THAT ARE GREATLY APPRECIATED BY LARGE COMPANIES THAT DEAL ON THE INTERNATIONAL MARKET. A HIGHLY QUALIFIED AND MOTIVATED STAFF PERMITS US TO OFFER AN AVANT-GARDE PRODUCT AND SERVICE WHICH MEET ALL SAFETY AND CONTINUITY DEMANDS, VITAL IN THE GENERATION OF ELECTRIC POWER. OUR COMPANY PHILOSOPHY HAS HAD A POSITIVE REACTION FROM THE MARKET BY BACKING OUR COMMITMENT AND HENCE STIMULATING OUR GROWTH.